APPENDIX M

BASELINE HUMAN HEALTH RISK ASSESSMENT REPORT

FINAL

BASELINE HUMAN HEALTH RISK ASSESSMENT REPORT

for the

FOSTER WHEELER ENERGY CORPORATION/CHURCH ROAD TCE SITE
MOUNTAIN TOP, PENNSYLVANIA 18707

Pursuant to Section 9.1(d)(4) of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study, Docket No. CERC-03-2009-0061DC

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June 2017

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LIST OF ACRONYMS

Õg	micrograms
1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethene
1,1,1-TCA	1,1,1-Trichloroethane
1,1,2-TCA	1,1,2-Trichloroethane
1,1,2,2-TCA	1,1,2,2-tetrachloroethane
AA	Affected Area
ADAF	age-dependent adjustment factor
ARAR	applicable or relevant and appropriate requirement
ASD	active soil depressurization
ATSDR	Agency for Toxic Substances and Disease Registry
BASE	Basement Air
BTEX	benzene, toluene, ethylbenzene and xylene
bgs	below ground surface
BHHRA	baseline human health risk assessment
CA	chemical concentration in air
CalEPA	California Environmental Protection Agency
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeters
COCs	chemicals of concern
COPCs	Chemicals of Potential Concern
CS	chemical concentration in soil (i.e., the EPC in soil)
CSF	cancer slope factor
CSM	Conceptual Site Model
cPAHs	carcinogenic polycyclic aromatic hydrocarbons
DADs	Dermal Absorbed Doses
DGAR	Data Gap Analysis Report
DQO	Data Quality Objective
ECs	Exposure Concentrations
ELCR	excess lifetime cancer risk
EPC	exposure point concentration
EWA	Expended Waste Area
FFF	former FWEC Facility
FLUTe	Flexible Underground Technologies
FS	Feasibility Study
FSBA	Former Shot Blast Area
FWEC	Foster Wheeler Energy Corporation

GC	gas chromatography
GETS	Groundwater Extraction and Treatment System
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HQ	Hazard Quotient
HVAC	heating, ventilation and air conditioning
IA	Indoor Air
IAQ	Indoor Air Quality
IEUBK	Integrated Exposure-Uptake Biokinetic Model
IRIS	Integrated Risk Information System
kg	kilogram
L	liter
m	meter
MCL	Maximum Contaminant Limit
mg	milligram
MIP	Membrane Interface Probe
MK	Morrison-Knudsen Company
MK Rail	Morrison-Knudsen Rail Corporation
MRLs	Minimum Risk Levels
ND	non-detect
NHL	non-Hodgkin lymphoma
ORD	Office of Research and Development
OSWER	Office of Solid Waste and Emergency Response
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PADOH	Pennsylvania Department of Health
PAHs	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCUs	power control units
PDBS	passive diffusion bag samples
PEAs	potential exposure areas
PEF	particulate emission factor
PPE	personal protective equipment
PPRTVs	Provisional Peer Reviewed Toxicity Values
RAGS	Risk Assessment Guidance for Superfund
RBL	Risk-Based Screening Level
REL	Reference Exposure level
RfCs	reference concentrations
RfDs	reference doses
RI	Remedial Investigation

RME	reasonable maximum exposure
RSL	Regional Screening Level
SF	Slope Factor
SIPs	Surrounding Industrial Properties
Site	Foster Wheeler Energy Corporation/Church Road TCE Site
SS	external soil gas
SSG	sub-slab soil vapor
SVOC	semi-volatile organic compound
TCE	Trichloroethene
TCL	Target Compound List
TCR	Target Cancer Risk
TEF	toxicity equivalency factor
Tetra Tech, Inc.	Tetra Tech
TF	transfer factor
THQ	Target Hazard Quotient
UCL	Upper Confidence Limit
URs	unit risks
USEPA	U.S. Environmental Protection Agency
UTL	Upper Tolerance Limit
VDEQ	Virginia Department of Environmental Quality
VF	volatilization factor
VI	vapor intrusion
VISL	Vapor Intrusion Screening Level
VOCs	volatile organic compounds
WABCO	Westinghouse Air Brake Company
Wabtec	Westinghouse Air Brake Technologies
WWTS	wastewater treatment system

EXECUTIVE SUMMARY

Tetra Tech, Inc. (Tetra Tech) prepared this baseline human health risk assessment (BHHRA) to support the remedial investigation (RI) being performed at the Foster Wheeler Energy Corporation (FWEC)/Church Road Trichloroethene (TCE) Site (the Site). The BHHRA assessed the potential risks to human health for current and potential future individuals posed by exposure to various chemicals within environmental media at the Site and surrounding areas. The BHHRA was conducted in accordance with the current guidance and protocols for the preparation of risk assessments published by U.S. Environmental Protection Agency (USEPA) Headquarters and USEPA Region 3 as defined in the Work Plan pursuant to Section 9.1(b) of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study, Docket No. CERC-03-2009-0061DC (Tetra Tech, 2010).

The Site is located in Luzerne County, PA. The BHHRA defined and evaluated four potential exposure areas (PEAs) in order to more clearly delineate and assess the potential risks to human health from the presence of constituents of concern without regard to their source. Two of these PEAs are part of the Site:

- The former FWEC Facility encompasses approximately 105 acres and is located in the northeastern portion of the Site in the Crestwood Industrial Park in Mountain Top (Wright Township), approximately 5 to 6 miles south of Wilkes-Barre, PA; and
- The Church Road TCE Site, including the Affected Area, as defined in the *Administrative Settlement Agreement and Order by Consent for Removal Response Action for the FWEC/Church Road TCE Site, dated August 29, 2005, Docket No. CERC-03-2005-0349DC* (2005 Order). The Affected Area extends from east to west along Church Road and Watering Run, is approximately 295 acres in size, and is generally located south and southwest of the former FWEC Facility.

The third PEA is Watering Run and its tributaries, a surface drainage feature that includes the stream, banks, and adjacent groundwater seeps that originates at the southern portion of the former FWEC Facility and flows down-hill past the SIPs and through the Affected Area.

The fourth PEA is the Surrounding Industrial Properties (SIPs) area, which lies in between the former FWEC Facility and the Affected Area and includes eight industrial properties in the Crestwood Industrial Park.

The soil, groundwater, sediment, surface water, and air (including indoor air, outdoor air and soil gas or sub-slab vapor) were sampled at multiple locations within the PEAs, as applicable, to fill the data gaps that had been identified relative to the performance of the Remedial Investigation/Feasibility Study (RI/FS). Sampling results were initially screened against

conservative, risk-based screening levels, and contaminants of potential concern (COPCs) were identified relative to the exposure media highlighted by the conceptual site models (CSMs) for potential exposures developed for each PEA. Conservative exposure point concentrations (EPCs) were established for each COPC for each exposure medium in the four PEAs. These EPCs were combined with site-specific exposure scenarios, chemical intake models, and toxicity values using methods defined by USEPA to calculate potential carcinogenic and non-carcinogenic risks associated with present and future use reasonable maximum exposure (RME) scenarios. The quantitative risk levels were separately summed across the set of complete and potentially complete exposure pathways and across COPCs for each exposure medium for each receptor. These total exposure risk levels were then compared to the threshold USEPA Excess Lifetime Cancer Risk (ELCR) (i.e., 1E-04) and the USEPA non-cancer hazard index (HI) threshold (i.e., 1.0). Table ES-1, presented at the end of this Executive Summary section, summarizes the cancer and non-cancer risks calculated for the current and potential future receptors evaluated in the BHHRA for projected risks that exceeded the cancer or non-cancer risk thresholds. Potential vapor intrusion risks were evaluated for the former FWEC Facility and the Affected Area using established USEPA assessment guidelines and protocols.

Former FWEC Facility

Potential health risks above target thresholds were identified for the former FWEC Facility with respect to potential future exposures to (refer to Table ES-1):

- TCE in groundwater that is hypothetically consumed by a potential future commercial worker;
- TCE in the soil that is directly contacted by a potential future commercial;
- TCE and several other volatile contaminants in indoor air inhaled by a potential future commercial worker conducting activities in an on-site building impacted by volatiles released from contaminated groundwater (assuming appropriate mitigation measures were not incorporated into the new structure);
- TCE in shallow groundwater that could be directly contacted by a potential future construction/utility worker;
- TCE in the soil by a potential future construction/utility worker (especially in the MIP1 Area);
- TCE, other volatiles and some inorganics in the soil and groundwater (if used for domestic supply) by hypothetical future child and adult residents; and
- Carcinogenic PAHs in the wastewater treatment retention pond (WWTP) sediment that could be directly contacted by a hypothetical future child resident.

The analysis also showed that if a current trespasser were to spend all of his/her time in the MIP1 Area and be exposed only to the surface soil there (in contrast to accessing and contacting

the surface soil over the entire former FWEC Facility) exposure to TCE in the soil would lead to projected non-cancer risks above the target threshold.

Affected Area

Potential current health risks were identified for the Affected Area residents and commercial workers only if the shallow groundwater were to be used as a drinking water supply for the homes and businesses. These potential risks were associated with TCE, acrolein and iron in the groundwater. However, this potential exposure pathway has effectively been precluded by the connection of virtually every residence and business to the municipal water system, as well as by deed restrictions prohibiting the use of groundwater by nearly all of the property owners within the Affected Area. At one residence where connection to the municipal water system was refused, the installation of a point-of-use groundwater treatment system mitigates this potential risk. However, a potential future groundwater ingestion risk will remain as long as contaminated groundwater is present in the Affected Area at concentrations above drinking water standards.

A comprehensive VI evaluation was performed at the residences and public buildings within the Affected Area that were identified in the Work Plan as having the greatest potential for VI based on an assessment of the distribution and measured concentrations of TCE in the groundwater beneath the Affected Area at that time. Sampling of some combination of the shallow groundwater, sub-slab vapor or soil gas from beyond the building foundation, and indoor and outdoor air was specified in the Work Plan as the methods for performing the VI investigation at these selected locations. The RI sampling results for VI were collectively evaluated at each sampled location using a three-step tiered process to determine whether the measured indoor air contaminant levels of any constituents could be due to VI from the underlying groundwater and whether they are present at levels that might pose an inhalation risk above conservative regulatory risk-based thresholds. The VI investigation approach that was employed was reviewed and approved by USEPA prior to implementation. This evaluation considered multiple lines of evidence and concluded that the levels of TCE measured in 2010 at the two residences associated with unique hydrogeologic and/or subsurface conditions (i.e., residential construction on the site of a natural spring and a leaking former well pump flooding the material beneath the foundation slab of another residence) could pose an unacceptable human health inhalation risk due to VI. However, active soil depressurization (ASD) systems were installed at both of these residences (i.e., Location 11 at 175 Church Road and Location 16 at 194 Church Road, see Table D-2) in 2011 following the 2010 sampling event and analyses to mitigate the potential risks. Operation of these mitigation systems effectively eliminates this potential exposure pathway at these locations. More description of the unique hydrogeologic and/or subsurface conditions is presented in Section 3.5.2 of the RI Report. The data and VI analysis for the Affected Area did not indicate a basis for similar VI risk to exist at other locations.

Based on approximately 10 years of groundwater data from groundwater monitoring wells and VI investigation sampling, the extent of the contaminant plume in the Affected Area is stable and the contaminant concentrations have declined over time due to the continuing operation of the Groundwater Extraction and Treatment System (GETS) at the former FWEC Facility and natural attenuation processes that are reducing the concentrations of many of the contaminants. In addition, the closure and cessation of pumping at the former private wells in the Affected Area has reduced the induced migration of groundwater toward the residences. This also has led to a reduction in the concentrations of volatile groundwater contaminants beneath the structures and a corresponding reduction in the potential VI at these locations. These ongoing activities and natural processes are expected to lead to further declines in the concentrations of the shallow volatile organic compound (VOC) groundwater contaminants in the Affected Area, and a further reduction in the potential for VI at these locations in the future. Based on the downward trend in contaminant concentrations and the installation and operation of the VI mitigation systems at the two residences associated with the unique subsurface conditions that increased the localized potential risk associated with VI, the current VI health risks for the Affected Area via the indoor air exposure pathway have been mitigated. However, a potential future VI risk will remain as long as the groundwater in the Affected Area is impacted by volatile organic compounds.

Watering Run

No current health risks were identified for individuals currently accessing the Watering Run PEA. However, there is the potential for direct contact exposure and risk to manganese in the sediments by a future construction worker if:

1. an extensive construction or re-development project were to be undertaken along Watering Run that would both require the most impacted sediments to be handled for an extended period of time; and
2. the construction workers would not use common personal protective equipment or implement routine best practices to limit exposure to the impacted sediments.

The potential risks in that scenario were primarily associated with exposure to manganese in the sediment, not TCE.

SIPs

Two potential health risks were identified for the SIPs PEA relative to the local groundwater. The first was associated with the hypothetical consumptive use of the groundwater (i.e., used for drinking water and/or general commercial or residential use). However, these potential exposures are unlikely to occur because these businesses also are connected to the municipal water supply and the local groundwater is not used now, or is it likely to be used for those purposes in the future. The second highlighted potential risk was associated with the possible direct contact exposure to TCE in the shallow groundwater by a future construction/utility

worker performing excavation on one of the properties impacted by the TCE plume at a location where the depth to impacted groundwater was relatively shallow.

The USEPA-approved RI/FS Work Plan did not require a targeted VI investigation for the SIPs. As a result, the data collected during the RI investigations, which included data relevant to the assessment of potential health risk relative to VI at the SIPs where TCE has been detected in the groundwater, was insufficient to perform a conclusive quantitative VI analysis for those SIPs. Based on the data collected during the RI investigation, structures associated with three particular SIPs (i.e., Bergen Machine, Certain Teed Corporation and, possibly, Fabri-Kal) may be located within 100 feet of the TCE groundwater plume migrating from the former FWEC Facility rather than being affected by localized sources.

Table ES-1
Summary of BHHRA Risks and Hazards Exceeding the Cancer or Non-Cancer Risk Thresholds (Bolded)
FWEC/Church Road TCE Site
Mountain Top, Luzerne County, Pennsylvania

Receptor	Media	Total ELCR for Media/Exposure Point	COPC Driver(s) With Individual ELCR > 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) With Individual HI > 1
FORMER FWEC FACILITY					
• Current Receptors (That May Not Also Be Potential Future Receptors)					
No Exceedances (based on average exposure concentrations)					
• Current and Potential Future Receptors					
No Exceedances					
• Potential Future Receptors					
Commercial Worker	Groundwater	**1.2E-04**	TCE	6.4	TCE
	Soil	1.5E-05		**4.23**	TCE
	Vapor Intrusion from Groundwater	**5.2E-04**	1,1-DCA	**65**	1,1,1-TCA, 1,1,2-TCA, 1,1 DCE, naphthalene, TCE
	Total for Commercial Worker	**6.5E-04**		**75**	
Construction/Utility Worker	Groundwater	3.4E-06		**28**	TCE
	Soil	1.2E-06		**5.1**	TCE (MIP1)
	Former Retention Pond Sediment	6.3E-05		0.48	
	Total for Construction/ Utility Worker	6.8E-05		**34**	
• Hypothetical Future Receptors					
Hypothetical Resident ï Child (Area Zoned Industrial)	Groundwater	**4.7E-04**	Chromium (as Cr VI), TCE	**99**	iron, manganese, TCE
	Soil	7.1E-05	TCE (MIP1)	**22**	1,1,2-TCA, TCE, cobalt
	Former Retention Pond Sediment	**1.2E-04**	PAHs	0.03	
	Vapor Intrusion from Groundwater	**5.4E-04**	1,1-DCA	**272**	1,1,1-TCA, 1,1,2-TCA, 1,1 DCE, , mercury, naphthalene, PCE, TCE, xylenes
	Subtotal for Child	**1.2E-03**		**393**	
Hypothetical Resident ï Adult (Area Zoned Industrial)	Groundwater	**5.3E-04**	Chromium (as Cr VI), TCE	**63**	cyanide, iron, manganese, TCE
	Soil	**3.2 E-04**	TCE (MIP1)	**17**	TCE
	Former Retention Pond Sediment	1.9E-05		0.005	
	Vapor Intrusion from Groundwater	**2.3E-03**	1,1,2-TCA, 1,1-DCA, naphthalene, TCE	**272**	1,1,1-TCA, 1,1,2-TCA, 1,1 DCE, mercury, naphthalene, PCE, TCE, xylenes
	Subtotal for Adult	**3.1E-03**		**353**	
	Total for Resident	**4.3E-03**		Not Applicable	

Table ES-1 (continued)
Summary of BHHRA Risks and Hazards Exceeding the Cancer or Non-Cancer Risk Thresholds (Bolded)
FWEC/Church Road TCE Site
Mountain Top, Luzerne County, Pennsylvania

Receptor	Media	Total ELCR for Media/Exposure Point	COPC Driver(s) With Individual ELCR > 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) With Individual HI > 1
AFFECTED AREA					
• **Current Receptors (That May Not Also Be Potential Future Receptors)**					
Resident ï Child/Adult	*Vapor Intrusion from Groundwater*	*Locations #11* (175 Church Road) *and #16* (194 Church Road) *[Already Mitigated]*	***TCE***	*Locations #11* (175 Church Road)*and #16* (194 Church Road) *[Already Mitigated]*	***TCE***
• **Potential Future Receptors (*Already Mitigated*)**					
Resident ï Child	*Groundwater (Assuming Drinking and Domestic Use That Is Not Allowed)*	*2.5E-05*		***6.7***	*iron, acrolein, TCE*
Resident ï Adult	*Groundwater (Assuming Drinking and Domestic Use That Is Not Allowed)*	*2.7E-05*		***94***	*Acrolein, TCE*
	Total for Resident	*5.2E-05*		*Not Applicable*	
Commercial Worker	*Groundwater (Assuming Drinking and Commercial Use That Is Not Allowed)*	*4.9E-06*		***1.1***	*none*
	Total for Commercial Worker	*4.9E-6*		***1.1***	
WATERING RUN AND TRIBUTARIES					
• **Current and Potential Future Receptors**					
No Exceedances					
• **Potential Future Receptors**					
Construction/Utility Worker	Stream Sediment	8.8E-07		**3.4**	manganese
	Total for Construction/ Utility Worker	8.8E-07		**3.4**	
SURROUNDING INDUSTRIAL PROPERTIES					
• **Current and Potential Future Receptors**					
Commercial Worker	*Groundwater (Assuming Drinking and Commercial Use That Is Not Allowed)*	*1.2E-05*		***3.7***	*manganese, TCE*
	Total for Commercial Worker	*1.2E-5*		***3.7***	
Construction/Utility Worker	Groundwater	3.2E-07		**2.2**	TCE
	Total for Construction/ Utility Worker	3.2E-07		**2.2**	

Table ES-1 (continued)
Summary of BHHRA Risks and Hazards Exceeding the Cancer or Non-Cancer Risk Thresholds (Bolded)
FWEC/Church Road TCE Site
Mountain Top, Luzerne County, Pennsylvania

• **Hypothetical Future Receptors**					
Hypothetical Resident ï Child (Area Zoned Industrial)	*Groundwater (Assuming Drinking and Domestic Use That Is Not Allowed)*	*5.1E-05*		***23***	*iron, manganese, TCE*
	Subtotal for Child	*5.1E-05*		***23***	
Hypothetical Resident ï Adult (Area Zoned Industrial)	*Groundwater (Assuming Drinking and Domestic Use That Is Not Allowed)*	*6.0E-05*		***19***	*manganese, TCE*
	Subtotal for Adult	*6.0E-05*		***19***	
	Total for Resident	***1.1E-04***		*Not Applicable*	

•

1.0 INTRODUCTION

1.1 Purpose of the Baseline Human Health Risk Assessment

This baseline human health risk assessment (BHHRA) was performed to assess the current and future risks to human health posed by potential exposure to various chemicals within environmental media impacted by past operations at the Foster Wheeler Energy Corporation (FWEC)/Church Road Trichloroethene (TCE) Site (the Site). The BHHRA was conducted as part of the overall Remedial Investigation (RI) for the Site in accordance with the Settlement Agreement. The BHHRA addressed the potential exposures and risks to public receptors relative to impacted soil, groundwater, sediments, surface water, and indoor air related to the past release or possible future release of contaminants from the Site. This assessment included a specific evaluation of potential vapor intrusion (VI) to current or future potentially occupied buildings associated with the former FWEC Facility and the Affected Area. The BHHRA was conducted in accordance with the current guidance and protocols for the preparation of risk assessments published by U.S. Environmental Protection Agency (USEPA) Headquarters and USEPA Region 3 as defined in the ñFinal Remedial Investigation/Feasibility Study Work Plan for the Foster Wheeler Energy Corporation/Church Road TCE Site ï Mountain Top, Pennsylvania 18707ò pursuant to Section 9.1(b) of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study, Docket No. CERC-03-2009-0061DC (Tetra Tech, 2010).

1.2 Organization of the Report

This BHHRA is organized as described below.

Section 1.0 INTRODUCTION ï This section presents the purpose and objectives of the BHHRA and the organization of this report.

Section 2.0 PROBLEM FORMULATION AND DATA EVALUATION ï The Problem Formulation portion of this section presents a brief summary of the Site location and description, the Site history as it relates to the risk assessment, and the conceptual site models (CSMs) for potential human exposure to contaminants in the impacted environmental media at the Site. The Data Evaluation portion of this risk assessment presents the results of the evaluation of the usability of the data for the risk assessment and screens the multi-media sampling data to identify the chemicals of potential concern (COPCs) in the soil, groundwater, sediment, surface water and indoor air associated with the Site.

Section 3.0 EXPOSURE ASSESSMENT ï This section presents the development of the exposure point concentrations for the BHHRA for the different exposure media at

the identified potential exposure points. This section also identifies the exposure parameters for the receptors associated with the current and reasonably anticipated future Site uses and activities. These included current and hypothetical future residents, former FWEC Facility site workers, trespassers, potential future commercial/industrial workers and construction/utility workers.

Section 4.0 TOXICITY ASSESSMENT ï This section presents the toxicity values used in the BHHRA to assess the nature and magnitude of the human health effects associated with potential exposures to the identified cancer and non-cancer COPCs via ingestion, incidental ingestion, dermal absorption, and inhalation. This section also discusses a number of special approaches to constituent toxicity assessment that were required for particular constituents in this BHHRA.

Section 5.0 RISK CHARACTERIZATION ï This section presents the measures of cancer and non-cancer risk used to assess the risks to the Site receptors, the risk calculations, and the resulting risk estimates for the various Site receptors, and identifies any scenarios and constituents exceeding the established regulatory risk thresholds.

Section 6.0 UNCERTAINTY ANALYSIS ï This section identifies and discusses the implications of the principal uncertainties associated with the various components of the BHHRA to provide additional context for the risk estimates.

Section 7.0 SUMMARY AND CONCLUSIONS ï This section presents a brief summary of the findings of the BHHRA.

Section 8.0 REFERENCES ï This section lists the citations for the sources of information referred to in this report.

Figures referred to in the report are included in order of reference at the end of the text. The USEPA standard format Risk Assessment Guidance for Superfund (RAGS) tables are included in Attachment A. Additional attachments (lettered B through I) contain other materials supporting the BHHRA and are referenced in the text.

2.0 PROBLEM FORMULATION AND DATA EVALUATION

2.1 Site Location and Description

The Site is located in Mountain Top, Wright Township, Luzerne County, PA, approximately 5 to 6 miles south of Wilkes-Barre, PA. The Site consists of the following two areas:

- The former FWEC Facility, an approximately 105 acre property located in the northeastern portion of the Site at 348 Crestwood Drive, within the Crestwood Industrial Park Complex; and
- The Church Road TCE Site, including the Affected Area, as defined in the *Administrative Settlement Agreement and Order by Consent for Removal Response Action for the FWEC/Church Road TCE Site, dated August 29, 2005, Docket No. CERC-03-2005-0349DC* (2005 Order). The Affected Area extends from east to west along Church Road and Watering Run and is approximately 295 acres in size, and is generally located south and southwest of the former FWEC Facility.

Figure 2-1 shows the Site layout and the relative positions of the former FWEC Facility and the Affected Area, as well as the SIPs and Watering Run. Additional details about the Site and surrounding areas may be found in the RI Report and the prior reports, as referenced.

2.1.1 Former FWEC Facility Property

The northeastern portion of the Site consists of the former FWEC Facility property, which encompasses approximately 105 acres and is located at 348 Crestwood Drive in the Crestwood Industrial Park.

2.1.1.1 Current Features

Currently, a small building associated with the active on-site GETS that is operated by FWEC is located in the southeastern portion of the property. Other structures remaining at the property from past operations include the former X-Ray Building and a portion of the former Main Building that was also used for x-ray inspections. None of these structures is now routinely occupied.

2.1.1.2 Past Features

The structures and facilities that were associated with the former FWEC Facility during FWECôs occupancy of the property consisted of the Main Building, the X-Ray Building, a wastewater treatment system (WWTS) located north-northwest of the Main Building, a shot-blast sands storage area located west of the Main Building, a firebrick and asbestos waste storage building

located south of the Main Building, an Expended Waste Area (EWA) south of the transformer station, and a former production well (currently MW-5). A vapor degreaser was located within the crane way strip at the southern end of the Main Building (see Figure 2-1).

The former sanitary WWTS included a clarifier and a retention/polishing pond, and was located north-northwest of the Main Building. The clarifier was approximately 20 feet in diameter and approximately 7.5 feet deep. The polishing pond was generally rectangular in shape and measured about 140 feet long by 48 feet wide with a maximum depth of approximately 3 feet. A Pennsylvania Department of Environmental Resources (PADER) permit for construction and operation of a new sanitary wastewater treatment plant was issued, but FWEC subsequently abandoned its plans for an on-site wastewater treatment plant and cancelled the permit. The former FWEC Facility reportedly was connected to the public sewer in 1979 or 1980.

Following transfer of the ownership of the property to Morrison-Knudsen Company (MK) in 1991, MK constructed four new buildings to support its locomotive manufacturing operations. These buildings are identified as the Wash Building, Shot Blast Building, Prime Paint Building, and Finish Paint Building. These buildings were constructed with pre-fabricated steel erected on slab-on-grade foundations.

The locomotives were high-pressure washed over a 10-foot wide by 5-foot deep poured concrete pit, and the collected wash water generated during this process was treated at the WWTS that was located within this building prior to discharge to the sanitary sewer system or re-use on-site. Shot blasting of painted locomotive bodies occurred in the Shot Blast Building, located southwest of the Main Building. A large shot blasting enclosure and a dust collector for managing the exhaust air were located inside the building. Painting operations were conducted at the Prime Paint and Finish Paint Buildings. Each building contained a large painting enclosure capable of surrounding a locomotive. Locomotives, and later power control units (PCUs), were painted at each of these buildings.

Smaller buildings also were present to the east of the Finish Paint Building and southwest of the developed area of the Main Building. These buildings were referred to as the Solvent Building and Paint Storage Building. These buildings formerly stored solvents and paints, respectively, and were equipped with metal pan secondary containment and explosion-proof fixtures.

2.1.1.3 Former FWEC Facility Property Subareas Addressed in this Risk Assessment

The five (5) remaining sources of contamination at the former FWEC Facility, which were further evaluated in this BHHRA as part of this RI were:

1. Former Vapor Degreaser Area (herein referred to as Membrane Interface Probe [MIP] Area #1);

2. Former WWTS;
3. Former Shot Blast Area (FSBA);
4. Former EWA; and
5. Area near former Finish Paint Building and Buildings located east of Finish Paint Building (e.g., Solvent Building and Paint Storage Building) (herein referred to as MIP Area #2).

2.1.2 Affected Area

The Affected Area extends from east-to-west along Church Road and Watering Run. It is approximately 295 acres in size, and is generally located south and southwest of the former FWEC Facility.

2.1.2.1 Current Features

Currently, the Affected Area is primarily a residential area with pockets of homes associated with either Church Road or South Mountain Boulevard. Going from east-to-west down the hill, there are two clusters of occupied structures along Church Road and a small development to the west. A church and school are located at the northeastern corner of the Church Road-South Mountain Boulevard intersection. Another development is located north of that intersection and east of South Mountain Boulevard.

2.1.2.2 Past Features

Historically, the Affected Area has been residential and agricultural. A junkyard was located near the intersection of Church Road and the railroad tracks back in the 1950s. A possible strip mine may have been located east of Church Road.

2.1.3 Surrounding Industrial Properties (SIPs)

The Crestwood Industrial Park is approximately 1,050 acres in size and is utilized by industries and manufacturers for mixed industrial use. Eight industrial properties are located within approximately one quarter-mile of Watering Run, and the majority of these properties are located between the former FWEC Facility and the Affected Area. These facilities represent the most proximal SIPs, besides the former FWEC Facility, potentially contributing contaminants via single or multiple migration pathways to Watering Run and the underlying groundwater hydro-stratigraphic system. The eight SIPs are (identified per the current occupant of the facility and street address):

1. CertainTeed Corporation, 1220 Oak Hill Road;
2. Bergen Machine, 1120 Oak Hill Road;

3. Quaker Oats/Gatorade, 750 Oak Hill Road;
4. Former HPG Warehouse, 1335 Oak Hill Road (building referred to as Cornell #1 in February 13, 2004 Lease Agreement);
5. I2M, 755 Oak Hill Road;
6. Fabri-Kal, 955 Oak Hill Road;
7. MarChem Northeast, 855 Oak Hill Road; and
8. Cornell Iron Works, 100 Elmwood Road.

These eight SIPs are not part of the Site.

2.1.4 Watering Run

Watering Run is a drainage feature originating at the southern portion of the former FWEC Facility property. It currently collects and conveys the treated effluent water from the groundwater extraction and treatment system. The watershed of Watering Run slopes generally to the southwest, and the stream flows in that direction. Groundwater is the primary recharge mechanism for Watering Run. Watering Run does not support recreational fishing in this area based on reconnaissance performed as part of the SLERA. The headwaters of Watering Run and the groundwater seeps and springs do not support fish because of their very limited, intermittent flow and shallow depth. Observations of any fish activity were limited to the lower channel of Watering Run downstream of the Oak Hill Road conduit. Fish were observed only in pool areas where water depths exceeded 12 inches. Observations recorded during surveys indicated that the minnow family (Cyprinidae) appeared to be present. Smaller fish species from other families also may be present. No sport fish were observed.

Watering Run and its tributaries are not part of the Site.

2.2 Site History

The ownership history of the former FWEC Facility property is presented in detail in the RI Report. A brief summary is provided here to provide context to the BHHRA:

- The former FWEC Facility property is currently owned by Westinghouse Air Brake Technologies (Wabtec).
- The property was transferred to FWEC from the Wyoming Valley Industrial Building Fund on January 29, 1953. FWEC ceased operations at the property in 1984.
- On August 22, 1989, the property was transferred from FWEC to MK, a predecessor of Wabtec. MK and its successors manufactured or remanufactured locomotives, small PCUs, and flat cars for rail transport of tractor-trailers.

- MK transferred ownership to Morrison-Knudsen Rail Corporation (MK Rail) on April 18, 1994. MK Rail merged with and into MotivePower Industries on January 1, 1997. All operations at the facility by MotivePower Industries ceased at this time.
- MotivePower Industries merged with and into Westinghouse Air Brake Company (WABCO) on November 11, 1999, which subsequently merged with WABCO Merger Subsidiary, to create Wabtec on December 23, 1999. Wabtec re-initiated operations at the facility, and the property was used for the warehousing of products (primarily fiberglass insulation products) by third parties under a lease agreement with Wabtec.
- On-site structures except for the treatment plant were demolished by Wabtec in 2005, and the rails were removed and/or recycled. No structures remain except for the building housing the treatment plant.

2.3 Conceptual Site Model

A CSM is a decision-making framework for a human health or ecological risk assessment that is based on and organizes a variety of site-specific information. It describes sources and receptors associated with a site and the interactions that potentially link them. A CSM identifies the current and reasonably anticipated future users of each exposure area, their primary activities, the exposure media of potential concern, the potential release mechanisms, and the potential exposure routes and pathways that could result in exposure to contaminants present.

A preliminary CSM was developed and presented in Section 6.0 of the Data Gap Analysis Report (DGAR) (Tetra Tech, 2009) and was referenced in the Draft Final Work Plan (Tetra Tech, 2010) to summarize previous investigations and help identify ongoing data needs required for the RI or a subsequent Feasibility Study (FS). The RI sampling results were combined with information on the physiography, geology, and hydrogeology of the area to describe the nature and extent of impacted exposure media and to identify relevant exposure pathways for human receptors. Based on this information, four potential exposure areas (PEAs) were identified, and separate CSMs were developed for each. The four PEAs were:

- The former FWEC Facility;
- The SIPs;
- The Affected Area; and
- Watering Run.

Exposure pathways associated with each PEA were then evaluated to determine if they were complete, potentially complete, or incomplete as illustrated on Figures 2-2 through 2-5 for the four PEAs. A complete human exposure pathway is comprised of the following elements (USEPA, 1989):

- A source and mechanism of chemical release to the environment;
- An environmental transport medium for the released chemical or mechanisms of transfer of the chemical from one environmental medium to another;
- A point of potential contact by people with the contaminated medium; and
- An effective route of exposure by which the person could get a dose or intake of the contaminant (i.e., ingestion, dermal absorption, or inhalation).

All four of these elements must be present in order for an exposure pathway to be considered ñcompleteò. The elements that are potentially present are included on each of the four CSMs to reflect the fuller complexity of the natural and man-related processes that may be affecting the releases from the former FWEC Facility. Elements of the human exposure pathways that are relevant to a specific PEA and CSM are indicated with black lines on that figure. Elements that are not considered to be present or relevant to the specific PEA and CSM, are indicated with a lighter gray line.

Based on the findings of the RI field investigation, there is the potential for exposure to released chemical constituents in each of the four PEAs listed above. As such, each of the PEA-specific CSMs is discussed further below.

2.3.1 Former FWEC Facility

This PEA contains the locations of the original buildings and primary sources of contaminant release. The CSM for the former FWEC Facility is presented in Figure 2-2. The locations within the former FWEC Facility that are considered to have been the primary sources of chemical release are:

- the former Vapor Degreaser;
- the former Finish Paint and former Paint and Solvent Storage Buildings;
- the FSBA and former EWA; and
- the former FWEC Facility WWTS Retention Pond (relative to select potential exposures).

All of these locations, except for the FSBA and former EWA, were determined to be adequately characterized and confirmed as primary sources in the DGAR. The DGAR required additional data to be collected within the FSBA and the former EWA during the RI to determine whether or not they also were primary sources. Data collected during the RI field investigations confirmed that these two areas also were primary sources of contamination.

Primary release mechanisms from the former Vapor Degreaser, the former Finish Paint Building, the former Paint and Solvent Storage Building, the FSBA and the former EWA sources include inadvertent leaks and spills during routine operation of the facility and poor housekeeping

practices such as storage of open drums on soil or at unbermed locations. Such practices could have resulted in direct releases to the surface and subsurface soil with subsequent secondary migration to the subsurface soil and groundwater. Discharges from the former WWTS Retention Pond also may have impacted the sediment and surface water within Watering Run.

Secondary release and transport mechanisms enable or promote the transfer of a chemical from one location to another or from one environmental medium to another. The following release and transport mechanisms are considered to play a possible role in exposure pathways associated with the former FWEC Facility:

- Volatilization of volatile organic compounds (VOCs) and entrainment of contaminated soil particulates into the ambient (outdoor) air with subsequent dispersion to down-wind locations and deposition onto previously uncontaminated surface soil;
- Volatilization of VOCs from the shallow groundwater into the vadose zone and its migration up through the soil or fill material and through the foundations of current or future buildings into the indoor air;
- Mechanical redistribution of potentially impacted surface or subsurface soil during excavation or construction activities into the surface and subsurface soil at the PEA;
- Erosion and runoff of the surface soil after heavy rains or snow melt events to new locations within the PEA;
- Re-suspension and re-deposition of sediment from one location in the former WWTS Retention Pond to another area within or adjacent to the pond (such as downstream of the outfall);
- Use of groundwater from an unsanctioned well for irrigation, releasing VOCs into the ambient air and soil gas (note that deed restrictions are in place that limit such uses);
- Infiltration and percolation of surface water from the former WWTS Retention Pond into the surrounding subsurface soil and into the groundwater below; and
- Transport of the groundwater beneath the former FWEC Facility down-gradient within the PEA.

The following release mechanisms are not considered to play a significant role at this PEA:

- Groundwater seeps ï No seeps were identified within the boundaries of the former FWEC Facility; and
- Recharge to Watering Run ï The only discharge to Watering Run within this PEA is through the current active on-site treatment system that discharges into Watering Run.

The potentially impacted exposure media include:

- the outdoor air, indoor air, surface soil, and subsurface soil at the former FWEC Facility;
- the sediment and surface water associated with the former WWTS Retention Pond; and
- the groundwater underlying the former FWEC Facility.

The current and reasonably anticipated future uses for the Site were considered and used to identify people who could potentially be exposed to these media. The primary receptors include a future commercial worker, a current or future trespasser, a current and a future former FWEC Facility site user, a future utility worker, and a future construction worker. A hypothetical future resident also was considered to provide an exposure scenario to be evaluated relative to an unrestricted use of this PEA. However, it should be noted that the properties within this PEA are zoned for industrial use and are managed under Pennsylvaniaôs Land Recycling and Environmental Remediation Standards Act, also known as Act 2, which is administered by the Pennsylvania Department of Environmental Protection (PADEP). Deed restrictions for groundwater use are in place that restricts residential development in this PEA. As such, a future resident scenario is highly unlikely.

The CSM for this PEA identifies the exposure media and likely exposure points for these potential receptors and whether they are complete, potentially complete, or incomplete relative to the particular contaminants within the identified exposure media. The exposure pathways judged to be complete or potentially complete are discussed below. Incomplete pathways are not highlighted in the text but are shown in the lighter gray color in Figure 2-2.

There are two exposure pathways that are identical for all receptors. Volatile compounds may be released from the soil into the ambient air, and particulates within the surface soil may be released or entrained into the ambient air by wind or mechanical disturbance. However, it is unlikely given the measured concentrations and limited extents of the soil contamination that the concentration of any chemical compounds released into the ambient air would be at a concentration that would cause a potential impact to human health. Therefore, exposure to outdoor air via inhalation of soil particulates and/or released VOCs is considered to be only potentially complete for all receptors at this PEA.

2.3.1.1 Current and Future Receptors

Trespasser ï A current or future trespasser is assumed to be at the PEA intermittently for only a few hours at a time, remaining outside of any enclosed structures. This receptor would not perform intrusive or soil-disturbing activities, but is likely to come into contact with the surface soil and the sediment and standing surface water in the former WWTS Retention Pond.

Exposure pathways associated with these media are considered to be complete through incidental ingestion, dermal absorption, and direct contact. Potentially complete exposure pathways are limited to inhalation of particulates and volatiles in outdoor air as described above.

Former FWEC Facility Site User ï It is assumed that this receptor could be at this PEA for a brief period of time while parking or moving transportation containers on-site or off-site. Therefore, the only complete exposure pathways associated with the current former FWEC Facility site user is through incidental ingestion and dermal absorption from direct contact with the surface soil. Surface soil data is available for MIP1, the FSBA, and the EWA. However, it is possible that, in the future, this person could perform intrusive activities within the PEA. This would allow him or her to come into contact with the subsurface soil and, as such, the exposure pathways associated with the subsurface soil environmental medium (i.e., through incidental ingestion and dermal absorption) are considered to be potentially complete only for the future site user. Surface and / or subsurface soil data is available for MIP1, MIP2, the FSBA, and the EWA. As described above, additional potentially complete exposure pathways for both the current and the future site user include the inhalation of particulates and volatiles in the outdoor air.

2.3.1.2 Potential Future Receptors

Hypothetical Future Resident (Adult and Child) ï It is assumed that the future residential receptors could hypothetically be present in the PEA year-round and conduct unrestricted activities. Accordingly, the exposure pathways associated with the surface soil and subsurface soil would be complete under this hypothetical scenario. These exposures to contaminants in soil may result from incidental ingestion and dermal absorption from direct contact.

The former FWEC Facility is currently zoned as industrial, and there is no indication that this zoning classification will be changed in the future. However, as a conservative measure, the inhalation of volatiles in indoor air exposure pathway was judged to be potentially complete for the hypothetical future resident for the baseline scenario. Sediment and surface water from the former WWTS Retention Pond could remain on-site or be removed as part of a redevelopment effort, so all exposure pathways associated with these media are considered to be potentially complete. As described above, additional potentially complete exposure pathways include the inhalation of particulates and volatiles in the outdoor air.

Currently, there is no expectation that the groundwater within the PEA boundary will be used now or in the future as a source of drinking water because of restrictions placed in accordance with previous regulatory agreements. However, in the unlikely event that residences are allowed at this PEA, the hypothetical future resident was also assumed to construct an unsanctioned groundwater well for domestic and irrigation use relative to home gardening or landscaping activities, although there are currently deed restrictions in place limiting this type of use.

Commercial Worker ï It is assumed that under possible future scenarios this receptor would be an office or manufacturing line worker spending the majority of the work day inside an on-site structure but not performing ground intrusive activities or going to the former WWTS Retention Pond (if the Retention Pond is still present after redevelopment). Therefore, complete exposure pathways associated with the commercial worker may be via incidental ingestion and dermal absorption from direct contact with the surface soil. These are the only complete exposure pathways associated with this receptor. As commercial redevelopment of the site may entail redistribution of site soils, the combined surface and/or subsurface data sets from MIP1, MIP2, FSBA and EWA were used.

If a commercial building is constructed on-site in the future, the inhalation pathway for volatile compounds would become potentially complete. The inhalation of particulates and volatiles in the outdoor air (i.e., while walking to and from their building, or spending a portion of the work day break times outside) are also considered to be potentially complete pathways. Finally, the commercial worker may be exposed to the groundwater via ingestion, dermal absorption via direct contact, and inhalation of volatiles in the unlikely event that an unsanctioned groundwater well is utilized for potable use or irrigation despite the presence of deed restrictions limiting this type of use.

Construction Worker/Utility Worker ï It is assumed that these potential future receptors could be at this PEA for a range of possible exposure durations but for a limited period of time (i.e., less than one year) performing construction and excavation activities associated with the potential future redevelopment of the PEA. These receptors would likely be exposed to contaminants within the surface soil and subsurface soil. They may also be exposed to the sediment of the former WWTS Retention Pond during redevelopment. Exposure to these media may result from incidental ingestion and dermal absorption from direct contact with the soils and sediment.

It is possible that an excavation would be begun in the footprint of the former WWTS Retention Pond without draining the surface water, and so, the incidental exposure pathway associated with surface water was also considered to be potentially complete. Exposure to the groundwater via incidental ingestion, dermal absorption and inhalation of released volatiles may occur if the excavation and digging activities extend below the water table. As such, these exposure pathways are considered potentially complete. Finally, exposure to contaminants in outdoor air is considered to be potentially complete as describe above and as a result of released particulates entrained into the air by wind or mechanical activity.

2.3.2 Affected Area

The Affected Area incorporates the Church Road TCE Site as defined in the Administrative Settlement Agreement and Order by Consent for Removal Response Action for the FWEC/Church Road TCE Site, dated August 29, 2005, Docket No. CERC-03-2005-0349DC (2005 Order) (Tetra Tech, 2010). This PEA consists of numerous private buildings, commercial buildings, and a church/school complex at the western boundary of the PEA. The CSM for the Affected Area is presented in Figure 2-3.

The primary sources of potential chemical contamination for the Affected Area are: the former Vapor Degreaser; the former Finish Paint Building; the former Paint and Solvent Storage Building; the FSBA; and the former EWA. The former WWTS Retention Pond is not considered a primary source for the rest of the PEAs because the surface water and sediment from this source would be unlikely to be able to impact the Affected Area, Watering Run, or the SIPs.

The primary release mechanisms from these sources include inadvertent leaks and spills and poor housekeeping practices. Contaminants released by these mechanisms would first impact the surface soil and would then migrate into the underlying groundwater, which in turn could migrate down-gradient into the Affected Area. Groundwater is the only media that is considered to be a direct source media for this PEA.

Many of the secondary release mechanisms previously described are not present in the Affected Area as is indicated by the lighter gray lines shown on Figure 2-3. The following release and transport mechanisms and exposure media are considered to play a possible role at the Affected Area:

- Volatilization and VI migration of VOCs from the groundwater into the indoor air;
- Spraying of groundwater from an unsanctioned residential well for irrigation or another non-potable use, which would release VOCs into the ambient air. While it is not believed that any wells of this type are currently being used in this manner and there are deed restrictions in place that restrict the use of groundwater for this or any purpose, it is plausible that a homeowner or commercial business owner might choose to install a well for one of these purposes; and
- Transport of the groundwater.

Potentially impacted exposure media include indoor air and groundwater. Outdoor air is potentially impacted only if the groundwater from an unsanctioned well is used for irrigation or a similar purpose, ignoring the deed restrictions that are currently in place, which would release volatile compounds into the surrounding air. Since this is a plausible potential scenario at any location in the PEA, it is included as a viable pathway for this PEA.

The principal receptors for this PEA are a current or future resident, a current or future commercial worker, a current or future teacher or student, a current or future preschool child, a

current or future trespasser/visitor, a current or future utility worker, and a future construction worker.

The CSM for this PEA identifies the exposure media and likely exposure points for these potential receptors and whether they are complete, potentially complete, or incomplete. The exposure pathways judged to be complete or potentially complete are discussed below. Incomplete pathways are not addressed in the text but are presented visually in Figure 2-3.

2.3.2.1 Current and Future Receptors

Resident (Adult and Child) – It is assumed that the current or future residential receptors would utilize the Affected Area year-round and would conduct unrestricted activities. These residents could then be exposed to potentially impacted outdoor air, indoor air, and groundwater. However, the exposure pathways associated with these media cannot categorically be considered to be complete throughout the PEA because of the observed variability in the physical characteristics (i.e., the presence of unsanctioned groundwater wells) and the sampled concentrations of VOCs throughout the PEA. For example, if there is an unsanctioned groundwater well providing untreated groundwater for irrigation and/or drinking water in violation of the current deed restrictions, the exposure pathways associated with the inhalation of volatiles via outdoor air and the ingestion of groundwater via drinking would be complete. However, since some residents may have access to these type of wells (and thus make the pathway complete or potentially complete for them) while other residents do not (making the pathway incomplete for them), these exposure pathways for the entire PEA are marked as potentially complete. Similarly, the inhalation of volatiles via VI to indoor air is considered to be potentially complete because sampling data from the RI indicate that this may be a complete pathway for some existing residences and an incomplete pathway for others. Exposure to groundwater may also be potentially complete via incidental ingestion, dermal absorption via direct contact, or the inhalation of released volatiles if the concentration of the contaminants is at a high enough level at the residence to pose a potential risk to human health. In addition, a future resident may infrequently drink from the hose in the course of home gardening or landscaping activities. Thus, it is possible but highly unlikely that the ingestion via drinking pathway would be potentially complete.

Commercial Worker – It is assumed that this receptor is an office or storefront worker who would spend the majority of the work day indoors and not performing intrusive activities. Concentrations of volatile compounds in the indoor and outdoor air vary across the PEA, and some businesses may have unsanctioned groundwater wells in violation of current deed restrictions that are being used for irrigation or landscaping, and release additional VOCs into the ambient air. This variability in the observed VOC concentrations results in some areas where the exposure pathways associated with outdoor air, indoor air, and groundwater are considered to be complete and other areas where these pathways are likely to be incomplete. Therefore, the

exposure pathways associated with the inhalation of volatiles in indoor and outdoor air, as well as the incidental ingestion, dermal absorption, and inhalation of volatiles via groundwater, are considered to be potentially complete.

Teacher/Student/Preschool Child – Similar to the commercial worker, these receptors are assumed to spend the majority of their day inside or on a landscaped playground and not performing intrusive activities deep enough to allow direct contact with the groundwater. Because the existing school and church (associated with St. Judeôs Parish) is connected to the public water supply, exposure to the groundwater is not a realistic exposure pathway for people at this location. As such, outdoor air and indoor air are the only media to which the teacher and children may be exposed. Similar to the resident, concentrations of VOCs in these media may vary. Therefore, these two inhalation exposure pathways are considered to be potentially complete.

Trespasser/Visitor ï A current or future trespasser or visitor is assumed to be at the PEA intermittently for only a few hours at a time, remaining outside of any enclosed structures. This receptor typically does not perform intrusive activities and would not come into contact with the groundwater. Potentially complete exposure pathways are limited to the inhalation of volatiles in outdoor air.

2.3.2.2 Potential Future Receptors

Construction/Utility Worker ï It is assumed that a future construction or utility worker would be present at the PEA for a range of possible exposure durations but for a limited period of time (i.e., less than one year) performing construction, excavation and maintenance activities associated with the current use and potential future redevelopment of the PEA.

As is presented in the CSM, potential contaminant exposure in the AA may come from below from a groundwater plume and as such the overburden soil was not considered a source of potential exposure. Because of groundwater level fluctuation, some volatile constituents may be moved locally upward and downward interstitially in the smear zone near the groundwater table interface. However, the volatiles do not exhibit a tendency to adsorb to the soils. Rather, they are more likely to remain dissolved in the groundwater or be released into the soil gas above the smear zone. In addition, off-site soils (i.e., soils located outside of the FFF boundary) are not expected to be significantly impacted by releases within the FFF due to the significant distance between the two PEAs. As such, there are no soil exposure pathways in this PEA that are considered to be complete for the construction/utility worker. Instead, exposure to the groundwater via incidental ingestion, dermal absorption and inhalation of released volatiles that are most likely to be significant relative to excavation activities in the AA. As such, these groundwater exposure pathways are considered to be potentially complete. In addition, exposure

to contaminants in outdoor air is considered to be potentially complete as a result of released particulates entrained into the air by wind or mechanical activity.

2.3.3 Watering Run

Watering Run flows adjacent to or through the three other PEAs. A separate PEA was created for Watering Run in order to more fully assess the unique access characteristics and potential exposures to the stream water and banks. As stated previously, the PEA does not include the point of discharge from the on-site active treatment system to Watering Run, although the surface water within the stream is included.

Similar to the Affected Area, the primary sources of potential chemical contamination for Watering Run are the former Vapor Degreaser, the former Finish Paint Building, the former Paint and Solvent Storage Building, the FSBA and the former EWA.

The primary release mechanisms from these sources were inadvertent leaks and spills and poor housekeeping practices. Contaminants released by these mechanisms would first impact the surface soil and then potentially migrate down through the soil into the groundwater, and then be transported down-gradient and be released into Watering Run. Groundwater is the only media that is considered a direct source media for this PEA.

The majority of the secondary release mechanisms previously described are not present in Watering Run as indicated by the gray lines illustrated on Figure 2-4. The following release mechanisms and exposure media are considered to play a possible role in relation to potential exposures to impacted media associated with Watering Run:

- Groundwater seeps ï Seeps are present at dispersed locations along the banks of Watering Run, allowing groundwater to come to the surface and impact the sediment and surface water; and
- Recharge to Watering Run ï Groundwater is the primary recharge mechanism for this surface water feature, along with some run-off. Any potential contaminants in the groundwater may be transferred into the sediment and surface water through this mechanism.

The potentially impacted exposure media in this PEA are surface water and sediment. Note these media are distinct from the surface water and sediment identified in the former FWEC Facility PEA.

The primary receptors identified for this PEA are a resident, a commercial worker, a trespasser/visitor, a former FWEC Facility site user (in that portion of this PEA that abuts the former FWEC Facility PEA), a future utility worker, and a future construction worker.

The CSM for this PEA identifies the exposure media and likely exposure points for these potential receptors and whether they are complete, potentially complete, or incomplete. The exposure pathways judged to be complete or potentially complete are discussed below. Incomplete pathways are not addressed in the text but are presented visually in Figure 2-4.

2.3.3.1 Current and Future Receptors

Trespasser/Visitor ï A current or future trespasser or visitor is assumed to be at the PEA intermittently for only a few hours at a time, remaining outside any enclosed structures that may be present. This receptor is assumed to not perform intrusive activities and would not come into contact with the local groundwater. However, it is anticipated that the trespasser/visitor would spend his or her time recreating along the banks and in the shallower water during the warmer months. The complete exposure pathways are considered to be ingestion and dermal absorption of contaminants from the sediment and surface water via direct contact.

Former FWEC Facility Site User ï This receptor would not be expected to cross into this PEA and spend time in or near Watering Run. Therefore, all exposure pathways for this receptor in this PEA are considered to be incomplete.

2.3.3.2 Potential Future Receptors

Hypothetical Resident or Future Commercial Worker ï It is assumed that these receptors would access this PEA only after the unlikely future redevelopment of the Watering Run corridor into a residential or commercial area. This type of re-development would likely result in the filling in or re-diverting of Watering Run. If the PEA is re-developed, the exposure media would no longer be present and no potential risk to human health would exist. Therefore, exposure pathways for these hypothetical future receptors are considered to be incomplete.

Construction Worker/Utility Worker ï It is assumed that these potential future receptors could be at this PEA for a range of possible durations but for a limited period of time (i.e., less than one year) performing construction and excavation activities associated with the redevelopment of the PEA or in the maintenance of culverts along the course of Watering Run. These receptors could be exposed to contaminants within the surface water or sediment. These exposures may result from incidental ingestion and dermal absorption from direct contact with the surface water and sediment. However, there are no current plans to develop Watering Run in the foreseeable future, and it is assumed a construction or utility worker will be supplied with the proper personal protective equipment (PPE) if he or she is required to work in the wet conditions of

Watering Run either during redevelopment or in culvert maintenance if the local conditions are uncertain. As such, the exposure pathways associated with incidental ingestion and dermal absorption via direct contact with the surface water and sediment is considered to be only potentially complete.

2.3.4 Surrounding Industrial Properties

The SIPs includes the industrial areas located between the former FWEC Facility and the Affected Area, but does not include the stream bed and banks of Watering Run. This PEA was investigated to determine the characteristics and flow of the contaminated groundwater plume migrating away from the former FWEC Facility. The CSM for the SIPs is presented in Figure 2-5.

The primary sources of potential chemical contamination for the SIPs are: the former Vapor Degreaser; the former Finish Paint Building; the former Paint and Solvent Storage Building; the FSBA; and the former EWA. These sources are identical to those of potential concern relative to the Affected Area and Watering Run. There is currently inadequate information to determine conclusively what, if any, contaminant source areas in the SIPs are impacting the environment on or off their properties.

The primary release mechanisms from these sources are believed to have been inadvertent leaks and spills at these sources and the application of poor housekeeping practices. Contaminants released by these mechanisms would have first impacted the surface soil and may then have migrated down into the groundwater. This groundwater may then have migrated down-gradient and into the SIPs. Groundwater is the only source media that is considered for this PEA.

Most of the secondary release mechanisms described previously are not present in the SIPs as indicated by the gray lines illustrated on Figure 2-5. The release and transport mechanisms that may be influential are:

- Volatile releases from the groundwater with subsequent upward migration and VI into the structures and indoor air at this PEA;
- Spraying of groundwater from an unsanctioned well for irrigation, landscaping, or another non-potable use, which would release VOCs into the ambient air. While it is not believed that any wells of this type are currently being used in this manner, it is plausible that a commercial business owner might choose to install a well for one of these purposes; and
- Transport of the groundwater.

The potentially impacted exposure media at this PEA are the indoor air (potentially at some locations) and groundwater. Outdoor air is potentially impacted only if the groundwater from an

unsanctioned well is used and releases volatile contaminants into the ambient air during that use. Since this is a plausible (if unlikely) potential scenario for this PEA it is included as a potentially viable pathway.

The primary receptors for this PEA are a current or future commercial worker, a current or future trespasser/visitor, a current or future utility worker, and a future construction worker. A hypothetical future resident was also considered to evaluate potential unrestricted use. It must be noted that this PEA is zoned for commercial/industrial use and, thus, the future resident scenario is considered to be highly unlikely.

The CSM for this PEA identifies the exposure media and likely exposure points for these potential receptors and whether they are complete, potentially complete, or incomplete. The exposure pathways judged to be complete or potentially complete are discussed below. Incomplete pathways are not addressed in the text but are presented visually in Figure 2-5.

2.3.4.1 Current and Future Receptors

Commercial Worker ï It is assumed that this receptor is an office or store worker spending the majority of the work day indoors and that they would not perform any ground intrusive activities. Concentrations of VOCs in the indoor and outdoor air likely vary across the PEA, and some businesses may have unsanctioned groundwater wells that are being used for irrigation, releasing additional VOCs into the ambient air. Note that this type of groundwater use is prohibited based on current deed restrictions in place. This variability of VOC concentrations results in some areas where the exposure pathways associated with outdoor air, indoor air, and groundwater may be complete and other areas where these pathways would in all likelihood be incomplete. Therefore, exposure pathways associated with the inhalation of volatiles in indoor or outdoor air, as well as the incidental ingestion, dermal absorption, and inhalation of volatiles released from groundwater, are considered to be potentially complete.

Trespasser/Visitor ï A current or future trespasser/visitor is assumed to be at the PEA intermittently for only a few hours at a time, remaining outside any enclosed structures that may be present. This receptor is assumed to not perform intrusive activities and would not come into contact with the local groundwater. Potentially complete exposure pathways are limited to the inhalation of volatiles in outdoor air as a result of potentially unsanctioned groundwater use.

Construction/Utility Worker ï There are no complete soil exposure pathways associated with these receptors for this PEA. Exposure to the groundwater at this PEA via incidental ingestion, dermal absorption and inhalation of volatiles may occur if maintenance or excavation activities extend below the water table. As such, these exposure pathways are considered to be potentially complete. In addition, exposure to contaminants in outdoor air is considered to be potentially complete as a result of released particulates entrained into the air by wind or mechanical activity.

2.3.4.2 Potential Future Receptors

Resident (Adult and Child) ï A hypothetical resident also was considered for this PEA to provide a baseline evaluation of potential risk associated with the unrestricted use of groundwater at this area. The unrestricted groundwater exposure pathways are depicted on the CSM.

2.4 Data Evaluation

The study boundary for the Site included the former FWEC Facility, the Affected Area (previously identified as the Church Road TCE Site), Watering Run and the SIPs (see Figure 2-1). The environmental media investigated and sampled during the RI varied between PEAs depending on their past histories and the potentially complete or complete exposure pathways as outlined in Section 2.3. Samples were collected from the soil, sediment, surface water, and groundwater at the former FWEC Facility to fill in data gaps identified in the DGAR (Tetra Tech, 2009) and to identify potential primary release locations within the PEA. Soil sample locations for the EWA, FSBA, MIP Area 1, and MIP Area 2 are illustrated in Figures 2-6, 2-7, and 2-8. Groundwater, surface water, sediment and soil locations are presented in Figure 2-6, and soil sample locations for MIP Area 1 and MIP Area 2 also are shown in Figures 4-1 and 4-2 of the RI Report, respectively. Groundwater, soil gas, sub-slab soil vapor, indoor air, and outdoor air samples were collected in the Affected Area to identify individual occupied structures and/or buildings that may be experiencing potential VI. Surface water, pore water and sediment were sampled in the Watering Run PEA. Sample locations for the groundwater, surface water, sediment, and pore water for the Affected Area and Watering Run are presented in Figure 2-7 and sample locations associated with vapor intrusion are present in figures in Attachment D. Finally, groundwater was sampled in the SIPs to determine the transport of volatile chemicals down-gradient from the former FWEC Facility and the sampling locations are presented in Figure 2-8. Data tables of all sample results utilized in the BHHRA are presented in Attachment E. The original documentation of all of the historical data used in the BHHRA is presented in Attachment F.

2.4.1 Site Data Compilation and Processing

2.4.1.1 Soil

Surface and subsurface samples were collected in four separate areas of the former FWEC Facility: MIP Area 1 (i.e., the former Vapor Degreaser Area); MIP Area 2 (i.e., the former Finish Paint Building, and Solvent and Paint Storage Buildings); the former EWA; and the FSBA. These dispersed areas were evaluated separately in the BHHRA because of differences in the history and contaminants associated within each area. Soil samples were analyzed for VOCs,

semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), TAL metals and cyanide.

MIP Area 1 (former Vapor Degreaser Area):

MIP Area 1 is the location of the former Vapor Degreaser where lubricants and cutting oils were removed from machined parts (see Section 1.4.2.1 of the RI Report for a full description). Two subsurface samples were collected at MIP Area 1 in November-December 2010 between 6 and 10 feet below ground surface (bgs) in MIP Area 1 from direct-push soil borings. Samples were collected if the MIP sensing tool that was utilized during the field investigation indicated that potential contamination was present. Further discussion of the use of the MIP sensing tool is provided in Section 2.5 of the RI report, and the results of the MIP sensing tool are presented in Section 4.6.1 of the RI Report. Surface soil was not sampled during the RI investigations because surface soil in this area was not identified as a medium of concern during the data gap analysis (Tetra Tech, 2009), and potential volatiles contamination was not identified with the surface soil by the MIP sensing tool in MIP Area 1.

In order to augment the soil investigation, a total of 17 surface and 38 subsurface historical soil sample results from three previous investigations were incorporated into the All Soil dataset for MIP Area 1, for a total of 57 soil samples (WCC 1986, WCC 1987, WCC 1991). These historical samples were collected within the polygon shown in RI Report Figure 4-1, although the exact locations of the soil samples are unknown. Sampling locations are presented in Figure 4-1 of the RI Report. The MIP Area 1 soils were evaluated using both a Surface Soil (i.e., 0-1 feet bgs) and an All Soil (i.e., 0-15 feet bgs) dataset for the BHHRA. Because there were a limited number of current and historical samples available, two historical samples were included in the surface soil dataset that included soil from a portion of the 0-1 foot bgs depth range but extended to 2 feet bgs. The datasets used in The BHHRA for the Surface Soil and All Soil at MIP Area 1 are presented in Tables E-1 and E-2, respectively, of Attachment E.

Soil samples collected during the RI investigations at MIP Area 1 were analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), TAL metals, and cyanide. Soil samples collected in 1985 were analyzed only for TCE. Samples collected in April and September 1986 were analyzed for VOCs using GC Method 601.

MIP Area 2 (the former Finish Paint Building, and Solvent and Paint Storage Buildings):

MIP Area 2 is the location of the former Finish Paint Building, and Solvent and Paint Storage Buildings as discussed in Section 1.4.2.1 of the RI Report. The Finish Paint Building was built in 1992 with pre-fabricated steel erected on slab-on-grade foundations. The building contained a large painting enclosure capable of surrounding a locomotive. The Solvent Building and Paint Storage Building were located east of the Finish Paint Building and were used to store solvents

and paint, respectively. A total of five subsurface samples (four original and one duplicate), as presented in Figure 2-6, were collected at MIP Area 2 in November-December 2010 from 7-14 feet bgs in the same manner as described above. No historical data was available within the boundaries of MIP Area 2 (see RI Report Figure 4-2). All MIP Area 2 soil samples were evaluated together in one All Soil dataset for the BHHRA. No surface soils were collected here because the systematic MIP screening as described above indicated that potential volatiles contamination was not associated with the surface soil in MIP Area 2. Further discussion of the results of the MIP sensing tool results are presented in Section 4.6.1 of the RI Report. In addition, surface soil in this area was not identified as a medium of concern during the data gap analysis and, therefore, no surface soil sampling was performed during the RI. The use of the RI subsurface soil data (as All Soil) in the BHHRA for the future use evaluations provides a meaningful measure of the potential risks for this subarea. The MIP Area 2 dataset is presented in Table E-3 of Attachment E.

Soil samples collected during the RI investigations at MIP Area 2 were analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), TAL metals, and cyanide.

Former Expended Waste Area (EWA)

The EWA was located south of the transformer station (see Section 2.1.1.2 of this report and Section 1.4.2.1 of the RI report), and was identified in the Work Plan as a potential source area to be visually inspected during the RI site reconnaissance. Upon visual inspection, it was determined that sampling was required.

Five surface soil grab samples (0-0.5 feet bgs) were collected in the former EWA in November and December of 2011 (see Figure 2-6). Two samples were collected at location FCR01-06, one was a field duplicate (FCR01-10). The number of samples for the area is low because the total area of the PEA is relatively small and represent localized sampling efforts within the FFF. No historical data were available for inclusion in the former EWA for the BHHRA. Soil samples collected were analyzed for VOCs, SVOCs, TAL metals, and cyanide. The results area presented in Table E-4 of Attachment E. A small number of samples were collected in 2016 and analyzed only for total chromium and hexavalent chromium (Cr VI) for speciation purposes. These results are present in Table E-14 of the same attachment.

Former Shot Blast Area (FSBA)

The FSBA includes the location of the Shot Blast Building southwest of the Main Building, where shot blasting of painted locomotives occurred (see Section 2.1.1.2). Like the EWA, the area was identified as requiring visual inspection by the Work Plan, and it was determined that sampling was required.

Five surface soil grab samples (0-0.5 feet bgs) were collected in the FSBA in November and December of 2011 (see Figure 2-6). Again, the number of samples is low because of the relatively small size of this localized sampling effort within the FFF, and no historical data were available. Sampling locations for the FSBA are presented in Figure 2-6. Soil samples collected in this area were analyzed for VOCs, SVOCs, TAL metals, and cyanide and the results are presented in Table E-5 of Attachment E. A small number of samples were collected in 2016 and were analyzed only for total chromium and hexavalent chromium (Cr VI) for speciation purposes. These results are present in Table E-14 of the same Attachment.

2.4.1.2 Surface Water

Surface water samples were collected at the WWTS Retention Pond at the former FWEC Facility PEA (Figure 2-6) and throughout the Watering Run PEA (Figure 2-7) during high flow and low flow conditions. As described in the Work Plan, the high flow condition sampling event occurred within two days of a singular rain event and the low flow condition sampling event occurred following a period of no precipitation for at least seven days (Tetra Tech, 2010). The high flow sampling event was conducted in May 2011, and the low flow sampling event was conducted in August 2011. In addition, data from four springs were included in the Watering Run dataset, which is presented in Table E-12 of Attachment E. The inclusion of the springs in the Watering Run dataset is discussed in Section 2.5.4. The locations of the four spring samples are present in Figure 2-9. The surface water data from these two PEAs were assessed separately in the BHHRA because of the different histories of the two PEAs. Surface water samples were analyzed for formaldehyde, VOCs, SVOCs, pesticides, metals and cyanide.

2.4.1.3 Sediment

Sediment samples also were collected at the WWTS Retention Pond at the former FWEC Facility PEA and throughout the Watering Run PEA in August 2011. Sample collection occurred during low flow conditions and after the surface water sample was collected. Samples in both areas were collected between 0-0.5 feet bgs. Additional historical data from June 1989 was compiled and incorporated into the WWTS Retention Pond dataset (WCC, 1989). No additional historical sediment data were identified for Watering Run. Sediment samples collected in these two areas are presented in Figures 2-6 and 2-7, respectively, and were evaluated separately. Sediment samples were analyzed for formaldehyde, VOCs, SVOCs, herbicides, pesticides, and metals and cyanide. Additional sediment samples were collected in October 2014 to further delineate the potential migration of the contamination found in the Retention Pond. These additional samples were collected northward along the WWTS Outflow Channel, and were analyzed for PAHs and metals.

2.4.1.4 Pore Water

Pore water samples were collected in the Watering Run PEA (Figure 2-7) during the low flow condition sampling event after the surface water and sediment samples were collected and using passive diffusion bag samples (PDBS). Each PDBS remained in place for approximately 14 days prior to removal. Pore water samples were analyzed for VOCs and SVOCs. The pore water sampling results were reviewed but were not included in the database used for the BHHRA.

2.4.1.5 Groundwater

Groundwater was collected at the former FWEC Facility, Affected Area, and the SIPs to identify PEA-specific and Site-wide variability in the concentrations of volatiles present in the groundwater. Groundwater sampling locations are illustrated in Figure 2-6, 2-7, and 2-8, respectively. The sampling also was performed to identify the extent of groundwater contaminant transport and migration down-gradient from the former FWEC Facility. The following rounds of groundwater sampling were included in the groundwater database: Site-wide sampling conducted in April 2014, September 2013 and May 2013; the sampling of four Flexible Liner Underground Technologies (FLUTe) wells (i.e., RMW-01D, RMW-06D, RMW-09D, and RMW-11D) between December 2012 and April 2013 with the exception of the 1,4-dioxane results (see Section 2.5.1 for a discussion); overburden well sampling conducted in April 2012; hydropunch well sampling conducted between November 2010 and August 2012; and interim well sampling performed in December 2011. Groundwater samples were analyzed for formaldehyde, VOCs, SVOCs, herbicides, pesticides, metals, and/or cyanide. Note that all groundwater monitoring well results for metals are based on unfiltered sample results. All groundwater data used for the BHHRA are included in the appropriate data tables in Attachment E.

Three grab samples (two originals and one duplicate) collected in the MIP 2 area from two soil borings were used for the assessment of potential indoor air contamination in the FFF. These samples are not included in the overall groundwater dataset because they are not from established groundwater monitoring wells and as such are not comparable to the other groundwater sampling results. However, they are considered to be representative of a source for vapor release and/or migration into a hypothetical future structure.

Two additional groundwater samples were collected in October 2014 in order to investigate a potentially anomalous reported TCE sampling result at well RMW-09S-1 relative to the time series of sampling results that had been done at that well. These samples were analyzed only for VOCs and are discussed further in Section 2.5.2.

The groundwater data sets compiled for the FFF, the Affected Area, and the SIPs included the results from monitoring wells shown to have been impacted by some past release, especially of TCE and its degradation products. These constituents were detected in a high fraction or

majority of the monitoring wells for which data was available for these areas. Other constituents (such as the BTEX compounds), which may or may not be attributable to the releases from the FFF sources, were generally detected at a relatively lower frequency across the set of monitoring wells in these exposure areas. In addition, the different constituents were sometimes detected at different depths at a given location within an exposure area depending on their properties and the local topography/geology. This was evident from the sampling performed at co-located wells clusters screened at different depths. Taken together, the impacted groundwater ñplumeò for different contaminants differed from constituent-to-constituent in both the horizontal and vertical spatial extents. Some areas of impacted groundwater also were discontinuous for the constituents for these reasons. Consequently, a single set of monitoring wells was chosen as the basis for the groundwater data bases in each exposure area using the results for TCE and its degradation products. This common definition avoided the possible appearance of picking and choosing data from certain wells and certain depths for purposes to the risk assessment data bases. Use of the maximum detected or a metric from the high end of the various resulting distributions resulted in conservative exposure point concentrations for the groundwater risk calculations.

2.4.2 Background Samples

2.4.2.1 Soil and Sediment

Background concentrations are generally evaluated to determine which detected constituents are indicated to be present due to natural occurrence or non-site related operations. Site-specific background soil concentrations were developed using the results of the 2016 sampling performed at locations that were believed to have not been impacted by past Site operations and activities. Approximately 20 samples were collected and analyzed. This analysis and the resulting background levels determined are presented in Attachment H.

2.4.2.2 Groundwater and Surface Water

Up-gradient groundwater monitoring wells CH-7 and CH-8 were selected to reflect groundwater that was not impacted by the Site and be representative of naturally-occurring groundwater. Both wells are located north of the former FWEC Facility, just south of Crestwood Road. No surface water samples were available to use as background concentrations.

2.4.3 Indoor Air

One to three types of vapor intrusion-related samples relative to each occupied structure that was investigated in the Affected Area (i.e., indoor air, outdoor air, and external soil gas or sub-slab soil vapor) were collected during the 2010 VI investigation. Groundwater samples also were collected during the 2010 VI investigation (herein referred to as ñVI investigation groundwater samplesò). In addition, shallow groundwater samples were collected from the established network of monitoring wells after 2010 in the vicinity of individual structures (herein referred to

as ñshallow groundwater monitoring well samplesò). The VI investigation groundwater samples and the monitoring well samples were used to conduct the evaluation of potential VI into the occupied structures within the Affected Area. The 2010 VI investigation sampling was guided by the concentrations of TCE detected in the shallow groundwater at the respective locations (Tetra Tech, 2010) as discussed in the rest of this section and in Attachment D to this BHHRA.

The data collection effort was conducted using appropriate regulatory and technical VI assessment guidance (including, among other guidance, USEPA Region 3ôs Vapor Intrusion Framework (USEPA-R3, 2009)) to characterize the potential for VI into the overlying structures within the Affected Area. Given the desire to conduct the VI investigation as quickly as possible, the 2010 sampling was performed in the Spring of that year. A second sampling event during the winter heating conditions (what the USEPA considers the óworst caseô scenario) was not performed based on the evaluation of the Spring sampling results and the mitigation steps that were taken immediately following. Based on an analysis of the available 2010 shallow groundwater monitoring data, ñGroupò levels were defined to distinguish locations within the Affected Area:

- Group 1 ï Properties with groundwater TCE concentrations between 130 and 200 micrograms per liter (Õg/L);
- Group 2 ï Properties with groundwater TCE concentrations between 50 and 130 Õg/L; and
- Group 3 ï Properties with groundwater TCE concentrations between 5 and 50 Õg/L.

The lower limit for the Group 3 Locations (i.e., 5 ug/L) was the published groundwater screening value for TCE from the USEPA vapor intrusion guidance at the time of the Work Plan development. Had the current USEPA TCE groundwater screening value (i.e., 1.2 ug/L) been used to identify residences for inclusion in Group 3, there would have been no change to the list of residences in that category. Over 70 properties in the Affected Area were evaluated and placed into a group based on these TCE concentration cut-offs. The evaluation considered the maximum detected TCE concentrations in wells associated with the buildings at the location relative to east-west demarcation lines along Church Road and north-south demarcation lines along South Mountain Boulevard. The evaluation yielded the following:

- Nine (9) properties located in the middle portion of the Affected Area fell within the horizontal boundary for Group 1, where seven (7) of the nine (9) properties that were accessible for sampling had TCE concentrations within the concentration range for Group 1 and two (2) properties had concentrations below that concentration range. The area that bounded these nine (9) properties was designated as ñArea 1.ò

- Twenty-seven (27) properties located in the eastern and western portions of the Affected Area fell within the horizontal boundaries associated with Group 2. Ten (10) of the 15 properties that were accessible for sampling had TCE concentrations within the concentration range for Group 2, and five (5) properties had concentrations below that concentration range. The area that bounded these 27 properties was designated as ñArea 2.ò
- Thirty-eight (38) properties at the far eastern and western portions of the Affected Area fell within the horizontal boundaries associated with Group 3, and each of the 12 of the properties that were accessible for sampling had TCE concentrations within the concentration range for Group 3. The area that bounded these 38 properties was designated as ñArea 3.ò

At seven Group 1 buildings located in the central portion of the Affected Area, indoor air, outdoor air, and either sub-slab soil vapor or external soil gas samples were collected. At other buildings and structures within the Affected Area, including occupied structures along Church Road, only sub-slab soil vapor or, in some cases, external soil gas samples (i.e., not from under a building foundation) were collected. The reduced sampling at the Group 3 locations was determined to be appropriate for the RI given the reduced potential and likelihood for VI concerns at these locations. This sampling strategy was statistically developed in Section 3.1.7 of the Work Plan and was approved by USEPA. The strategy was robust and included the potential to sample additional properties if potential VI concerns were indicated in the sampled properties. No such concerns arose during the VI investigation. Samples were analyzed for VOCs and SVOCs.

Prior to conducting the VI field sampling activities, a 13-page ñIndoor Air Quality (IAQ) and Building Assessment/Inventory Questionnaireò was completed for each sampled location. The questionnaire contained 59 questions pertaining to the following information:

- Building Location and Date;
- Occupant Contact Information;
- General Building Description;
- Basement/Crawl Space Description;
- Additional Building Details/Occupant Use; and
- Sketches of the Floor Plans on Each Level of the Building.

The questionnaire was completed at least one week prior to the sampling at that location. The questionnaire and inventory were later used to evaluate the possibility that on-property sources of contaminants could have affected the VI sampling results. Temporary relocation of such products and airing of the structure was performed prior to conducting the VI sampling program.

The VI evaluation also included collecting property-specific data to support the VI evaluation, such as the presence of radon mitigation systems, septic systems, and underground tanks.

The following summarizes the sampling activities performed during the VI evaluation by Area. Additional details of VI investigation sampling by location are presented in Attachment D to this BHHRA.

- Area 1 ï A total of 11 VI investigation groundwater or surface water samples (including 1 duplicate), 11 sub-slab soil vapor samples, 15 indoor air samples (including 1 duplicate), 7 outdoor air samples, and 2 external soil gas samples were collected from 13 properties in this part of the Site.

- Area 2 ï A total of 28 VI investigation groundwater or surface water samples (including 1 duplicate), 27 sub-slab soil vapor samples (including 3 duplicates), 2 indoor air samples, and 1 external soil gas sample were collected from 20 properties in this part of the Site.

- Area 3 ï A total of 16 VI investigation groundwater or surface water samples (including 2 duplicates), 25 sub-slab soil vapor samples (including 1 duplicate), and 1 external soil gas sample were collected from 9 properties in this part of the Site.

Based on the results of the VI air sampling and analyses performed in 2010 and in consultation with USEPA, VI mitigation activities were performed at Location 11 (175 Church Road) and Location 16 (194 Church Road) in July of 2011. Mitigation systems were installed at these two locations because the assessment of potential indoor air risks performed at that time using the then-current risk-based screening criteria and vapor intrusion assessment methodology indicated that the unique subsurface conditions associated with these locations (i.e., residential construction on the site of a natural spring and a leaking former well pump flooding the material beneath the foundation slab of another residence) were causing the indoor air at both locations to be preferentially impacted by vapor intrusion to a degree greater than what would be consistent with the precautionary screening levels. The VI mitigation systems were installed in July 2011 by Clean Vapor, LLC. Details of the VI mitigation systems were documented in reports submitted to USEPA in August 2011 (Clean Vapor LLC, 2011a, 2011b) (see Supplement 2 to Attachment D).

2.5 Data Usability Evaluation

A detailed data usability evaluation was performed on the data collected during the RI. This data was assessed relative to its adequacy to fulfill the requirements of the RI/FS data quality objectives (DQOs). Laboratory data were assessed in terms of the following parameters:

- Precision, or the degree of agreement between replicate measurements of the same or identical samples; determined through the use of laboratory duplicates, matrix spike duplicates, and field duplicate samples;
- Accuracy, or the degree of agreement between a measured analytical result and an accepted true value; determined through the use of surrogate compounds, internal standard compounds, matrix spike samples, and laboratory control spike samples;
- Representativeness; determined through the selection of appropriate sampling locations and the implementation of approved sampling procedures;
- Comparability; between the RI data results and between past, present and future sampling events; and
- Completeness; judged by the percentage of samples that met or exceeded the criteria objective levels (i.e., the number of usable sample results for the data set).

In addition to the validation review which assessed the laboratory analytical data, the evaluation also checked the field investigation procedures, field logbooks, and other documentation records and verified that the sampling procedures were performed following the approved protocols, were of sufficient quality to satisfy the DQOs, and could be relied upon for performing the risk assessments. The RI determined that the data fulfilled the project-specific objective requirements and was thus acceptable for use to support risk assessments and Site decisions. A full description of the data usability evaluation is presented in the RI Report.

The majority of the validated data was utilized in the BHHRA. However, certain data results were not included in the groundwater dataset or were re-classified from groundwater to surface water (or from surface water to groundwater) as discussed below.

2.5.1 1,4-Dioxane in FLUTe Wells

Sampling results for 1,4-dioxane for samples collected prior to April 2014 from the four multiport FLUTe wells (i.e., RMW-01D, RMW-06, RMW-09D, RMW-011D) installed in the bedrock hydro-stratigraphic unit were not included in the groundwater dataset. During review of the laboratory results from the Round 1 and 2 sampling events that occurred in May and September 2013, large deviations in the reported concentrations for this compound were observed. It was determined that the concentrations of 1,4-dioxane were influenced by the well purge procedure utilized for these wells. Based on FWECôs independent evaluation, a modified FLUTe well purge procedure was developed to collect representative groundwater samples. As such, the reported concentrations of 1,4-dioxane prior to April 2014 in these four wells were not included for analysis in the risk assessment groundwater dataset. This issue is discussed more fully in the RI Report in Sections 2.11.9 and 4.2.3.

2.5.2 TCE Sampling Results for RMW-09S-1

A total of five groundwater samples, including the additional sample that was collected in October 2014, were collected at well RMS-09S-1 over the course of the RI field investigation. The sampling results for TCE at this well were consistently below 0.50 Õg/L (including one non-detect result) with the exception of a sampling result of 110 Õg/L collected in April 2014. TCE results collected during the same time period at the adjacent overburden well RMW-09S-2 were between 60 and 86 Õg/L. The consistency of results at RMW-09S-2 across this time period, as well as at bedrock FLUTe wells in the same approximate location, suggested that the significant variation seen at RMW-09S-1 may have been an anomalous detection. Statistical tests (i.e., Q-test, Grubbsô test, and ProUCL outlier test; see Sections 2.11.0 and 5.3.3 of the RI Report and Attachment I of this BHHRA) on the sampling results data set for RMW-09S-1 indicate that the 110 Õg/L result is an outlier at the 99% confidence interval ($p < 0.01$). Based on these outlier test results, the sampling results at RMS-09S-1 for the April 2014 sampling event were removed from the groundwater data set for the Affected Area (including the 110 Õg/L detection) and were replaced with the sampling results from the October 2014 sampling event.

2.5.3 MIP Area 2 (former Finish Paint Building, and Solvent and Paint Storage Buildings) Groundwater Samples

Three groundwater samples were collected concurrently with the soil borings performed at the location of the former Finish Paint Building and the former Paint and Solvent Storage Buildings (i.e., MIP Area 2) at the former FWEC Facility PEA in December 2010. These samples were collected to provide preliminary treatability study information for evaluation during the FS. Because these samples were collected from soil borings and not from established groundwater monitoring wells, they are not considered comparable to samples collected for the groundwater investigations and, thus, were not included in the BHHRA groundwater dataset.

2.5.4 Seeps and Springs Water Samples

During the RI field investigation, locations where groundwater was observed seeping out of the ground and becoming a source of recharge for Watering Run were sampled and classified as surface water and labelled as ñseepsò. These samples were collected at the point where these seeps were discharging out of the ground. The water had not yet commingled with the surface water of Watering Run and, thus, the water discharging at these seeps is more representative of the groundwater than it is the stream it is entering. Therefore, for the purposes of the BHHRA, these particular sample locations were considered to be groundwater samples and were included in the groundwater dataset.

Data results from four other locations designated as ñspringsò were collected during the first and second round of the groundwater investigation in May and September of 2013. Upon further review of the location and nature of these water samples, it was determined that they were most likely directly connected to the surface water of Watering Run and, thus, were more

representative of surface water than groundwater. These samples were included in the surface water dataset for the BHHRA.

2.5.5 Different Analytical Methods and Analyte Lists for Different VI-Related Sampling

VI analyses necessarily involve the evaluation of co-located sampling results for groundwater and various air samples in relation to a particular structure or location. Sampling results for groundwater, external soil gas, sub-slab vapor, indoor air, and outdoor air at the same location are typically sought to evaluate whether vapor migration from the subsurface is occurring at that location and whether constituents measured in the indoor air originated with subsurface contamination, interior volatiles emission sources, or the contaminants in the outdoor air. The preferred analytical method for volatile organics in air samples is generally the air toxics method TO-15. TO-15 is capable of quantifying a relatively large number of VOCs in air to typically low limits of detection. This often results in a sizeable list of detected compounds for any air sample, often with low estimated concentrations of the constituents that are lower than the mandated reporting limit. Groundwater samples are typically analyzed for the Target Compound List (TCL) VOCs using a different sample preparation and analytical method than is used for the TO-15 samples. The TCL list of volatile organics has considerable overlap with the TO-15 list of volatile organics, but generally reports fewer compounds. As a result, when trying to compare sampling results for a location with both groundwater and air samples, the case often arises where a particular volatile constituent is detected in one or more air samples but was not analyzed in the groundwater. The other case also can occur where a TCL VOC is detected in groundwater but is not part of the set of TO-15 reported analytes. Such differences in the groundwater-air analyte lists can lead to uncertainties about whether a vapor migration linkage from the subsurface to indoor air is actually present or not. This is discussed further in the Uncertainty Analysis.

2.6 Screening and Selection of Chemicals of Potential Concern

Tables 2.1-2.13 in Attachment A present the screening level assessment performed at the Site using the standardized RAGS table format. A separate screening table was developed for each exposure medium within each PEA (or, in the case of soil, each subarea of the exposure medium). Each table presents the minimum and maximum concentrations of all analytes that were detected at least once and the associated data validation qualifiers for those results. In addition to these statistics, each table presents for each detected chemical the location(s) where the maximum detected concentration was observed, the frequency of detection, and the range of detection limits for the samples evaluated. For metals, the range of concentrations observed in site-specific background samples is provided for reference and comparison.

The screening toxicity value is located in the next column. The RSLs for all non-VI sampling media were selected from the USEPA Regional Screening Level (RSL) Summary Table based

on a Target Cancer Risk (TCR) of 1E-6 and/or a Target Hazard Quotient (THQ) of 0.1 (updated in June 2015). Soil samples were screened against the RSLs for Residential Soil, and sediment samples were screened against ten times the USEPA RSL for Soil as specified in the RI Work Plan. The non-VI groundwater samples relative to domestic or hypothetical potable use were screened against the USEPA RSL for Tapwater. The surface water sampling results were screened against ten times the USEPA RSL for Tapwater as specified in the RI Work Plan. The groundwater, soil gas, and indoor air samples were screened against the Vapor Intrusion Screening Level (VISL) Target Groundwater, Soil Gas, and Indoor Air Concentrations, respectively, for a potential residential VI scenario based on a TCR of 1E-6 and/or a THQ of 0.1 from the Office of Solid Waste and Emergency Response (OSWER) Vapor Intrusion Assessment Vapor Intrusion Screening Level (VISL) Calculator tool, Version 3.4 (dated June 2015). The USEPA Maximum Contaminant Limit (MCL) was included in the groundwater tables as an applicable or relevant and appropriate requirement (ARAR). No ARARs were identified for soil, sediment or surface water at this time. Finally, the last two columns of these tables show whether or not the analyte was selected as a COPC, and the rationale used in making that determination. The identified COPCs are presented below by exposure medium.

2.6.1 Soil at the Former FWEC Facility

Four separate and dispersed soil areas were sampled within the former FWEC Facility PEA: MIP Area 1, MIP Area 2, the former EWA, and the FSBA. These four areas were screened separately because of the difference in their prior uses and the observed sampling results. Where necessary, two separate soil datasets were created in accordance with the site-specific CSM for potential human exposures. A surface soil dataset (i.e., 0-1 feet bgs) was compiled to quantify the potential human health risk to those receptors whose activities would only bring them into contact with the surficial or near-surface soils. For those receptors whose duties would include digging or excavation into soils deeper than 1 feet bgs (i.e., construction and utility workers), an ñAll Soilò dataset (i.e., 0-15 feet bgs) was compiled.

2.6.1.1 MIP Area 1 (former Vapor Degreaser Area)

MIP Area 1 is the only soil area for which Surface Soil (0-1 feet bgs) and All Soil (0-15 feet bgs) data were available separately. All of the surface soil data were compiled from previous reports, but the All Soil dataset was a mixture of historical data and data collected during the RI investigation. All of the historical data samples were analyzed for VOCs. Table 2.1 in Attachment A presents the results of the surface soil screening at MIP Area 1. All three of the compounds detected (i.e., 1,1,2,2-tetrachloroethane [1,1,2,2-TCA], 1,1,2-trichloroethane [1,1,2-TCA], and TCE) exceeded their USEPA RSLs for Residential Soil. The compounds 1,1,2,2-TCA and 1,1,2-TCA were detected in one (1) of only two (2) samples in which they were analyzed. TCE was detected in each of the 17 of the samples for which it was analyzed. Note that all of the samples, which are all historical samples, were analyzed for VOCs. While there are

only two detections of 1,1,2,2-TCA and 1,1,2-TCA, sample results from 17 locations were used in the BHHRA dataset for surface soils. The results for all three VOCs indicate that the potential risk from 1,1,2,2-TCA and 1,2,2-TCA are an order of magnitude smaller than the risk presented by TCE, and as such the risk associated with this area is adequately characterized by the historical dataset used in this BHHRA.

A total of 30 constituents were detected in the All Soil dataset for MIP Area 1, as presented in Table 2.2 in Attachment A. Chromium speciation data indicated that chromium VI is less than 1.5% of total chromium in soil and the only detections of chromium VI in soil were in samples from the Former Shot Blast Area. Therefore, the RSL for trivalent chromium was used as a screening criteria. Of the many VOCs and SVOCs detected, only 1,1,2,2-TCA, 1,1,2-TCA, and TCE were detected at maximum concentrations exceeding their USEPA RSLs. These are the same compounds identified as COPCs for the MIP Area 1 surface soil. The compounds 1,1,2,2-TCA and 1,1,2-TCA were detected in 2 of 38 samples in the All Soil dataset, and TCE was detected in the majority (48 of 53) of the samples for which it was analyzed. The COPCs 1,1,2,2-TCA, 1,1,2-TCA, and TCE were carried forward and further evaluated in the BHHRA for the receptors identified as potentially being exposed to the surface and subsurface soil of MIP Area 1. In addition to these VOCs, arsenic, cobalt, iron, and manganese were detected at maximum concentrations greater than screening criteria. Although the concentrations of arsenic, iron, and manganese were not statistically significantly greater than concentrations in site-specific background samples, all four metals were retained as COPCs.

2.6.1.2 MIP Area 2 (former Finish Paint Building, and Solvent and Paint Storage Buildings)

A total of nine (9) of the 53 analytes that were detected in this subarea exceeded their USEPA RSL value, as seen in Table 2.3 in Attachment A. The polycyclic aromatic hydrocarbons (PAHs) benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were all detected in one (1) out of five (5) samples collected, and this detection exceeded the RSL. All of the detections occurred at the same location (MIP2-B20A-7.5-8.0). These four PAHs were carried forward as COPCs in the BHHRA for this soil subarea. In addition to these SVOCs, cyanide, arsenic, cobalt, iron, and manganese were detected at maximum concentrations greater than screening criteria. The concentrations of arsenic, iron, and manganese were statistically significantly greater than concentrations in site-specific background samples. Chromium speciation data indicated that chromium VI is less than 1.5% of total chromium in soil. Therefore, the RSL for trivalent chromium was used as a screening criteria.

2.6.1.3 Former Expended Waste Area (EWA)

Table 2.4 in Attachment A presents the results of the soil screening at the former EWA. Of the 34 compounds detected, six (6) metals and five (5) PAHs exceeded their USEPA Residential Soil RSL values. Chromium VI was not detected in any of the four soil samples from the EWA

that were analyzed. The metals cobalt, copper, and nickel also exceeded the reference background concentrations. All of the metals were detected in all five of the samples collected in this subarea, and with the exception of arsenic, all maximum detections occurred at the same location (FCR01-06_120211). The PAHs benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected in at least two (2) locations, and all of the maximum PAH detections were from the same sample location (FCR01-08_120211). However, the maximum metals concentrations were detected at a different location. These six metals and five PAHs were identified as COPCs and were carried forward through the BHHRA.

2.6.1.4 Former Shot Blast Area (FSBA)

As shown in Table 2.5 in Attachment A, a total of the 35 compounds were detected. Nine (9) metals and five (5) PAHs exceeded their USEPA Residential Soil RSL values. Although chromium speciation data indicated that in general, chromium VI is less than 1.5% of total chromium, chromium VI was detected in all three (3) of the soil samples from the FSBA that were analyzed. These three detections were the only detections of chromium VI in soil samples. Of the nine metals all but arsenic and lead also were statistically significantly greater than their site-specific background concentrations. All of the metals were detected in all 10 of the samples collected in this subarea, and almost all of the maximum detections occurred at the same location (FCR01-04_120211). The PAHs benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected in samples from at least six (6) of 10 locations, and all of the maximum detections occurred at the same location as the metals maximums. These nine metals and five PAHs were identified as COPCs and were carried forward through the BHHRA.

2.6.2 Groundwater

Groundwater was analyzed at the former FWEC Facility, the SIP and the Affected Area separately to determine the nature and level of contamination present within each PEA.

2.6.2.1 Former FWEC Facility

Table 2.6 in Attachment A presents the results of the groundwater screening at the former FWEC Facility. Of the 44 analytes detected, a total of 23 exceeded their USEPA Tapwater RSL values. These include nine (9) metals (i.e., aluminum, barium, cadmium, total chromium (which is conservatively assumed to be chromium VI due to lack of validated chromium speciation data), cobalt, iron, lead, manganese, and mercury), the inorganic compound cyanide, the SVOC 1,2,4-trichlorobenzene, and 11 VOCs (i.e., 1,1,2-TCA, 1,1-dichloroethane [1,1-DCA], 1,1-dichloroethene [1,1-DCE], 1,2-dichloroethane, 1,4-dioxane, benzene, chloroform, cis-1,2-dichloroethene, tetrachloroethene [PCE], TCE, and vinyl chloride). These 23 compounds were

carried forward in the BHHRA as COPCs for non-VI exposure pathways relative to domestic or hypothetical potable use.

2.6.2.2 SIPs

As shown on Table 2.7 in Attachment A, 40 analytes were detected at least once in the SIP groundwater. A total of 15 analytes exceeded their USEPA Tapwater RSL values, including two (2) metals (iron and manganese), the SVOC bis(2-ethylhexyl)phthalate, and 12 VOCs (i.e., formaldehyde, 1,1-DCA, 1,4-dioxane, acetone, benzene, bromodichloromethane, carbon tetrachloride, chloroform, cis-1,2-dichloroethene, toluene, TCE, and vinyl chloride). These 14 compounds were carried forward in the BHHRA as COPCs for non-VI exposure pathways relative to domestic or hypothetical potable use.

2.6.2.3 Affected Area

As shown on Table 2.8 in Attachment A, 30 analytes were detected at least once in the groundwater in the Affected Area. Of these, a total of nine (9) analytes exceeded their USEPA Tapwater RSL values, including the metal iron and eight (8) VOCs (i.e., 1,4-dioxane, acrolein, benzene, bromodichloromethane, carbon tetrachloride, chloroform, TCE, and vinyl chloride). These nine (9) compounds were carried forward in the BHHRA as COPCs for non-VI exposure pathways relative to domestic or hypothetical potable use.

2.6.3 Sediment

2.6.3.1 Retention Pond

Table 2.9A in Attachment A presents the results of the sediment screening at the WWTS Retention Pond. Of the 74 compounds detected, two (2) metals (arsenic and manganese) and seven (7) PAHs exceeded 10x their USEPA Residential Soil RSL values. Chromium VI was not detected in the original or duplicate sediment sample submitted for recent chromium speciation. The PAHs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene were detected at all sampling locations, and dibenz(a,h)anthracene was detected at seven (7) of nine (9) locations. The maximum detection for all nine (9) compounds occurred at the same location (SD01-082411). These nine (9) compounds were identified as COPCs and carried forward through the BHHRA.

Table 2.9B in Attachment A presents the results of the sediment screening at the WWTS Outflow Channel north of the WWTS Retention Pond. Of the 38 compounds detected, only one (1) PAH (benzo(a)pyrene) exceeded 10x its USEPA Residential Soil RSL value. High molecular weight PAHs were detected at four (4) of five (5) locations and the maximum detection concentrations occurred at the same location (SD-37-10132014). However, the maximum

detected concentrations of PAHs are lower than the maximum detected concentrations measured in the WWTS Retention Pond by approximately three orders of magnitude. Given the significantly lower concentrations of PAHs in these Outflow Channel samples, human health risks for the WWTS Outflow Channel sediments would be proportionately much lower than those projected for the WWTS Retention Pond. Therefore, human health risks for the WWTS Outflow Channel were not calculated separately.

2.6.3.2 Watering Run, Tributaries and Streams

As shown on Table 2.10 in Attachment A, a total of 31 compounds were detected in the sediment of Watering Run or one of its tributaries. Of these, four (4) metals (i.e., arsenic, cobalt, manganese, and thallium) exceeded 10x their USEPA Residential Soil RSL values and manganese also exceeded the reference background concentrations. Arsenic, cobalt, and manganese were detected in all six (6) samples while thallium was only detected twice. These metals were identified as COPCs and carried forward through the BHHRA.

2.6.4 Surface Water

2.6.4.1 Retention Pond

Table 2.11 in Attachment A presents the results of the surface water screening at the former FWEC Facilityôs former WWTS Retention Pond. Of the 16 analytes detected, none exceeded 10x their respective USEPA Tapwater RSL values. As a result, no COPCs were identified for the surface water of the Retention Pond.

2.6.4.2 Watering Run, Tributaries and Streams

Table 2.12 in Attachment A presents the results of the surface water screening at the Watering Run PEA. Of the 26 analytes detected, only TCE and formaldehyde exceeded the 10x Tap Water RSL screening value of 2.8 ug/L. Out of 49 samples analyzed for TCE, there were 16 detections and only two exceedances of the Ambient Water Quality Criteria ï organism only criteria of 30 ug/L. Both of the samples exhibiting exceedances were collected from a daylighting spring located at 201 Church Road at concentrations of 61 ug/L and 48 ug/L. The only other exceedance of the 10x Tap Water RSL screening value was observed in one sample from a spring at Camp St. George at a concentration of 9 ug/L. While these spring sampling results are at locations with ground level accessibility and, as such, resemble the surface water sampling locations, the level of dissolved volatiles in the spring samples would not be expected to persist in open, flowing water subject to agitation and potentially sunlight. The TCE concentrations from the true surface water samples from Watering Run and its tributaries and streams were below the screening criteria for TCE.

Table 2.12 also highlights formaldehyde as a constituent that was detected at a maximum surface water concentration exceeding its screening criterion. This detection was the only formaldehyde detection out of 47 surface water samples collected from Watering Run. The detection was at sampling location SW-11, which was in Watering Run directly adjacent to the CertainTeed facility in the SIP along Oak Hill Road. There was no other detection of formaldehyde in the surface water upstream or downstream of this point. Given the very limited extent of the indicated presence of formaldehyde in the surface water, significant exposure during the activity of a person interacting with Watering Run in a recreational or other manner would be highly unlikely. Formaldehyde also would be expected to be released into the ambient air from the water as it flowed and was agitated. As such, this single detection was not considered to be significant from a risk perspective.

Supplemental sampling of the Watering Run in 2016 to speciate the chromium thought to be present in the surface water detected total chromium in all 10 of the samples in which it was analyzed for and hexavalent chromium in both of the samples it was analyzed for. Table 2.12, therefore, reflects a screening of both total chromium (using the risk-based criteria for tri-valent chromium as a surrogate for total chromium) and hexavalent chromium separately. As can be seen, the maximum detected concentrations of both forms of chromium were below their respective screening levels and chromium was not identified as a COPC in any form.

As a result, no COPCs were identified for the surface water of Watering Run.

2.6.5 Indoor Air

2.6.5.1 Former FWEC Facility

VI is most directly driven by the nature and magnitude of the dissolved volatiles contamination in the groundwater in the water-bearing layer closest to the ground surface and a potential foundation of a future occupied structure. The first encountered water-bearing unit at the former FWEC Facility was found to be closest to the ground surface and most heavily contaminated with volatiles at the location of the former Finish Paint Building and the former Paint and Solvent Storage Buildings. This area, which became known as the MIP Area 2, had a depth to the impacted groundwater between 2.25 and 4.71 feet bgs. Table 2.13 in Attachment A lists the volatile constituents that were measured to be present in these monitoring well samples. Only two sampling locations within this relatively small area reported detections of volatiles: GW-MIP2-20A and GW-MIP2-30. The maximum detected groundwater concentration was then compared to the VISL Target Groundwater Concentration for a potential residential VI scenario based on a TCR of 1E-6 and/or a THQ of 0.1 from the OSWER Vapor Intrusion Assessment Vapor Intrusion Screening Level Calculator tool, Version 3.4 (dated June 2015). Those constituents exhibiting maximum detected volatiles concentrations in this shallow groundwater that exceeded their respective target concentrations were selected as COPCs for VI for the

overall former FWEC Facility. This screening was based on the most extreme observed conditions at MIP Area 2 (i.e., high concentrations and shallowest groundwater) and was considered to provide a conservative screening for COPCs for VI for the entire former FWEC Facility (i.e., a screening designed to identify risks at lower contaminant levels in consideration of the representative contaminant levels present and the likely exposures). The ten volatile constituents identified as COPCs for VI were: 1,1,1-trichloroethane (1,1,1-TCA); 1,1,2-TCA; 1,1-DCA; 1,1-DCE; ethylbenzene; mercury; naphthalene; PCE; TCE; and xylenes.

2.6.5.2 Affected Area

Potential indoor air VI concerns at the Site have previously been evaluated and monitored by multiple groups, including the Pennsylvania Department of Health (PADOH), PADER (now PADEP), USEPA, and the Agency for Toxic Substances and Disease Registry (ATSDR) (PADOH, 2010). PADOH and ATSDR reviewed the groundwater sampling data, surface water sampling data, and limited residential indoor air/vapor intrusion sampling data. As a result, residents in the area of the down-gradient groundwater plume were provided alternate drinking water supplies by point-of-use groundwater treatment systems, then connection to the municipal water supply system, and VI mitigation systems (active venting) were installed at two residences (Clean Vapor, 2011a, 2011b).

In addition, PADOH and ATSDR analyzed the cancer incidence data for the Mountain Top area to determine if the rates of cancer that are potentially associated with exposures to TCE are elevated compared to the Commonwealth of Pennsylvania as a whole. The cooperative Health Consultation was performed by PADOH and ATSDR to determine if site-related TCE could harm peopleôs health, including through inhalation of potentially impacted indoor air. The Health Consultation concluded that ñ*Breathing the TCE levels detected in the residential indoor air samples (to date) is not expected to harm the publicôs health*ò (PADOH, 2010). The Health Consultation noted that a baseline risk assessment would be developed as part of the RI/FS to identify the existing or potential risks to human health and the environment based on the sampling conducted for the RI.

During this same timeframe, updated vapor intrusion assessment and management guidance was developed and proposed by USEPA (e.g., USEPA, 2012; USEPA, 2013) to replace and supplement the Draft Vapor Intrusion Guidance published in 2002 (USEPA, 2002), as were risk-based target screening values for indoor air, sub-slab or soil gas, and groundwater (USEPA, 2015a,b). Attachment D to this BHHRA presents an evaluation of the more recently collected RI VI investigation sampling data that were collected since the assessment performed by PADOH and ATSDR, including a consideration of the building characteristics that are relevant to the potential vapor intrusion inhalation exposure pathway at a number of locations within the Affected Area. The VI evaluation was conducted in accordance with the USEPA-approved Work Plan that was developed to incorporate the newer VI guidance, screening values, and

assessment approaches. Other recent VI guidance and best practices also were applied in the VI evaluation when the Work Plan did not specifically address some aspect of the evaluation.

This evaluation was performed on a building-by-building basis using the following information that was available for each location, including: shallow monitoring well groundwater samples that were collected from nearby monitoring wells; groundwater data collected during the VI investigation in association with specific locations and residences; measurements of the sub-slab vapor or external soil gas constituent concentrations that were collected in relation to the building; measurements of the indoor air constituent concentrations at the building (typically for the basement and/or first floor); and concurrent measurements of the outdoor air constituent concentrations at the location. This property-specific approach was believed to be most technically defensible and useful with respect to site management decision-making and conservative (i.e., more protective) in nature. In addition to the sampling performed in 2010, a 13-page ñIndoor Air Quality (IAQ) and Building Assessment/Inventory Questionnaireò was completed for each sampled building. The questionnaire contained 59 questions pertaining to the following information: building location and date; occupant contact information; general building description; basement/crawl space description; additional building details/occupant use; and sketches of the floor plans on each level of the building. Further details of the data collected and used in the VI evaluation are presented in Attachment D to the BHHRA.

The VI evaluation was designed to apply the assessment process prescribed in USEPA guidance, consider aspects of VI assessment recommended by PADEP, and identify COPCs for the BHHRA relative to the VI inhalation exposure pathway. Accordingly, a three step process that was reviewed and approved by USEPA was applied:

- Step I: Assess the Completeness of the Vapor Intrusion Inhalation Exposure Pathway at Each Building/Location;
- Step II: Assess the Potential Risk-Related Significance of the Measured Shallow Groundwater, Sub-Slab Vapor/External Soil Gas, and (if available) the Indoor Air Constituent Concentrations Associated with Each Building/Location; and
- Step III: Assess the Strength of the Linkage of the Presence of the Detected Constituents in the Indoor Air or Sub-Slab Vapor to the Releases from the former FWEC Facility Using a ñMultiple Lines of Evidenceò Approach.

Each of these sequential steps is further described below.

<u>Step I:</u> Assessment of the Completeness of the VI Inhalation Exposure Pathway

The potential completeness of the VI inhalation exposure pathway was assessed by first identifying the list of constituents that were found to be present in both the VI investigation

shallow groundwater samples and the soil gas and/or indoor air at a concentration that exceeded the USEPA target risk-based residential screening levels associated with that medium. For indoor air, this constituent-specific risk-based screening level was the USEPA Residential Air RSL dated June 2015 (USEPA, 2015). This screening level is the same as the Target Indoor Air Concentration published in association with the USEPAôs OSWER Vapor Intrusion Assessment VISL Residential Exposure Scenario RBL Calculator Version 3.4 dated June 2015 (USEPA, 2015b). These published values are based on a single chemical TCR of 1E-6 or a THQ for the constituent of 0.1. In accordance with the USEPAôs Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) protocol for COPC selection, the risk-based screening level should be based on a THQ for the constituent of 0.1 to account for the possibility of multiple constituents at a site affecting the same target organ or biological system of an individual who could be exposed to a group of contaminants. For the sub-slab vapor or soil gas, this constituent-specific screening level was the VISL Target Sub-Slab and Exterior Soil Gas Concentration dated June 2015 (USEPA, 2015b) using a TCR of 1E-6 and THQ of 0.1. Only those constituents that were present in the local shallow groundwater <u>and</u> had measured indoor air, sub-slab vapor <u>or</u> soil gas concentrations exceeding their respective screening levels were further considered as potentially posing an inhalation risk due to a potentially complete VI exposure pathway. These cases were further considered using multiple lines of evidence to judge the completeness of the VI pathway.

A second check was then made to ensure that the constituents identified based on the comparison above were considered ñsufficiently volatile and toxic by USEPA to pose an inhalation risk via vapor intrusion from a groundwater sourceò (USEPA, 2015a). The VISL Guidance specifies the volatility and toxicity thresholds used by USEPA to make this determination. The determination was based on the molecular weight, vapor pressure, Henryôs Law Constant, and the toxicity of the constituent. Constituents that met these requirements have been listed by USEPA in the VISL Guidance (USEPA, 2015a, Appendix A). Only those constituents that are sufficiently volatile and toxic to pose potential VI concerns relative to contaminated subsurface groundwater were retained for further consideration relative to assessing the potential completeness of the VI inhalation exposure pathway.

Following this check, the sampling results for each building/location were compiled and examined in relation to each other. The sampling data associated with the potential vapor migration pathway at that location (i.e., from the shallow groundwater up through the subsurface soil and into the building) were evaluated to see if the constituent was measured and was found to be present at each point along the migration route. A complete VI inhalation exposure pathway would require that the constituent or its degradation products be detected at a building/location in the shallow groundwater (i.e., either in the VI investigation or shallow monitoring well groundwater samples), the sub-slab vapor, and the indoor air, assuming that there were no elevated detection limits associated with the samples for a medium at that location. In addition, vapor intrusion into the building would require the sub-slab vapor concentration of a

constituent to be higher than what is detected in the indoor air and that the indoor air concentration of the constituent is higher than the concentration of the same constituent in the outdoor air. The available data for these media for each building were examined to determine if this vertical VI gradient of detected constituent concentrations was in evidence along the upward vapor migration route. When concentrations for one or more media or analyte in that medium were not available for a particular location, the data and information that were available were examined, and judgment was made about the potential completeness of the VI inhalation exposure pathway with uncertainty ascribed. If the VI inhalation exposure pathway could not be shown to be incomplete based on the data that were available, the pathway was conservatively assumed to be potentially complete and was evaluated further for that building/location. For each location where the VI inhalation exposure pathway was assessed to be complete or potentially complete, those constituents that were found to be present in the indoor air, or in the sub-slab vapor or external soil gas if no indoor air sampling was performed, were further evaluated in Step II.

<u>Step II</u>: Assessment of the Significance of the Measured Concentrations Relative to VI Inhalation Risk

Step II was an assessment of the potential significance of the measured groundwater and/or sub-slab vapor or soil gas at a building assuming that vapor migration from subsurface groundwater may be occurring. This assessment was done in two ways: (1) first by calculating the cumulative projected inhalation risk for each location based on the measured soil vapor (sub-slab or external soil gas) and indoor air concentrations; and (2) second on a constituent-specific basis by location using multiple lines of evidence relative to the potential completeness of the VI pathway in consideration of the measures groundwater, soil gas, indoor air and ambient air measurements.

Screening Level Cumulative Risk Projection by Location

The USEPA Vapor Intrusion Screening Level (VISL) Calculator (Version 3.4, June 2015 RSLs) was then applied in a second phase of the Step II assessment using the property-specific vapor intrusion sampling results for external soil gas, sub-slab soil gas and indoor air. These datasets were the same as those used in the Vapor Intrusion Evaluation that was performed as part of the Draft BHHRA and the first phase of the Step II assessment. These VISL Calculator runs provided estimates of the cumulative indoor air inhalation risk given a number of conservative default assumptions about the structures and the people occupying these structures. The risk estimates accounted for all measured air constituents in the:

(1) external soil gas and/or sub-slab soil gas (based on the available data); and

(2) indoor air when indoor air measurements were taken (regardless of source).

The VISL Calculator runs highlighted 8 residences with potential VI concerns based on the indoor air sampling results alone or the combination of the indoor air and sub-slab soil gas sampling results, but many of the identified highest contributors to these risks were petroleum-related compounds or compounds associated with the use of chlorinated municipal water or interior chemical product storage (as further detailed below). Only 3 residences were highlighted for potential vapor intrusion concerns based only on the sub-slab sampling results, but TCE was not associated with 2 of these residences and did not contribute to the projected cancer risk in excess of 1E-6 or an HI=1 at the third residence. Only two residences (i.e., 175 Church Road and 194 Church Road) were highlighted for potential vapor intrusion concerns based on the VISL Calculator runs using both the indoor air and the sub-slab soil gas sampling results and indicated TCE as a risk driver. The VISL Calculator modeling runs for 171 Church Road also were highlighted for potential vapor intrusion concerns based on runs using both the indoor air and the sub-slab soil gas sampling results, however the risk drivers at this location did not include TCE or its degradation products (the risk drivers were primarily the BTEX compounds and naphthalene). The VISL Calculator results did suggest that there may be ubiquitous indoor air inhalation concerns at the residences in the Affected Area that are not related to the TCE plume.

Screening Level Constituent-Specific Assessment by Location

The measured near-surface groundwater, soil gas and indoor air concentrations at each building location were compared to their constituent-specific VISL Target Groundwater Concentration, Target Sub-Slab and Exterior Soil Gas Concentration or Target Indoor Air Concentration dated June 2015 (USEPA, 2015), respectively. If neither the maximum detected groundwater or sub-slab vapor/soil gas concentration exceeded its respective risk-based target concentration, that constituent was screened out of the VI evaluation for that building/location as this would be evidence against there being a subsurface source of that volatile contaminant. If the maximum detected concentration of the constituent in either the shallow groundwater or the sub-slab vapor/soil gas samples exceeded its respective VISL risk-based target concentration for that medium, that constituent was retained for further evaluation at that location. Any constituents with basement (BASE) or indoor air (IA) measurements that exceeded the constituentôs VISL Target Indoor Air Concentration (equivalent to the Residential Indoor Air RSL) also were not eliminated from the VI evaluation at that point. Table D-4 of Attachment D to this BHHRA presents the results of Steps I and this part of Step II of this assessment on a location-by-location basis. Table D-4 also presents results of Step III of the assessment, as detailed below.

<u>Step III:</u> Assessment of the Potential Linkage of the Detected Volatile Constituents at the Affected Area to the Releases from the Former FWEC Facility

Step III was an assessment of what the source or sources of the constituents that were detected in the indoor air was indicated to be, based on all available information about that location. The three primary sources of indoor air contaminants are:

1. Outdoor air;
2. Interior sources (e.g., stored chemicals and consumer products); and
3. VI from subsurface contamination.

A number of Lines of Evidence were examined to determine which source or sources may have generated the indoor air concentrations for a particular constituent at a particular building location. Different Lines of Evidence suggest different potential sources:

Lines of Evidence suggesting source is Outdoor Air:

A. The measured outdoor air concentration of the constituent is similar to or higher than the measured indoor air concentration.

Lines of Evidence suggesting source is Internal to the Building:

B. The building has a garage that is attached to the living space or is integral with the basement.
C. Fuels, solvents and other chemicals are stored within the basement or attached garage.
D. The building is connected to the public water supply that disinfects its water with chlorine prior to distribution.
E. The building has a septic system.
F. The building occupants engage in hobbies that make use of products with volatile constituents.
G. The building is occupied by individuals who smoke tobacco products indoors or burn coal or wood in fireplaces.

Lines of Evidence suggesting source is Vapor Intrusion from the Subsurface:

H. The measured sub-slab vapor concentration of the constituent was higher than the measured indoor air concentration.
I. Constituent was detected in the shallow groundwater at the building and was a COPC for the groundwater at the former FWEC Facility.
J. The building has cracks in the basement floor or walls and/or has a sump or basement floor drain and the groundwater table is relatively close to the foundation or floor of the lowest occupied living space.

Based on the application of the three-step VI evaluation process described above (and presented in Attachment D), only TCE at Locations 11 and 16 was identified as a COPC relative to potential VI and the indoor air inhalation exposure pathway.

VI mitigation activities were performed at Location 11 (175 Church Road) and Location 16 (194 Church Road) in July of 2011 following the VI air sampling and analyses performed in 2010. It should be noted that two mitigation systems were installed in 2011 because the assessment of potential indoor air risks performed at that time indicated the indoor air at both locations was being potentially impacted by vapor intrusion. The analysis performed here for this RI that used more complete and more recent data also indicated the need for a mitigation system at both Location 11 and Location 16 based on the sampling performed before the installation of the mitigation system. The active soil depressurization (ASD) systems at Locations 11 and 16 were made operational on Friday, July 8, 2011. These ASD systems feature a single suction point and a garage attic mounted blower. Given the operation of these systems, the concentrations of TCE measured in the sub-slab vapor would be dramatically reduced, and the vapor migration pathway into the IA at this location would be eliminated.

As such, given the installation and operation of these VI mitigation systems, no VI constituents (i.e., TCE) currently pose an inhalation risk to the occupants of the Affected Area, no COPCs are identified for the indoor air VI and inhalation pathway for the BHHRA, and no further quantification of the current inhalation risk is warranted. However, a potential future VI risk will remain as long as the groundwater in the Affected Area is impacted by volatile organic compounds.

3.0 EXPOSURE ASSESSMENT

The exposure assessment identifies the COPC concentrations, exposure parameters, and equations that are used to quantify the complete exposure pathways identified in the CSMs for each identified receptor at each PEA. The exposure assessment identifies the magnitude of the exposure in terms of the exposure frequency and duration of a receptorôs potential exposure to COPCs. The following subsections detail the key components to the exposure pathways associated with the complete pathways that were quantitatively evaluated in the BHHRA. Additional details relative to contaminant fate and transport are presented in the RI Report.

3.1 Exposure Point Concentrations (EPCs)

A representative exposure point concentration (EPC) for each identified COPC in each exposure medium at each PEA was calculated using the available sampling data and the appropriate statistical methods recommended by USEPA risk assessment guidance and used to estimate contaminant intakes for the identified receptors. The USEPA Office of Research and Development (ORD) developed the ProUCLÈ software to generate statistical analyses for environmental applications for data sets with and without non-detect (ND) observations (USEPA, 2013). The current version of the ProUCLÈ statistical software package (Version 5.0) was employed to generate an EPC based on the 95 percent Upper Confidence Limit (UCL) of the mean or the maximum detected concentration, whichever was lower for each COPC within each exposure medium (USEPA, 2013). ProUCLÈ was used to generate UCL values for the COPCs for each exposure medium. For instances where ProUCLÈ was unable to generate a recommended UCL value or when the recommended UCL value exceeded the maximum detected concentration, then the maximum detected concentration in that medium in that area was selected as the EPC. To be conservative, both of the two field duplicate results (i.e., original sample and duplicate sample) were used in the UCL calculation. Per ProUCLÈ Technical Guidance and recommendations, UCLs were calculated with ND observations, which were entered as the reporting limit, which was coded to distinguish this data as ND results. This allows for multiple detection limits in ProUCLÈ to be considered during the computation of the UCL.

Tables 3.1 to 3.11 in Attachment A present a list of the COPCs identified by the screening process for each potential exposure medium at each PEA. Following the COPCs, the arithmetic mean of the detect and ND values as calculated by ProUCLÈ, the recommended UCL value generated by ProUCLÈ, the maximum detected concentration, the value selected as the EPC, and the statistical method recommended by ProUCLÈ (if applicable) are presented. See Attachment B for the ProUCLÈ output generated for each dataset. Tables 3.12 to 3.17 in Attachment A present EPCs estimated using transport modeling.

3.1.1 Soil

3.1.1.1 Ingestion and Dermal Absorption of Soil

Tables 3.1-3.5 present the EPCs for the soil subareas at the former FWEC Facility. EPCs for the surface soil of MIP Area 1 were a combination of maximum concentrations (for two COPCs) and a ProUCLÈ generated UCL (for one COPC). The maximum detected concentration was selected to be the EPC for four of the identified COPCs for the soil of MIP Area 2 because there was only one detection of each COPC. EPCs for the remaining three soil subareas in the former FWEC Facility were selected from the UCLs provided by ProUCLÈ. These soil EPCs are used to directly calculate the risk associated with the incidental ingestion and dermal exposure pathways in soil.

3.1.1.2 Inhalation of Outdoor Air

The EPC for the inhalation of particulates and volatiles in outdoor air must be calculated using a transfer factor (TF) to estimate the concentration of a particular chemical when it is either entrained by wind (for non-volatile chemicals) or volatized from the soil into the ambient air. The EPC was calculated from the soil EPC using the following equation:

CA = CS/PEF (for particulates)
CA = CS/VF (for volatile compounds)

Where:

CA = Chemical concentration in Air
CS = Chemical concentration in Soil (i.e., the EPC in soil)
PEF = Particulate Emission Factor
VF = Volatilization Factor

The particulate emission factor (PEF) represents the amount of a non-volatile chemical that is expected to be transferred into the air via wind. The reciprocal of the PEF is coupled with the concentration of the contaminant in soil to estimate a resulting concentration in air. Consequently, lower PEFs are associated with higher air concentrations. The PEF that was utilized for this BHHRA is the USEPA default value of 1.36E09 cubic meters per kilogram (m^3/kg) (USEPA, 2014) for all receptors except construction workers. The PEF for construction workers was 1.97E07 m^3/kg.

Similarly, the volatilization factor (VF) is a TF that estimates the amount of a volatile compound (i.e., either a VOC or certain lighter SVOCs) that will volatize and release into the ambient air from a known concentration of compound in the soil. Unlike the PEF, however, VFs are chemical-specific.

The quantitative approach described in of the *Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites* (EPA, 2002b) was applied when surface soil may be expected to release volatiles into the ambient air where they could be inhaled by a receptor. The equation for the VF is the following:

$$VF = \frac{{}^{Q}/_{C_{vol}} * (3.14 * D_A * T)^{1/2} * 10^{-4}(m^2/cm^2)}{(2 * \rho_B * D_A)}$$

Where:

VF =	Volatilization Factor [m^3/kg];
D_A =	Apparent Diffusivity [cm^2/s];
Q/C_{vol} =	Inverse of the geometric mean air concentration to the volatilization flux rate at the center of a square source [g/m^2-s per kg/m^3];
T =	9.5E08 [seconds]; and
ρ_b =	Dry Soil Bulk Density [g/cm^3].

Additionally:

$$D_A = \frac{\left[\left({\theta_A}^{10/3} D_{ia} H' + {\theta_W}^{10/3} D_W\right)/n^2\right]}{\rho_b K_d + \theta_w + \theta_A H'}$$

Where:

ρ_b =	Dry Soil Bulk Density, 1.5 [g/cm^3];
θ_a =	Air-filled Soil Porosity (L_{air}/L_{soil}), n-θ_w;
n =	Total Soil Porosity (L_{pore}/L_{soil}), 1 – (ρ_b/ ρ_s);
θ_w =	Water-filled Soil Porosity, 0.15 (L_{water}/L_{soil});
ρ_s =	Soil Particle Density, 2.65 [g/cm^3];
D_i =	Diffusivity in Air [cm^2/s], chemical specific;
H′ =	Dimensionless Henry's Law Constant, chemical-specific;
Dw =	Diffusivity in Water [cm^2/s];
K_d =	Soil-Water Partition Coefficient [cm^3/g] = K_{oc} x f_{oc} for organics;
K_{oc} =	Soil Organic Carbon Partition Coefficient (cm^3/g), chemical specific
f_{oc} =	Fraction Organic Carbon in soil, 0.006 [g/g].

Chemical-specific properties used to calculate VFs were obtained from the June 2015 RSL parameters table. The value of Q/Cvol was set to 81.9 g/m^2-s per kg/m^3 (USEPA, 2015b). Details of the VF calculations are provided in RAGS Table 4.7 in Attachment A.

The PEF or VF was used to calculate the EPC (i.e., CA), that was used to calculate the potential risk to each relevant receptor that comes into contact with outdoor air. Tables 7.1-7.13 in Attachment A show the outdoor air EPCs when they apply.

3.1.2 Groundwater

3.1.2.1 Ingestion and Dermal Absorption of Groundwater

Tables 3.6-3.8 present the non-VI EPCs for groundwater in each PEA. EPCs for each PEA were a combination of maximum concentrations and ProUCLÈ generated UCLs. These groundwater EPCs are used to directly calculate the risk associated with the incidental ingestion and dermal exposure pathways associated with groundwater.

3.1.2.2 Inhalation of Volatilized Constituents in Groundwater During Showering

Tables 3.12 to 3.14 present the model estimated concentrations of VOCs in the shower room resulting from COPCs in groundwater used for showering. A two-film model developed by Foster and Chrostowski (CPF Associates, 2003) based on gas-liquid mass transfer theory was used to estimate potential VOC emissions during showering using the impacted groundwater. The volatilization rate across the surface of the shower droplet during the droplet flight is used to predict the VOC emission rate. The emission rate is then used to predict air concentrations in the shower room while showering and immediately after the shower once the water has been turned off. These indoor air concentrations are then used to calculate exposures both during the shower and after the shower while still in the bathroom. Absorbed doses may be calculated by also incorporating the efficiency of VOC absorption across the lung lining. The VOC concentration leaving the shower droplet (C_{ld}) is obtained from an integrated rate equation based on a mass-balance approach (Foster and Chrostowski 1986, 1987):

$$C_{id} = C_0 \left(1 - exp\left[-\frac{K_{aL} \times t_d}{60 \times d}\right]\right)$$

where:

C_{ld} = VOC concentration leaving shower droplet after time td (µg/L);

C_0 = Initial VOC concentration in the groundwater (µg/L);

K_{aL} = Temperature-adjusted overall mass transfer coefficient (cm/hour);

t_d = Shower droplet drop time (sec); and

d = Shower droplet diameter (mm).

The term ñ60 x dò in the denominator of the exponential term accounts for the specific interfacial area for a spherical shower droplet (6/d) multiplied by conversion factors (1 hour/3600 sec and 10 mm/cm).

The overall mass transfer coefficient is adjusted to the bath water temperature according to a semi-empirical equation developed to estimate the effect of temperature on oxygen mass-transfer rate:

$$K_{aL} = K_L \left[\frac{T_1 \mu_s}{T_s \mu_1}\right]^{-0.5}$$

where:

K_{aL} = Temperature adjusted overall mass-transfer coefficient (cm/hr);

K_l = Overall mass-transfer coefficient (cm/hr);

T_1 = Calibration temperature for KL = 293 K;

μ_1 = Water viscosity at calibration temperature = 1.002 cp;

T_s = Shower/bath water temperature (K); and

μ_s = Water viscosity at shower/bath water temperature, (cp),

where:

$$\mu_s = 10^{\wedge}\left[8.67E - 4 + \frac{1.3272[20 - (T_s - 273)] - 0.001053[T_s - 273) - 20]^2}{(T_s - 273) + 105}\right]$$

The overall mass-transfer coefficient for the volatile constituent is calculated according to the following equation, consistent with the two-film model:

$$K_L = \left[\frac{1}{k_l} + \frac{RT}{Hk_g}\right]^{-1}$$

where:

K_L = Overall mass-transfer coefficient (cm/hr);

k_l = Liquid-film mass transfer coefficient (cm/hr);

R = Universal Gas Constant, 8.2x10-5 atm-m3 /mol-K;

T = Absolute Temperature (293 K);

H = Henryôs Law Constant (atm-m3 /mol); and

k_g = Gas-film mass transfer coefficient (cm/hr).

This equation describes the mass transfer rate of a compound across an air-water interface where diffusion may be limited by both liquid-phase and gas-phase resistances. For most volatile constituents with Henryôs Law Constants greater than 10-3 atm-m3 /mol-K, mass transfer is primarily limited by liquid-phase resistance. It has been shown, however, that under some kitchen wash basin water flow rate and aeration conditions, gas-phase resistance may still be important even for fairly volatile compounds such as chloroform (Henryôs Law Constant on the order of 10-3 atm-m3 /mol-K).

Typical values of k_L (20 cm/hr) and k_g (3,000 cm/hr), which have been measured for CO_2 and H_2O, respectively, may be used to estimate volatile-specific values for these parameters, as follows:

$$k_{g(VOC)} = k_{g(H2O)} \times \left(\frac{18}{MW_{VOC}}\right)^{0.5}$$

$$k_{l(VOC)} = k_{l(CO2)} \times \left(\frac{44}{MW_{VOC}}\right)^{0.5}$$

where:

$k_{g(VOC)}$ = gas-film mass transfer coefficient for VOC (cm/hr);

$k_{g(H2O)}$ = gas-film mass transfer coefficient for H2O (cm/hr);

$k_{l(VOC)}$ = liquid-film mass transfer coefficient for volatile (cm/hr);

$k_{l(CO2)}$ = liquid-film mass transfer coefficient for CO2 (cm/hr); and

MW = molecular weight of the volatile (g/mol).

The volatile constituent emission rate into the shower room is calculated from the volatile concentration leaving shower droplet (after time t_d) using the following equation:

$$S = \frac{C_{id} \times FR \times 60}{10^6}$$

where:

S = shower room VOC emission rate (g/hr);

C_{ld} = volatile concentration leaving shower droplet after time t_d (µg/L);

FR = shower water flow rate (L/min);

60 = conversion factor (min/hr); and

10^6 = conversion factor (µg/g).

Once the volatile-specific generation rate within the shower room is estimated for each volatile dissolved in the groundwater, the airborne concentration of each volatile constituent is estimated separately for two time periods: (1) the time period in which the water spray is on (and there are releases of volatiles into the shower room); and (2) the time period after the water spray is turned off.

1. During the first time interval when water is spraying, the concentration of each volatile constituent builds up exponentially and asymptotically toward a limiting concentration equal to the ratio of the constituent-specific volatile generation rate and the fresh air exchange rate with the shower room space. At the time when the shower is turned off, the concentration of the volatile in the shower room air has reached its maximum value. The Foster and Chrostowski shower model quantifies this concentration build-up over time, as well as the maximum concentration reached when the spray is turned off (C_{max}):

$$C_{max} = \frac{S'}{R} * \ [1 - Exp(R * D_s)]$$

where:

Sô = Volatile emission rate in the shower room (ug/m^3-min);

R = Air Exchange Rate in the shower room (1/min); and

D_s = Shower (spraying) event duration (min/event).

2. After the water is turned off, no more of the volatile is assumed to be released into the shower room space and the constituent concentration begins to drop off exponentially and asymptotically toward zero as fresh air mixes with the impacted air in the shower room through continuing air exchange. The shower model also quantifies this concentration reduction over this time interval.

The average airborne concentration of each volatile in the shower room space is then found by integrating the concentration build-up and reduction curves from their starting times to their ending times. The average volatile concentration in the shower room air during the shower (spraying) ($C_{ave\text{-}s}$) is given by:

$$C_{ave-s} = \left[\frac{S'}{R * D_s}\right] * \left[D_s - \frac{1}{R} + \frac{Exp(-R * D_s)}{R}\right]$$

The average volatile concentration in the shower room air after the shower (spraying) has stopped ($C_{ave\text{-}as}$) is given by:

$$C_{ave-as} = \left[\frac{\frac{S'}{R} * \ [Exp(R * D_s) - 1]}{D_t - \ D_s}\right] * \left[\frac{Exp(-R * D_s)}{R} - \frac{Exp(-R * D_t)}{R}\right]$$

where:

D_t = Total shower event duration (spraying plus after spraying (min/event).

An average airborne concentration for the entire shower duration (i.e., during the water spraying and after the spraying when the person is still present in the shower room space) ($C_{ave\text{-}exposure}$) is calculated as the time-weighted average of the interval average concentrations for the two time periods:

$$C_{ave-exposure} = \left[C_{ave-s} * \frac{D_s}{D_t}\right] + \left[C_{ave-as} * \frac{D_t - D_s}{D_t}\right]$$

This time-weighted average is then used at the exposure concentrations for the inhalation risk assessment for the showering event.

The estimation of exposure concentrations during showering is seen to be determined by constituent-specific mass transfer behavior, the characteristic shower room ventilation and fresh air exchange, and the duration of the active showering and the overall residence time in the shower room. The calculation of the mass transfer coefficient is a simplification of several types of mass transfer processes (e.g., from falling droplets and water impacting on the shower floor). The calculation of mass transfer coefficients is also an important component of modeling volatilization, and requires information on both chemical-specific properties as well as the interfacial area across which volatilization can occur. Mass transfer also can be affected by different water characteristics (e.g., water flow rate, shower nozzle type, droplet size distribution, and water temperature). Very limited experimental data are available, however, for describing mass transfer coefficients for indoor water uses. Room air exchange rates and inter-zonal air flow rates can be dramatically affected by the positioning of interior doors (open or closed), the use of forced ventilation (fans, air conditioners and evaporative coolers) and season of the year. Typical showering durations were assumed in the estimates. The validation of the Foster and Chrostowski model shower with laboratory and residential measurements indicates that the model provides a reasonable representation of the shower (CPF Associates, 2003 and USEPA, 1991).

The approach used focuses on indoor air concentrations associated with volatilization from showering, but not from other indoor water uses such as air humidifiers, the dishwashing machine, the clothes washing machine, toilets and sinks. Some empirical studies indicate that the mass transfer of volatile constituents from showers into indoor air is greater, perhaps by an order of magnitude, than from kitchen wash basins and clothes washing machines (CPF Associates, 2003).

3.1.2.3 Inhalation of Volatilized Constituents in Groundwater in a Construction Trench

As indicated in Section 3.1.2.3 the regional water table is typically greater than 20 feet deep and a typical utility trench is less than 8 feet deep. As such, it is very unlikely that a worker would have direct prolonged exposure to groundwater. Nonetheless there are some portions of each of

the three PEAs where the water table is less than 8 feet below ground surface and therefore this BHHRA conservatively assumes that a construction or utility excavation could encounter groundwater.

The source of volatilized COPCs in trench air is groundwater that may pool in the base of a construction excavation. A screening level model developed by the Virginia Department of Environmental Quality (VDEQ) was used to estimate the concentration of COPCs in air within the trench. Specifically, the concentration in air can be estimated by the following equation:

$$CA = CW \times VF$$

where:

CA	=	Concentration in trench air (mg/m^3);
CW	=	Concentration in water (mg/L); and
VF	=	Volatilization Factor.

And Volatilization Factor (VF) is estimated as:

$$VF = \frac{K_i \times A \times F \times 10^{-3} \times 10^4 \times 3600}{ACH \times V}$$

where:

Ki	=	Overall mass transfer coefficient of chemical (cm/s);
A	=	Area of the trench (m^2);
F	=	Fraction of floor of the trench through which chemical can enter (unitless);
ACH	=	Air Changes per hour (hr^{-1});
V	=	Volume of trench (m^3);
10^{-3}	=	conversion factor (L/cm^3);
10^4	=	conversion factor (cm^2/m^2); and
3600	=	conversion factor (seconds/hour).

The mass transfer coefficient, Ki, is estimated as follows:

$$K_i = 1 \Big/ \left\{ \left(\frac{1}{k_a}\right) + \left[(R \times T) \Big/ (H_i \times k_{ig}) \right] \right\}$$

where:

Ka	=	Liquid-phase mass transfer coefficient of I (cm/s);
R	=	Ideal Gas Constant (atm-m^3/mole-K);
T	=	Average system absolute temperature (K);
Hi	=	Henryôs Law Constant of I (atm-m^3/mol); and
Kig	=	Gas-phase mass transfer coefficient of I (cm/s).

The value for R is 8.2 x 10^{-5}. The default value of 298K was used for the average system absolute temperature.

If a trench were intercept the groundwater, it would only be for a few inches since a groundwater pool of more than a few inches would likely require dewatering. Therefore the trench depth was set to equal the actual depth to groundwater in the monitoring well associated with the highest water table. For the FFF Area, the water table at monitoring well CH-3A has typically been 3.5 feet bgs. For the SIP Area, the water table at monitoring well location RMW-04S-1 has typically been 3.7 feet bgs. For the AA Area, the water table at RMS-14S has typically been 5.5 feet bgs. The VDEQ default values for the remaining trench dimensions are 3 feet wide and 8 feet long.

According to the VDEQ, studies of urban canyons suggest that if the ratio of trench width relative to wind direction to trench depth is less than or equal to 1, a circulation cell or cells will be set up within the trench that limits the degree of gas exchange with the atmosphere. In consultation with USEPA Region III, VDEQ developed an assumed ACH of 2/hour -- based upon measured ventilation rates of buildings. If the ratio of trench width to trench depth is greater than one, air exchange between the trench and above-ground atmosphere is not restricted, thus ACH would be 360/hour -- based upon the ratio of trench depth to the average wind speed. The ratio of the assumed trench width (3 feet) to trench depth (3.5 to 5.5 feet) is greater than 1 but less than 2 for each of the three PEAs considered. The VDEQ model does not allow the user to adjust the ACH to reflect the trench geometry. Therefore the assumed ACH of 2/hour is likely to substantially underestimate the air exchange rate and, therefore, significantly overestimate the trench air concentration.

Model outputs can be found in Tables 3.15 to 3.17 in Attachment A.

3.1.3 Sediment

3.1.3.1 Ingestion and Dermal Absorption of Sediment

Tables 3.9 and 3.10 in Attachment A present the EPCs for the sediment in the former WWTS Retention Pond in the former FWEC Facility and in Watering Run, respectively. COPCs identified in the sediment were detected more than once and, therefore, all of the EPCs for both sediment areas were selected from the UCLs provided by ProUCLÈ. These sediment EPCs were used to directly calculate the risk associated with the incidental ingestion and dermal exposure pathways for sediment.

3.1.4 Indoor Air

The EPCs for the indoor air exposure pathway for a future occupied structure at the former FWEC Facility were developed using a conservative modeling approach. Figure 8 of the DGAR identified the predominant soil type in this area as ñCFò ï cut and fill land. This material would be expected to present a relatively low resistance to vapor migration. Accordingly, the CF soil was approximated in this regard by common sand which shares this property. Because no soil gas samples were collected in the former FWEC Facility, the groundwater quality in the first encountered water-bearing unit in this area was used as the basis for estimating the potential indoor air concentrations of the COPCs for VI. This was done by estimating constituent-specific groundwater-to-indoor air attenuation factors using the USEPA Screening-Level Johnson and Ettinger Model (i.e., JnE Lite) (USEPA, 2014) with location-specific model input parameters. These input parameters were:

Soil Type	Sand
Soil Properties	Determined based on soil type
Depth to GW from Bottom of Foundation	
- Former FWEC Facility	0.68m +/- 0.068m
Average Groundwater Temperature	24 C
Air Properties	From the model
Soil-Gas Flow Rate	5 L/min
Building Type	Slab-on-Grade
Structure	default 1-story (conservative assumption for screening)
Air Exchange Rate	0.25 exchanges per hour (default)
Building Mixing Height	2.44 m (default)
Building Footprint Area	100 m^2 (default)
Subsurface Foundation Area	106 m^2 (default)
Building Crack Ratio	0.00038 [unitless] (default)
Foundation Slab Thickness	0.1 m (default)

The output reports from the constituent-specific JnE Lite modeling runs for the COPCs for VI for the former FWEC Facility indoor air are included in Attachment C. The runs for the former FWEC Facility reflect the shallower groundwater at MIP Area 2. The calculated groundwater-to-indoor air attenuation factors for the former FWEC Facility ranged from a low value of 0.00114 for xylenes to a high value of 0.00138 for 1,1-DCE. The indoor air EPCs were then calculated by multiplying the average detected groundwater concentration of each COPC for VI in each exposure area (in Õg/L) by the respective constituent-specific groundwater-to-indoor air attenuation factor for that exposure area (with the required units conversions) to yield indoor air

EPCs (in units of milligrams [mg]/meter [m]^3). Table 3.11 present these EPC calculations for the COPCs for VI for the former FWEC Facility.

3.2 Exposure Parameters

Exposure parameters and assumptions were defined for each of the current or potential future receptors for the pathways identified for quantitative analysis. Parameters used to develop the quantitative risk estimates for this BHHRA are discussed below and are summarized with ample notes and references in RAGS Tables 4.1 through 4.4 in Attachment A for each identified receptorôs exposures to soil, sediment, groundwater, and indoor air respectively. The chemical fate and transport of COPCs through these media for each PEA are discussed in Section 2.3 of this BHHRA and in more detail in other sections of the RI Report. These exposure parameters were identified on a medium, pathway, and receptor-specific basis in these tables. The parameters used in this BHHRA were primarily based on guidance contained in:

- Table 1: Standard Default Factors as provided in the *Userôs Guide (May 2014)* for the RSLs for Chemical Contaminants at Superfund Sites (USEPA, 2014c);
- *RAGS Part A* (USEPA, 1989);
- the *Exposure Factors Handbook* (USEPA, 2011);
- the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2002b); and
- *RAGS Part E* (USEPA, 2004). Some exposure parameters, as are noted, were established based on site-specific conditions or considerations.

Reasonable maximum exposure (RME) parameters are generally designed to be conservative so that no actual exposed population will receive greater exposures than those estimated. RME exposure parameters and assumptions were chosen for the following receptors: an adult and child resident (generally hypothetical), a commercial worker, an adolescent trespasser/visitor, a former FWEC Facility site user, and a construction/utility worker.

3.2.1 Resident (Hypothetical)

Residents were assumed to include both adults and young children. Adult Residents were assumed to be persons greater than 18 years of age who weigh 80 kg (USEPA, 2014c). Young Child Residents were assumed to be an infant to 6 years old and weigh 15 kg (USEPA, 2002b, 2014). An exposure frequency of 365 days per year with 15 days per year spent away from home (for a total of 350 days per year) (USEPA, 1991, 2002, 2014) was assumed for both the Hypothetical Adult and Child Resident. Exposure durations were set to 20 years for the Adult Resident and 6 years for the Young Child Resident (USEPA, 2014c). For the purposes of application of age-dependent adjustment factors, the 20-year exposure duration for adults

encompasses ages 6 to 26 years of age. The averaging time for carcinogenic effects was 70 years and, for non-carcinogenic effects, it was the exposure duration (USEPA, 1989).

3.2.1.1 Adult and Child

Hypothetical on-site Adult and Child Residents were assumed to be potentially exposed to soil (mixed vertically by future redevelopment and regarding activity), sediment, and groundwater by ingestion, dermal absorption and inhalation. Potential exposure to volatile COPCs in indoor air due to VI is by inhalation. Exposure parameters for Residents are presented in RAGS Tables 4.1, 4.2, 4.3, and 4.4 for soil, groundwater, sediment, and indoor air, respectively.

There is no current indication that the former FWEC Facility property will or could be converted to residential use in the future. However, a hypothetical residential scenario was evaluated as a baseline indication of the risk associated with unrestricted use of this portion of the Site. Exposure points for impacted soil include MIP Area 1 (former Vapor Degreaser Area), MIP Area 2 (former Finish Paint Building, and Solvent and Paint Storage Buildings), the FSBA and the former EWA. Soil ingestion rates of 100 milligrams per day (mg/day) and 200 mg/day were assumed for the Hypothetical Adult and Child Residents, respectively (USEPA, 2002b, 2104). Values of 6,032 square centimeters (cm^2) and 2,373 cm^2 of exposed skin surface area were chosen for the assessment of potential dermal exposure to soil for the Adult and Child Resident, respectively (USEPA, 2014d). The Adult and Child soil to skin adherence factors were set to 0.07 and 0.2 mg/cm^2-event, corresponding to the USEPA recommended RME values for adult and child residents, respectively (USEPA, 2004, 2002, 2014).

As stated previously, on-site residential reuse of the former FWEC Facility is not considered to be likely, but was evaluated as a baseline for comparison. Similarly, the domestic use of the local groundwater as a potable supply was evaluated as a baseline. The recommended RME Standard Default Exposure Factor groundwater ingestion rates of 2.5 liters per day for adults and 0.78 liters per day for children were assumed. Similarly default values of 20,900 cm^2 and 6,378 cm^2 of skin surface area were chosen for the assessment of potential dermal exposure to groundwater for the Adult and Child Resident, respectively (USEPA, 2014c). The exposure duration for dermal contact with COPCs in groundwater during bathing was 0.71 hour per event for Adult and 0.54 hour per event for a Child. The exposure duration for inhalation of volatilized COPCs from groundwater during showering was conservatively assumed to be 0.71 hours per day for 350 days per year. Consistent with USEPA Region 3 policy, exposure to volatilized COPCs during showering is not evaluated for children.

The exposure point for impacted sediment is the former WWTS Retention Pond and the WWTS Outflow Channel. The site-specific assumption of residential exposure to sediment for 2 hours per day for 12 days each year is based on data presented in Table 16-19 of USEPA, 2011 or time spent in ñPool, River, or Lake.ò Average time spent per day for ñdoersò is 121 minutes per day

(i.e., 2 hours) and the average time spent per day for the general population is 4 minutes per day. At 12 events per year and 2 hours per event, the average time spent per day is 4 minutes. The sediment ingestion rates of 20 mg/day for an Adult and 50 mg/day for a Child represent the mean for general population, soil only ingestion rates for age groups 1 to <6 years and adults (USEPA, 2011). Values of 6,032 cm^2 and 2,690 cm^2 of exposed skin surface area were chosen for the assessment of potential dermal exposure to sediment for the Adult and Child Resident, respectively (USEPA, 2014c). The Adult and Child soil to skin adherence factors were set to 0.07 and 0.2 mg/cm^2-event, corresponding to the USEPA-recommended RME values for Adult and Child Residents, respectively (USEPA, 2004, 2002, 2014).

Potential exposure to volatile constituent in indoor air due to VI was evaluated assuming inhalation exposure 24 hours per day for 350 days per year. These values correspond to the recommended RME Standard Default Exposure Factors for residential exposure.

3.2.1.2 Off-Site Resident

Exposure parameters for Residents not associated with the former FWEC Facility property are presented in RAGS Tables 4.2 and 4.4 for groundwater and indoor air, respectively. Off-site groundwater is currently not used as a source of drinking water because of restrictions placed in accordance with previous regulatory agreements. Hypothetical exposure to groundwater as a source of drinking water was evaluated for off-site residents in the Affected Area and for hypothetical residents in the SIPs to provide a baseline point of comparison. The recommended RME Standard Default Exposure Factor groundwater ingestion rates of 2.5 liters per day for adults and 0.78 liters per day for children were assumed. Similarly, default values of 20,900 cm^2 and 6,378 cm^2 of skin surface area were chosen for the assessment of potential dermal exposure to groundwater for the Adult and Child Resident, respectively (USEPA, 2014c). The exposure duration for dermal contact with COPCs in groundwater during bathing was 0.71 hour per event for adult and 0.54 hours per event for children. The exposure duration for inhalation of volatilized COPCs from groundwater during showering was conservatively assumed to be 0.71 hours per day for 350 days per year. Consistent with USEPA Region 3 policy, exposure to volatilized COPCs during showering is not evaluated for children.

Potential exposure to volatile constituent in indoor air due to VI was evaluated assuming inhalation exposure 24 hours per day for 350 days per year. These values correspond to the recommended RME Standard Default Exposure Factors for residential exposure.

3.2.2 Former FWEC Facility Site User

The exposure parameters for a current or future former FWEC Facility site user are displayed in RAGS Table 4.1 in Attachment A. The former FWEC Facility site user is assumed to be potentially exposed to All Soil by incidental ingestion, dermal absorption, and the inhalation of

particulates entrained into the outdoor air during excavation activity. The former FWEC Facility site user is assumed to be an adult weighing 80 kg.

The RME exposure parameters for this receptor are based on site-specific assumptions of a 2 hour work day, activity 1 day per week, and a 25-year exposure duration for this receptor. These assumed values reflect a worker who parks or moves transportation containers. A composite worker-related soil ingestion rate of 100 mg/day was chosen (USEPA, 2014c). A value of 3,527 cm^2 was chosen as the exposed skin surface area for dermal exposure to soil, and the soil to skin adherence factor was set to 0.12 mg/cm^2. These values correspond to the default composite worker values. The averaging time for carcinogenic effects was 70 years and, for non-carcinogenic effects, it was the exposure duration (USEPA, 1989).

3.2.3 Construction/Utility Worker

The exposure parameters for a current or future construction/utility worker are displayed in RAGS Tables 4.1, 4.2 and 4.3 for soil, groundwater and sediment, respectively. The construction/utility worker is assumed to be an adult weighing 80 kg. The RME exposure parameters for this receptor are based on site-specific assumptions of an 8 hour work day, activity 250 days per year, and a 1-year exposure duration for this receptor.

On-site exposure points for impacted soil include MIP Area 1, MIP Area 2, the FSBA and the former EWA. There are no off-site exposure points for soil. The construction/utility worker is assumed to be potentially exposed to All Soil by incidental ingestion, dermal absorption, and the inhalation of particulates released into the air from their excavation activity. A construction worker-related soil ingestion rate of 330 mg/day was chosen (USEPA, 2002b, 2014). A value of 3,527 cm^2 was chosen as the exposed skin surface area for dermal exposure to soil, and a soil to skin adherence factor was set to 0.3 mg/cm^2, corresponding to the 95th percentile value for an adult construction worker (USEPA, 2002b). These values correspond to the Standard Default Exposure Factors for construction workers (USEPA, 2014c). The averaging time for carcinogenic effects was 70 years and, for non-carcinogenic effects, it was the exposure duration (USEPA, 1989).

The on-site exposure point for impacted sediment is the former WWTS Retention Pond and the off-site exposure point is Watering Run and its tributaries. As discussed in Section 2.3.6.1, the sediment in the WWTS Outflow Channel was demonstrated to have constituent concentrations considerably lower (i.e., orders of magnitude) than were measured in the WWTS Retention Pond sediments. As contact with sediments would be similar to soils during construction activities or utility maintenance, the Standard Default Exposure Factors for soil were assumed for sediments.

Although the water table is generally greater than 15 feet below ground surface, there are a few locations where the water table is relatively shallow. Due to the relatively shallow water table,

groundwater may be exposure during trenching or other subsurface activities. The conservative site-specific assumption for exposure to groundwater is for 4 hours per day for 10 days each year. The daily groundwater ingestion rate of 5 milliliters is equivalent to approximately 1 teaspoon. A value of 3,470 cm^2 of skin surface area was chosen for the assessment of potential dermal exposure to groundwater based on the default values for soil.

3.2.4 Trespasser/Visitor

Trespassers/Visitors are assumed to be adolescents aged 11 to 16 years. Exposure parameters for a trespasser/visitor are presented in RAGS Tables 4.1 and 4.3. Adolescents are assumed to be 11 to 16 years old and weigh 56.8 kg which is the recommended mean body weight for ages 11 to 16 years (USEPA, 2011). The trespasser/visitor was assumed to be potentially exposed to surface soil and sediment COPCs by incidental ingestion and dermal absorption. For soil, the exposure parameters for this receptor were based on conservative site-specific assumptions of trespassing for 2 hours per day for 100 days each year (i.e., approximately 3 days per week for 32 weeks from April through October). For sediment, the site-specific exposure frequency of 12 days each year was selected to be consistent with the resident.

With the exception of exposure frequency, same exposure parameters were used for soil and sediment. An ingestion rate of 50 mg/day was conservatively assumed based on the general population central tendency value for soil ingestion by persons aged 6 to 21 years (USEPA, 2011). A value of 3,914 cm^2 for the exposed skin surface area for dermal exposure to soil was based on the surface area of the face, forearms, hands, and lower legs. The soil to skin adherence factor was set to 0.07 mg/cm^2-event, corresponding to the recommended RME values for a recreational child ages 6 to 16 (USEPA, 2014c). The averaging time for carcinogenic effects was 70 years and, for non-carcinogenic effects, it was the exposure duration (USEPA, 1989).

3.2.5 Commercial/Industrial Worker

The exposure parameters for a current or future commercial/industrial worker are displayed in RAGS Tables 4.1, 4.2, and 4.4 for soil, groundwater, and indoor air, respectively. The commercial/industrial worker is assumed to be an adult weighing 80 kg. The RME exposure parameters for this receptor are based on the standard default assumptions of an 8 hour work day, activity 250 days per year, and a 25-year exposure duration for the composite worker (USEPA, 2014c). The averaging time for carcinogenic effects was 70 years and, for non-carcinogenic effects, it was the exposure duration (USEPA, 1989).

On-site exposure points for impacted surface soil include MIP Area 1, the FSBA and the former EWA. As there is no surface soil data for MIP Area 2, it could not be included as an exposure point. There are no off-site exposure points for surface soil. The commercial/industrial worker is assumed to be potentially exposed to All Soil by incidental ingestion, dermal absorption, and

the inhalation of volatiles and particulates emitted into the air. The direct contact with soil exposure factors of incidental ingestion rate of 100 mg/day; 3,527 cm^2 exposed skin surface area for dermal exposure to soil; and a soil to skin adherence factor of 0.12 mg/cm^2 were selected based on the composite worker defaults (USEPA, 2014c,d).

On-site groundwater is currently not used because of restrictions placed in accordance with previous regulatory agreements. As a point of reference, exposure to groundwater used in the workplace was evaluated assuming 1 liter per day is ingested, dermal contact for 15 minutes per day assuming 250 days per year for 25 years. A value of 2,220 cm^2 of skin surface area was chosen for the assessment of potential dermal exposure to groundwater for the on-site commercial/industrial worker based on the average surface area of forearms and hands for adult males and adult females from Table 7-2 of USEPA, 2011. Although commercial properties within the Affected Area and the SIPs are on public water supply, incidental exposure to groundwater was quantitatively evaluated using the same exposure parameters.

Potential exposure to volatile constituents in indoor air due to VI was evaluated assuming inhalation exposure 24 hours per day for 250 days per year. These values correspond to the recommended RME Standard Default Exposure Factors for the composite worker (USEPA, 2014c).

4.0 TOXICITY ASSESSMENT

This section describes the process used to identify intake route-specific toxicity values for each COPC selected for BHHRA. Toxicity values are used in conjunction with the information presented in the exposure assessment in Section 3 to calculate the hazards and risks presented in Section 5 below.

USEPA has performed toxicity assessments for numerous chemicals and has published the corresponding toxicity values that have undergone peer review. These toxicity values include reference doses (RfDs) and reference concentrations (RfCs) for evaluating the non-carcinogenic health effects associated with exposure, and cancer slope factors (CSFs) and unit risks (URs) for evaluating the carcinogenic health effects associated with exposure. Section 4.1 presents information regarding the non-cancer toxicity values, and Section 4.2 presents the information regarding the cancer toxicity values used in this BHHRA. Section 4.3 addresses some special cases and considerations that are relevant to the Site.

The preferential hierarchy of sources from which toxicity values and information were drawn was (USEPA, 2003):

- Tier 1: Integrated Risk Information System (IRIS), which is an on-line USEPA database containing current toxicity values for many chemicals that have gone through a rigorous peer review and USEPA consensus review process (USEPA, 2013);
- Tier 2: Provisional Peer Reviewed Toxicity Values (PPRTVs) developed by the USEPA Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center. PPRTVs retain subchronic values even if IRIS releases a profile without subchronic values; and
- Tier 3: Additional USEPA and non-USEPA sources of toxicity information, including (but not limited to) the ATSDR Minimum Risk Levels (MRLs), the California Environmental Protection Agency (CalEPA) toxicity values, and toxicity values published in the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997).

In the fall of 2009, an additional source of toxicity values was added: screening toxicity values in an appendix to certain PPRTV assessments. These values were placed ahead of HEAST toxicity values because these values are more recent, use current USEPA methodologies in the derivation, and are externally peer reviewed. A summary of the toxicity values selected for use in this BHHRA for each identified non-carcinogenic and carcinogenic COPC is presented below.

4.1 Non-Carcinogenic Health Criteria

For non-carcinogens, the USEPA publishes RfDs that are the chemical-specific doses below which no significant adverse health effects are expected. For chemicals that have non-carcinogenic health effect endpoints, many authorities consider organisms to have repair and detoxification capabilities that must be exceeded by some critical level (threshold) before the health effect is manifested. For example, an organ can have a large number of cells performing the same or similar functions that must be significantly depleted before an effect on the organ is seen. This threshold view holds that a range of exposures from just above zero to some finite value can be tolerated by the organism without an appreciable risk of adverse effects.

4.1.1 Oral/Dermal Criteria

The chronic oral/dermal RfD values selected for use in this BHHRA were compiled from the hierarchy of sources listed above. These values were checked to insure that the most up-to-date values were used from the cited sources. An RfD, expressed in units of milligrams of chemical per kilogram of body weight per day (mg/kg-day), is an estimate of a daily exposure level for people (including sensitive individuals) that is likely to be without an appreciable risk of deleterious effects during the period of exposure. The purpose of the RfD is to provide a benchmark value against which estimated doses (e.g., those projected for human exposures to various environmental media) might be compared. Doses that are higher than the RfD may indicate that an inadequate margin of safety could exist for exposure to that substance and that an adverse health effect could occur. The RfD is derived using uncertainty and modifying factors (e.g., to adjust exposures from animals to humans and to protect sensitive sub-populations) to ensure that it is likely to overestimate (rather than underestimate) the potential for adverse non-carcinogenic effects to occur. The chronic oral RfD values are listed in RAGS Table 5.1 in Attachment A. Subchronic oral RfDs were used for the subchronic exposure scenarios that were evaluated. Subchronic oral RfDs are specifically developed to be protective for short-term exposure to a compound. Subchronic oral RfDs should generally be used to evaluate the potential non-carcinogenic effects of exposure periods between two weeks and seven years. Subchronic oral RfDs only were used in the evaluation of the construction worker / utility worker receptor.

The chronic dermal RfD values for the identified COPCs also are listed in RAGS Table 5.1 in Attachment A. There are, at present, no USEPA-derived RfDs for the dermal route of exposure. Dermal RfDs were calculated from the oral RfD value using an oral-to-dermal adjustment factor. The oral-to-dermal adjustment factor is based on chemical-specific gastrointestinal absorption efficiencies listed in USEPA RAGS Part E, Exhibit 4.1 (USEPA, 2004). The methodologies developed for evaluating dermal absorption are based on an estimation of absorbed dose. The IRIS-verified RfDs are typically based on an administered dose. Therefore, an adjustment of the oral toxicity value to represent an absorbed rather than an administered dose is necessary. The

adjustment accounts for the absorption efficiency in the critical clinical or epidemiological study forming the basis of the published toxicity factor. The magnitude of the toxicity factor adjustment is inversely proportional to the absorption fraction in the critical study. As the absorption efficiency decreases, the difference between the absorbed dose and administered dose increases.

Consistent with RAGS Part E (USEPA, 2004), an adjustment was made to establish a dermal RfD when the following conditions were met:

- The toxicity value derived from the critical study was based on an administered dose (e.g., delivery in diet or by gavage) in its study design; and

- A scientifically defensible database demonstrates that the gastrointestinal absorption of the chemical in question from a medium (e.g., water, feed) similar to the one employed in the critical study is significantly less than 100% (i.e., <50%).

If these conditions were not met, complete (i.e., 100%) absorption was assumed, and no adjustment of the oral toxicity value was made to obtain a toxicity value to be used for the dermal absorption route.

4.1.2 Inhalation Criteria

Non-cancer toxicity values for the inhalation route are typically expressed as RfCs. The inhalation RfC is analogous to the RfD and is an estimate of the air concentration in mg/m^3 that an individual can breathe over the period of exposure without a risk of deleterious effects. The inhalation RfC was developed to be protective of adverse health effects, both systemic and portal-of-entry, associated with inhalation exposure. The inhalation RfC values associated with the identified COPCs are listed in RAGS Table 5.2 in Attachment A. Chronic RfCs are an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. EPA subchronic inhalation RfCs are generally used for exposures that are between 2 weeks and 7 years. ATSDR subchronic MRLs are based on exposures less than 1 year. Table 5.2 includes ATSDR chronic inhalation MRLs as a chronic RfC, intermediate inhalation MRLs as a subchronic RfC and California Environmental Protection Agency (chronic) Reference Exposure Levels (RELs) as chronic RfCs. Subchronic RfCs only were used in the evaluation of the construction worker / utility worker receptor.

4.2 Carcinogenic Health Criteria

A CSF is a numerical estimate of the potency of a chemical which, when multiplied by the average lifetime dose, gives the probability of an individual developing cancer over a lifetime.

CSFs are expressed in units of the inverse of milligrams of chemical per kilogram of body weight per day [(mg/kg-day)$^{-1}$]. They are usually derived by USEPA by means of a linearized multistage model and reflect the upper-bound limit of cancer potency of any chemical. The underlying assumption used by USEPA for regulatory risk assessment for constituents with known or assumed potential carcinogenic effects is that no threshold dose exists. In other words, USEPA assumes that a finite level of potential risk is associated with any dose above zero. As a result, the calculated carcinogenic risk is likely to represent a plausible upper limit to the risk. The actual risk is unknown but is likely to be lower than the predicted risk (i.e., conservative), and may be as low as zero (USEPA, 1989).

In 2005, USEPA released updated guidelines that it will follow when assessing the risks posed by carcinogenic chemicals (USEPA, 2005). These guidelines revise the methods that USEPA has used since 1986 to calculate cancer risks from exposure to chemicals. The older guidelines made use of a number of default assumptions and fallback positions to protect public health when applicable data was lacking. The updated guidelines allow for the analysis of all available data before resorting to the use of the default assumptions or fallback positions. The updated guidelines also address the assessment of childhood cancer and cancer later in life for adults exposed to a carcinogen as a child.

However, at this time, the assessments summarized in the current IRIS database were mostly developed using the prior cancer risk guidelines. As such, the old guidelines provide the framework within which the current cancer toxicity values and quantitative methods must be interpreted and applied. Under the prior cancer risk guidelines, USEPA used a system for classifying chemicals according to their likelihood as a human carcinogen. This system was based on five categories that made up the ñweight-of-evidenceò system of carcinogenicity that was used to classify each compound. That weight-of-evidence classification system is summarized below.

Group	Classification
A	This category indicates there is sufficient evidence from epidemiological studies to support a causal association between an agent and human cancer.
B1	This category generally indicates there is at least limited evidence from epidemiologic studies of carcinogenicity to humans.
B2	This category generally indicates, in the absence of data on humans, there is sufficient evidence of carcinogenicity in animals.
C	This category indicates that there is limited evidence of carcinogenicity in animals in the absence of data on humans.

D This category indicates that the evidence for carcinogenicity in animals is inadequate, or no data are available.

E This category indicates that there is evidence of non-carcinogenicity in at least two adequate animal tests in different species or in both epidemiologic and animal studies.

Per the USEPA (2005), the following default age-dependent adjustment factors (ADAFs) were applied to the slope factor (SF) for the COPCs with a mutagenic mode of action, as appropriate for the hypothetical resident and trespasser in each PEA (i.e., FFF, AA, and SIP):

Age	ADAF
0 to <2	10
2 to <16	3
16 to <30	1

4.2.1 Oral/Dermal Criteria

As discussed above, there are also, at present, no USEPA-derived CSFs for the dermal route of exposure. Dermal CSF values are calculated from the oral CSF values using an oral-to-dermal adjustment factor. This adjustment for the oral CSFs was performed using the same general process applied for the oral RfDs, as described in Section 4.1.1. It is noted, however, that adjustment of the RfD required its multiplication by the oral-to-dermal adjustment factor, while adjustment of the CSF requires its division by the oral-to-dermal adjustment factor. The oral and dermal CSF values selected for use in this BHHRA are listed in RAGS Table 6.1 in Attachment A.

4.2.2 Inhalation Criteria

Carcinogenic toxicity values for the inhalation pathway are typically expressed as URs. The URs used in this BHHRA were compiled from the hierarchy of sources listed previously, and are listed in RAGS Table 6.2 in Attachment A.

4.3 Special Cases

4.3.1 Benzene

The oral CSF for benzene is an extrapolation from the known inhalation dose-response to the potential oral route of exposure. The inhalation UR is reported as a range, from 2.2×10^{-6} to 7.8×10^{-6} per Õg/m^3. For the purposes of this BHHRA, the upper end of the CSF and UR ranges were chosen.

4.3.2 Carcinogenic Polycyclic Aromatic Hydrocarbons

Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (EPA/600/R-93/089, July 1993) recommends that a toxicity equivalency factor (TEF) be used to convert concentrations of carcinogenic polycyclic aromatic hydrocarbons (cPAHs) to an equivalent concentration of benzo(a)pyrene when assessing the cancer risks posed by these substances from oral exposures. These TEFs are based on the potency of each compound relative to that of benzo(a)pyrene. For the values listed in RAGS Tables 6.1 and 7.1ï 7.12, these TEFs have been applied to the toxicity values. These TEFs are not needed and are not to be used with the CalEPA Inhalation Unit Risk Values listed in Table 6. The following table presents the TEFs for cPAHs recommended in *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.*

Toxicity Equivalency Factors for Carcinogenic Polycyclic Aromatic Hydrocarbons

Compound	TEF
Benzo(a)pyrene	1.0
Benz(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenz(a,h)anthracene	1.0
Indeno(1,2,3-c,d)pyrene	0.1

4.3.3 TCE

Adverse noncancer effects associated with oral TCE exposure include decreased body weight, liver and kidney effects, and neurological, immunological, reproductive, and developmental effects. Therefore, separate RfDs were developed based on consideration of relevant and appropriate endpoints carried through to the derivation of ñcandidateò RfDs. Each of the ñcandidateò RfDs has different uncertainty factors, ranging from 10 to 1,000. Based on these ñcandidateò RfDs, a single oral RfD of 0.0005 mg/kg-day and a single RfC of 0.002 mg/m^3 were utilized based on multiple critical effects.

IRIS has recently released a Toxicity Assessment for TCE. IRIS suggests that the kidney risk be assessed using the mutagenic equations and the liver and non-Hodgkin lymphoma (NHL) be addressed using the standard cancer equations. Additionally, it is recommended that the application of ADAFs to (the kidney cancer component of) this slope factor be considered when assessing cancer risks to individuals exposed in early life (i.e., <16 years old). Data for TCE are not sufficient to develop separate risk estimates for childhood exposure. The oral slope factor of 4.6 x 10^{-2} per mg/kg/day, calculated from data from adult exposure, does not reflect presumed

increased early-life susceptibility to kidney tumors for this chemical. Generally, the application of ADAFs is recommended when assessing cancer risks for a carcinogen with a mutagenic mode of action. Therefore, the ADAFs are applied to the portion of the slope factor associated with kidney tumors but not to the portion of the slope factor associated with liver tumors and NHL.

For the purposes of application of the ADAF, the resident child receptor is aged 0 to 6 and the resident adult receptor is aged 6 to 26. The ADAF is only applied to the kidney portion of the CSF for trichloroethene (9.3E-03 for oral and dermal exposures; 1E-03 for inhalation exposure).

For the purposes of application of the ADAF, the trespasser receptor is aged 11 to 16. The ADAF is only applied to the kidney portion of the CSF for trichloroethene (9.3E-03 mg/kg-day^{-1} for oral and dermal exposures; 1E-03 (mg/m^3)$^{-1}$ for inhalation exposure).

4.3.4 Vinyl Chloride

IRIS presents two sets of oral CSF and UR values for vinyl chloride. The oral CSF of 7.2E-1 per mg/kg-day to account for continuous lifetime exposure during adulthood, based on use of the linearized multistage model, is shown in RAGS Table 6.1 in Attachment A and was utilized in the risk calculations. IRIS recommends a twofold increase to 1.4 per mg/kg-day to account for continuous lifetime exposure from birth. Similarly, the UR estimate of 4.4 E-3/(Õg/m^3) to account for continuous, lifetime exposure during adulthood, based on use of the linearized multistage model, is shown in RAGS Table 6.2 in Attachment A and was utilized in the risk calculations. IRIS recommends a twofold increase to 8.8 E-6/(Õg/m^3), to account for continuous lifetime exposure from birth.

As presented in the RSL Userôs Guide, the examples in the Toxicological Review (USEPA, 2001) indicate that, during childhood, both pro-rated and non-pro-rated risks should be generated using the lower CSF or UR (i.e., the ñcontinuous lifetime exposure during adulthoodò values). This approach for calculating the carcinogenic risk associated with vinyl chloride in groundwater for children (i.e., the approach used to calculate the USEPA RSLs for residential groundwater use as Tapwater) was applied in this BHHRA along with the oral CSF of 7.2E-1 per mg/kg-day and the UR estimate of 4.4 E-3/(mg/m)^3 to account for continuous lifetime exposure during adulthood. The equations for calculating the pro-rated and non-prorated intakes are shown in Table 4.2. As vinyl chloride was not identified as a COPC in any other exposure medium, no other vinyl chloride-specific adjustments to the intake and toxicity were required. Although vinyl chloride is a mutagen, the ADAFs are not applied when using this approach. When estimating the risk using this method and considering the lifetime segments during childhood and adulthood, it is clear that the cancer risks early in life are higher than those that would be generated if the typical pro-rated risks were simply generated using the lifetime CSF or UR. This finding is consistent with the IRIS assessmentôs statements that cancer risk is increased during early life. However, over the course of a 70-year lifetime, the risk generated using the

pro-rated and non-pro-rated segments, along with the lower CSF or UR, generally exceeds the risk generated using only pro-rated exposure and the lifetime CSF or UR. However, the former risk estimates trend closer and closer to the latter as life advances, and converge at about the 70-year mark.

4.3.5 Lead

USEPA has no consensus RfD or CSF for inorganic lead; USEPA considers lead to be a special case because of the difficulty in identifying the classic ñthresholdò needed to develop an RfD. USEPA, therefore, evaluates lead exposure by using blood-lead modeling, such as the Integrated Exposure-Uptake Biokinetic Model (IEUBK). The USEPA Office of Solid Waste has also released a detailed directive on risk assessment and cleanup of lead in residential soil. The directive recommends that soil lead levels less than 400 mg/kg are generally safe for residential use. Above that level, the document suggests collecting data and modeling blood-lead levels with the IEUBK model. For water, the MCL of 15 µg/L and for air, the National Ambient Air Quality Standard of 0.15 Õg/m^3 were used as points of comparison.

5.0 RISK CHARACTERIZATION

The final step in the risk assessment process is the quantitative human health risk characterization. Risk characterization is performed by inputting site-specific data and assumptions into formula developed by USEPA for the calculation of cancer risks and non-cancer health hazards. The quantitative evaluation of risks involves combining EPCs, exposure scenarios, chemical intake models, and toxicity values using methods defined by USEPA to calculate potential carcinogenic and non-carcinogenic risks associated with current and potential future use RME scenarios. Potential health risks were calculated for baseline conditions, projecting exposures to contaminant levels at the Site as they currently exist.

The quantitative assessment of potential risks to human health associated with present and future use scenarios was performed by calculating:

- Chronic Daily Intakes (CDIs) for each ingestion-related exposure pathway;
- Dermal Absorbed Doses (DADs) for each exposure pathway related to dermal absorption; and
- Exposure Concentrations (ECs) for each inhalation exposure pathway.

Formulae for each exposure pathway are shown on RAGS Tables 4.1 through 4.4 in Attachment A. CDIs and DADs are expressed as the amount of a chemical an individual would be exposed to per unit body weight per day (i.e., mg/kg-day). The CDIs and DADs are averaged over a lifetime (70 years) for carcinogens and over the exposure duration for non-carcinogens (USEPA, 1989). The ECs are expressed as an effective airborne concentration in units of mg/m^3.

For non-carcinogens, exposure pathways were evaluated by comparing chemical-specific CDIs and DADs to their associated RfD for the oral and dermal routes of exposure, respectively, and by comparing the EC to the RfC for the inhalation route of exposure. Potential non-carcinogenic effects are evaluated as the ratio of the CDI or DAD to the appropriate RfD or the EC to the RfC. This ratio is referred to as the Hazard Quotient (HQ). The sum of all CDI/RfD or DAD/RfD ratios, for all of the COPCs for each receptor in each medium is called the Hazard Index (HI) and is calculated as shown below:

$$HI = \sum_{i=1}^{n} \frac{CDI_i}{RfD_i} \qquad \text{(oral exposure pathways)}$$

$$HI = \sum_{i=1}^{n} \frac{DAD_i}{RfD_i} \qquad \text{(dermal exposure pathways)}$$

where:

CDI_i = Chronic oral daily intake for chemical i (mg/kg-day)

DAD_i	=	Chronic dermal daily intake for chemical i (mg/kg-day)
HI	=	Hazard Index [unitless]
n	=	Number of COPCs in each medium [unitless]
RfD_i	=	Reference dose for chemical i (mg/kg-day)

For inhalation, the HI is defined as:

$$HI = \sum_{i=1}^{n} \frac{EC_i}{RfC_i} \qquad \text{(inhalation exposure pathways)}$$

where:

EC_i	=	Inhalation exposure concentration for chemical i (mg/m^3)
HI	=	Hazard Index [unitless]
n	=	Number of COPCs in air [unitless]
RfC_i	=	Reference concentration for chemical i (mg/m^3)

An HI less than 1.0 is unlikely to be associated with adverse health effects and is, therefore, less likely to be of concern than an HI greater than 1.0. However, a conclusion should not be categorically drawn that HIs less than 1.0 are ñacceptableò and that HIs greater than 1.0 indicate that health effects will occur. This is a consequence of uncertainties inherent in derivation of the RfD or RfC in the exposure assessment and uncertainties associated with adding individual terms in the HI calculation. In addition, for cases with HIs greater than 1.0, the effect/target organ-specific HIs were evaluated (assuming that two chemicals that produce adverse effects on the same target organ are dose additive). HIs cannot be summed across age groups. Tables 7.1 through 7.13 in Attachment A present the EPCs, calculated route-specific chemical intakes, chemical-specific RfD or RfC, and individual HQs for each receptor, exposure medium, and pathway combination addressed in the BHHRA.

The potential incremental excess lifetime cancer risk (ELCR) due to exposure to a specific carcinogenic compound is calculated by multiplying chemical-specific CDIs by their associated SFs for the oral and dermal routes of exposure and by multiplying the EC by the UR for the inhalation route of exposure. The sum of the CDI*SF products for the COPCs for each receptor in each medium is called the ELCR and is calculated as shown below:

$$ELCR = \sum_{i=1}^{n} CDI_i \cdot SF_i \qquad \text{(oral exposure pathways)}$$

$$ELCR = \sum_{i=1}^{n} DAD_i \cdot SF_i \qquad \text{(dermal exposure pathways)}$$

where:

CDI_i	=	Chronic daily intake for chemical i (mg/kg-day)
DAD_i	=	Chronic dermal daily intake for chemical i (mg/kg-day)
ELCR	=	Excess lifetime cancer risk (unitless)
n	=	Number of COPCs in each medium [unitless]
SF_i	=	Slope factor for chemical i $(mg/kg\text{-}day)^{-1}$

For inhalation, the ELCR is defined as:

$$ELCR = \sum_{i=1}^{n} EC_i \cdot UR_i \qquad \text{(inhalation exposure pathways)}$$

where:

EC_i	=	Exposure point concentration for chemical i (mg/m^3)
ELCR	=	Excess lifetime cancer risk (unitless)
n	=	Number of COPCs in the air [unitless]
UR_i	=	Inhalation unit risk for chemical i $(mg/m^3)^{-1}$

For the purposes of this assessment, cancer risks for exposure to multiple carcinogenic contaminants were assumed to be additive. USEPA has determined that the target risk range is between 1E-6 and 1E-4 for evaluating the need for remedial action. An ELCR below or within this range is unlikely to be associated with cancer effects and is less likely to be of concern than an ELCR exceeding this range (i.e., greater than 1E-4). Tables 7.1 through 7.13 in Attachment A present the EPCs, calculated route-specific chemical intakes, chemical-specific SFs or URs, and individual ELCRs for each receptor, exposure medium, and pathway combination addressed in the BHHRA.

5.1 Results of Risk Calculations

This section contains a receptor-specific summary of the potential carcinogenic and non-carcinogenic risk projected for each receptor assuming RME exposures to the COPCs associated with each PEA. Total ELCR and HI estimates also were calculated by summing across COPCs and exposure media for a particular receptor. Results of carcinogenic ELCR and HI calculations are detailed in RAGS Tables 7.1 through 7.13 in Attachment A.

The following paragraphs contain discussions of the results of these calculations and identify the chemicals of concern (COCs), which are COPCs that were found to contribute most significantly to the Site risk or hazard. Chemicals that were found to individually contribute a carcinogenic

ELCR greater than 1E-4 or an HI greater than 1 to a particular receptor were judged to ñcontribute significantlyò to Site risks and are summarized in RAGS Tables 9.1 through 9.13 (Attachment A) for each receptor.

5.1.1 Former FWEC Facility

The CSM for this PEA (Figure 2-2) identified two current receptors (i.e., site users and trespassers) and three potential future receptors (i.e., site users, commercial workers and construction/utility workers). In addition, hypothetical Adult and Child Residents were considered as a baseline point of comparison relative to unrestricted use. COPCs were identified for surface soil (MIP Area 1, FSBA, and EWA areas), All Soil (MIP Area 1, MIP Area 2, FSBA, and EWA areas), groundwater, sediments (Retention Pond), and possible VI from groundwater to indoor air (see RAGS Tables 2.1 to 2.5 (soil), 2.6 (groundwater), 2.9A and B (sediment), and 2.13 (indoor air), respectively). No surface water COPCs were identified (see RAGS Table 2.11 in Attachment A). As no surface soil data was available for MIP Area 2, the All Soil EPCs for MIP Area 2 were assumed to be representative of surface soil.

ELCR and HI values for each combination of type of receptor (i.e., current, current and future, future, and hypothetical) and exposure medium are listed in Table 5-1 (provided at the end of this report section). Among the current receptors, the total ELCR and HI estimates did not exceed the target range for the former FWEC Facility Site User (see RAGS Table 7.4A in Attachment A) or the trespasser (see RAGS Table 7.3 in Attachment A).

Among the potential future receptors, the ELCR for the commercial worker (see RAGS Table 7.2 in Attachment A) projected for exposure to the conservatively modeled indoor air concentration of 1,1-DCA due to VI from groundwater exceeded 1.0E-4 (i.e., 5.2E-4), and the HIs for exposure to 1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, naphthalene and TCE in the projected indoor air exceeded 1. In addition, for potential exposures associated with groundwater use for tapwater/sanitary supply (i.e., ingestion, hand washing) the ELCR exceeded 1.0E-4 (i.e., 1.2E-4) and the HI was 6.4, primarily due to TCE. For potential future exposures to a commercial worker, the HI associated with TCE in the MIP Area 1 surface soil exceeded 1, and VI from the groundwater and the consumption of groundwater showed cancer and non-cancer risks above the thresholds. For the future former FWEC Facility Site User (see RAGS Table 7.4B in Attachment A), the HI for TCE in MIP Area 1 soils was 1.0 assuming all of the former FWEC Facility Site Users time on-site was spent within this area. If the site users potential exposure time is divided between MIP Area 1 and the other portions of the Site, then the overall HI is less than 1. The ELCR estimates for the site user did not exceed the target risk range. The Total ELCR for a future construction/utility worker did not exceed the target risk range, but the HIs for their exposure to projected vapors released from groundwater into a trench exceeded 1 due to TCE and soil (especially in the MIP Area 1) exceeded 1 (see RAGS Table 7.5 in Attachment A) primarily due to TCE in MIP Area 1 soils.

Considering the hypothetical residential or unrestricted use of the Site (see RAGS Table 7.1 in Attachment A), risks for the Child Resident associated with TCE in the MIP Area 1 soil exceeded 1.0E-4 (i.e., 1.4E-4) and the HIs associated with TCE and 1,1,2-TCA in the MIP Area 1 soil exceeded 1. The calculated HIs for cobalt in the FSBA and in the former EWA also exceeded 1. For the Adult Resident, the risks associated with TCE in the MIP Area 1 soil exceeded 1.0E-4, and the calculated HIs associated with TCE and 1,1,2,-TCA in the MIP Area 1 soil exceeded 1. The HIs associated with domestic use of groundwater for both the child and adult residents exceeded 1 for iron, manganese and TCE and the HI for adult resident also exceeded 1 for cyanide. The ELCR for domestic use of groundwater was greater than 1.0E-4 for both the child and adult residents primarily due to TCE and chromium (assuming all chromium in groundwater is hexavalent chromium). The ELCR for exposure to the modeled indoor air concentration of 1,1-DCA due to VI from groundwater exceeded 1.0E-4 for the child and adult residents, and also for 1,1,2-TCA, naphthalene, and TCE for the adult resident. The HIs for exposure the modeled indoor air concentration of to 1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, mercury, naphthalene, TCE and xylenes due to VI from groundwater (based on MIP data) exceeded 1 for both the child and adult residents.

5.1.2 Affected Area

The CSM for this PEA (Figure 2-3) identified six current receptors (i.e., residents, commercial workers, teachers/students and pre-school children at St. Judeôs School, trespassers/visitors, and construction/utility workers). COPCs were identified for groundwater (see RAGS Table 2.8 in Attachment A). Possible VI from groundwater to indoor air also was evaluated in detail as discussed in Section 2.6.5.3 and Attachment D. Based on extensive soil gas and indoor air sampling, only two locations (Locations 11 and 16) were identified as having a potentially complete VI pathway relative to the Site releases. However, this exposure pathway was effectively eliminated for current exposures through the installation of vapor mitigation systems at the structures at both of these locations in 2011.

Based on approximately 10 years of groundwater data from groundwater monitoring wells and VI investigation sampling, the extent of the contaminant plume in the Affected Area is stable and the contaminant concentrations have declined due to the continuing operation of the GETS at the source at the former FWEC Facility and the natural attenuation processes that are reducing the concentrations of many of the contaminants. In addition, the discontinued pumping and closure of the private wells in the Affected Area has reduced the induced migration of groundwater toward the residences. This also has led to a reduction in the concentrations of the volatile groundwater contaminants beneath the structures that could influence potential vapor intrusion at these locations. These ongoing activities and natural processes will lead to further declines in the concentrations of the shallow volatile groundwater contaminants in the Affected Area, and a further reduction in the potential for VI at these residences in the future.

Based on the downward trend in contaminant concentrations and the installation and operation of the VI mitigation systems at the two residences associated with the unique subsurface conditions that increased the localized potential risk associated with VI, the current VI health risks for the Affected Area via the indoor air exposure pathway have been mitigated. However, a potential future VI risk will remain as long as the groundwater in the Affected Area is impacted by volatile organic compounds.

Groundwater in the Affected Area is not currently used for drinking as the structures and buildings have been connected to the municipal supply system or a point of use treatment system. However, the hypothetical use of the local groundwater as a drinking water supply was evaluated as a point of reference. For this hypothetical groundwater exposure scenario, the HIs for iron, acrolein and TCE exceeded 1 for the Child Resident and the HIs for acrolein and TCE exceeded 1 for the Adult Resident. The ELCR estimates for a resident did not exceed the target risk range (see RAGS Table 7.6 in Attachment A).

The projected risks for a future commercial worker having workplace exposure to groundwater did not exceed the benchmark value and although the total HI was slightly greater than 1, once segregated by target organ / organ system, the HIs were less than 1 (see RAGS Tables 7.7 and 9.7 in Attachment A). The HI and total ELCR for a future construction/utility worker did not exceed the target ranges (see RAGS Table 7.8 in Attachment A).

5.1.3 Watering Run and Tributaries

The CSM for this PEA (Figure 2-4) identified trespassers/visitors and potential future construction/utility workers as receptors most likely associated with Watering Run. COPCs were identified for the sediments in Watering Run and its tributaries (see RAGS Table 2.10 in Attachment A). However, no surface water COPCs were identified (see RAGS Table 2.12 in Attachment A).

The projected risks and hazards for the trespasser were both below their respective benchmarks (see RAGS Table 7.9 in Attachment A). The calculated HI exceeded 1 for construction/utility workers due to manganese in the sediments. The Total ELCR for a future construction/utility worker did not exceed the target risk range (see RAGS Table 7.10 in Attachment A).

5.1.4 Surrounding Industrial Properties

The CSM for this PEA (Figure 2-5) identified two current or future receptors (i.e., a commercial worker and a construction/utility worker). In addition, a hypothetical residential exposure scenario relative to unrestricted groundwater use (including consumptive use) was considered as a point of comparison for this PEA.

Among the current receptors, the total ELCR estimates did not exceed the target range for the commercial worker or the construction/utility worker (see RAGS Tables 7.12 and 7.13 in Attachment A). The calculated HI for the commercial worker (i.e., 3.7) exceeded 1 due to manganese and TCE the HI for the construction/utility workers exceeded 1 due to TCE (i.e., 2.2) (see RAGS Tables 7.12 and 7.13 in Attachment A).

The groundwater in the SIPs is not currently used for drinking or for any known non-consumptive use. However, the hypothetical domestic use of groundwater for drinking and bathing was evaluated as a point of reference relative to unrestricted use (see RAGS Table 7.11 in Attachment A). For the hypothetical scenario, the HIs for iron, manganese, and TCE each exceeded 1 for the Child Resident and the HI for manganese and TCE each exceeded 1 for the Adult Resident. The lifetime ELCR estimate for a resident (i.e., 1.1E-4) exceeded the target risk range primarily due to TCE.

The USEPA-approved RI/FS Work Plan did not require sampling for or a targeted VI investigation for the SIPs. Accordingly, the data collected during the RI investigations, which included data relevant to the subject of potential health risk relative to VI at the SIPs at or near which TCE has been detected in groundwater, is insufficient to properly perform a quantitative VI analysis for those SIPs.

5.2 Evaluation of Lead

Lead was selected as a COPC for the FSBA soil. The EPC for lead in this area was 271 mg/kg, the arithmetic average was 104 mg/kg, and the maximum detected concentration was 419 mg/kg. The USEPA Office of Solid Waste has released a detailed directive on risk assessment and cleanup of residential soil lead. The directive recommends that soil lead levels less than 400 mg/kg are generally safe for residential use. As such, the detected levels of lead in the FSBA soil are not indicated to pose a significant risk to future site users.

Table 5-1
Summary of Risks and Hazards

Receptor	Media	Exposure Point	Total ELCR for Media/ Exposure Point	COPC Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) with Individual HI Greater Than 1
CURRENT RECEPTORS (THAT MAY NOT ALSO BE FUTURE RECEPTORS)						
FORMER FWEC FACILITY						
Site User (Non-Intrusive)	Surface Soil	Average for Exposure to All Soil Areas	2.0E-06		0.35	
		MIP1 (Assuming sole exposure)	3.7E-06		0.98	
		FSBA (Assuming sole exposure)	1.6E-06		0.042	
		EWA (Assuming sole exposure)	8.7E-07		0.050	
		Total for Site User	2.0E-06		0.35	
CURRENT AND POTENTIAL FUTURE RECEPTORS						
FORMER FWEC FACILITY						
Trespasser	Surface Soil	Average for Exposure to All Soil Areas	1.4E-06		0.64	
		MIP1 (Assuming sole exposure)	2.2E-06		**1.8**	TCE
		FSBA (Assuming sole exposure)	1.4E-06		0.060	
		EWA (Assuming sole exposure)	5.0E-07		0.073	
	Sediment	Retention Pond	1.4E-05		0.0063	
		Total for Trespasser	1.5E-05		0.65	
AFFECTED AREA						
Construction/ Utility Worker	Groundwater	Trenching	1.0E-07		0.73	
		Total for Construction/ Utility Worker	1.0E-07		0.73	

Table 5-1
Summary of Risks and Hazards

Receptor	Media	Exposure Point	Total ELCR for Media/ Exposure Point	COPC Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) with Individual HI Greater Than 1
WATERING RUN AND TRIBUTARIES						
Trespasser/Visitor	Sediment	Stream Sediment	5.9E-08		0.061	
		Total for Trespasser/Visitor	5.9E-08		0.061	
SURROUNDING INDUSTRIAL PROPERTIES						
Commercial Worker	Groundwater	Tapwater	1.2E-05		**3.7**	manganese, TCE
		Total for Commercial Worker	1.2E-05		**3.7**	
Construction/ Utility Worker	Groundwater (Potential If Encountered)	Trenching	3.2E-07		**2.2**	TCE
		Total for Construction/ Utility Worker	3.2E-07		**2.2**	

Table 5-1
Summary of Risks and Hazards

Receptor	Media	Exposure Point	Total ELCR for Media/ Exposure Point	COPC Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) with Individual HI Greater Than 1
POTENTIAL FUTURE RECEPTORS						
FORMER FWEC FACILITY						
Commercial Worker	Groundwater	Tapwater	**1.2E-04**	TCE	**6.4**	TCE
	All Soil	Average for Exposure to All Soil Areas	1.5E-05		**4.2**	
		MIP1 (Assuming sole exposure)	5.2E-05		**17**	TCE
		MIP2 (Assuming sole exposure	1.6E-06		0.082	
		FSBA (Assuming sole exposure)	5.0E-06		0.12	
		EWA (Assuming sole exposure)	2.6E-06		0.15	
	Vapor Intrusion from Groundwater	Indoor Air	**5.2E-04**	1,1-DCA	**65**	1,1,1-TCA, 1,1,2-TCA, 1,1-DCE naphthalene, TCE
		Total for Commercial Worker	**6.5E-04**		**75**	
Site User (Intrusive)	Soil	Average for Exposure to All Soil Areas	1.8E-06		0.28	
		MIP1 (Assuming sole exposure)	4.2E-06		1.0	
		MIP2 (Assuming sole exposure)	5.6E-07		0.026	
		FSBA (Assuming sole exposure)	1.6E-06		0.042	
		EWA (Assuming sole exposure)	8.7E-07		0.050	
		Total for Site User (Intrusive)	1.8E-06		0.28	

Table 5-1
Summary of Risks and Hazards

Receptor	Media	Exposure Point	Total ELCR for Media/ Exposure Point	COPC Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) with Individual HI Greater Than 1
Construction/ Utility Worker	Groundwater	Trenching	3.4E-06		**28**	TCE
	All Soil	Average for Exposure to All Soil Areas	1.2E-06		**5.1**	
		MIP1 (Assuming sole exposure)	3.0E-06		**18**	TCE
		MIP2 (Assuming sole exposure)	3.5E-07		0.47	
		FSBA (Assuming sole exposure)	1.0E-06		0.60	
		EWA (Assuming sole exposure)	5.8E-07		0.77	
	Sediment	Retention Pond	6.3E-05		0.48	
		Total for Construction/ Utility Worker	6.8E-05		**34**	
WATERING RUN AND TRIBUTARIES						
Construction/ Utility Worker	Sediment	Watering Run Sediment	8.8E-07		**3.4**	manganese
		Total for Construction/ Utility Worker	8.8E-07		**3.4**	

Table 5-1
Summary of Risks and Hazards

Receptor	Media	Exposure Point	Total ELCR for Media/ Exposure Point	COPC Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) with Individual HI Greater Than 1
HYPOTHETICAL RECEPTORS						
FORMER FWEC FACILITY						
Hypothetical Resident – Child (Area Zoned Industrial)	Groundwater	Tapwater	**4.7E-04**	Chromium VI, TCE	**99**	iron, manganese, TCE
	All Soil	Average for Exposure to All Areas	7.1E-05		**22**	
		MIP1 (Assuming sole exposure)	**1.4E-04**	TCE	**79**	1,1,2-TCA, TCE
		MIP2 (Assuming sole exposure)	1.6E-05		**1.7**	none
		FSBA (Assuming sole exposure)	9.3E-05		**2.8**	cobalt
		EWA (Assuming sole exposure)	3.1E-05		**3.3**	cobalt
	Sediment	Retention Pond Sediment	**1.2E-04**	PAHs	0.03	
	Vapor Intrusion from Groundwater	Indoor Air	**5.4E-04**	1,1-DCA	**272**	1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, mercury, naphthalene, TCE, xylenes
		Subtotal for Child	**1.2E-03**		**393**	
Hypothetical Resident – Adult (Area Zoned Industrial)	Groundwater	Tapwater	**5.3E-04**	Chromium VI, TCE	**63**	iron, manganese, TCE, cyanide
	All Soil	Average for Exposure to All Soil Areas	**3.2E-04**		**17**	
		MIP1 (Assuming sole exposure)	**1.3E-03**	TCE	**69**	1,1,2-TCA, TCE
		MIP2 (Assuming sole exposure)	3.7E-06		0.2	
		FSBA (Assuming sole exposure)	1.5E-05		0.29	
		EWA (Assuming sole exposure)	6.2.E-06		0.35	

Table 5-1
Summary of Risks and Hazards

Receptor	Media	Exposure Point	Total ELCR for Media/ Exposure Point	COPC Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) with Individual HI Greater Than 1
	Sediment	Retention Pond Sediment	1.9E-05		0.005	
	Vapor Intrusion from Groundwater	Indoor Air	**2.3E-03**	1,1,2-TCA, 1-1-DCA, naphthalene, TCE	**272**	1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, mercury, naphthalene, TCE, xylenes
		Subtotal for Adult	**3.1E-03**		**353**	
		Total for Resident	**4.3E-03**		Not Applicable	
AFFECTED AREA						
Commercial Worker (Assuming Drinking Use that is Not Allowed)	Groundwater	Tapwater (Hypothetical)	4.9E-06		**1.1**	none
		Total for Commercial Worker	4.9E-06		**1.1**	
Resident – Child (Assuming Drinking and Domestic Use that is Not Allowed)	Groundwater	Tapwater (Hypothetical)	2.5E-05		**6.7**	iron, acrolein, TCE
Resident – Adult (Assuming Drinking and Domestic Use that is Not Allowed)	Groundwater	Tapwater (Hypothetical)	2.7E-05		**94**	acrolein, TCE
		Total for Resident	5.2E-05		Not Applicable	

Table 5-1
Summary of Risks and Hazards

Receptor	Media	Exposure Point	Total ELCR for Media/ Exposure Point	COPC Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/Exposure Point	COPC Driver(s) with Individual HI Greater Than 1
SURROUNDING INDUSTRIAL PROPERTIES						
Hypothetical Resident – Child (Area Zoned Industrial) (Assuming Drinking and Domestic Use That Is Not Allowed)	Groundwater	Tapwater	5.1E-05		**23**	iron, manganese, TCE
		Subtotal for Child	5.1E-05		**23**	
Hypothetical Resident – Adult (Area Zoned Industrial) (Assuming Drinking and Domestic Use That Is Not Allowed)	Groundwater	Tapwater	6.0E-05		**19**	manganese, TCE
		Subtotal for Adult	6.0E-05		**19**	
		Total for Resident	**1.1E-04**		Not Applicable	

6.0 UNCERTAINTY ANALYSIS

Risk assessments contain elements of uncertainty. The findings of the BHHRA identified the potential receptors and exposure scenarios indicated to pose the greatest risk and the contaminants in each exposure medium in each of the PEAs that contributed the most to the risks. A few of the uncertainties associated with the BHHRA results that were judged to be potentially most significant are discussed below. The sources and characteristics of these uncertainties provide perspective on the accuracy and level of conservatism inherent in the risk estimates and the underlying assumptions. The purpose of the discussion of uncertainty is to provide the Site Risk Managers with additional perspective on the risk results.

Most of the assumptions that were made in developing the baseline risk estimates were biased toward health protectiveness, that is, toward overestimating rather than underestimating risk. There is, therefore, a reasonable degree of certainty that actual risks to individuals exposed to contamination at the Site will not be higher than those estimated in the BHHRA and are likely to be much lower.

6.1 Data Selection and Exposure Point Concentrations

Soil data were limited to the former FWEC Facility property, given that soil contamination is not likely to migrate from this property. As such, this does not add uncertainty to the BHHRA. Because of the nature of the on-site sources, the majority of the soil sampling was not performed at the ground surface but at a depth associated with the features of the historical sources and the most likely points of release. In those cases where both surface and subsurface soil samples were taken in the same area, the concentrations of the detected constituents were similar. In addition, as many of the soil exposure scenarios were associated with potential future re-use and re-development of the former FWEC Facility property, it is likely that the re-development, and associated excavation and re-grading that will be performed, would serve to mix the current surface and subsurface soil to an appreciable degree. As such, this does not add uncertainty to the BHHRA.

Soil samples were collected in the EWA and the FSBA within the former FWEC Facility in both November and December of 2011 at different locations. The December sampling results were fully validated, while the November sampling results were subjected to a less rigorous data review. However, given that both sets of samples were collected within the respective PEAs and that the two sets of results were comparable in magnitude, both sets of results were used in the BHHRA. The inclusion of the November data did not add uncertainty to the BHHRA.

Soil samples were collected in MIP Area 1, MIP Area 2, the EWA, and the FSBA within the former FWEC Facility. These areas were selected because they encompass the soil with the

greatest potential for contamination with this PEA. As such, the potential risks for human health calculated from these soils may be biased high when considering the entire PEA.

Chromium speciation data was collected for the FSBA and EWA soils and Retention Pond sediments. Based on the available data, hexavalent chromium was only detected in the FSBA soil samples and represented approximately 0.4 to 1.8% of the total chromium present. Therefore, chromium reported as total chromium in soil samples from the other areas of the site (MIP1, MIP2, EWA, Retention Pod sediments and Watering Run sediments) was assumed to not be present as hexavalent chromium. For the FSBA, hexavalent chromium was selected as a COPC.

Formaldehyde was identified as a COPC in some media (i.e., former FWEC Facility and SIP groundwater and the Watering Run surface water) but it has not associated with the former FWEC Facility. In addition, there are known sources of formaldehyde associated with other nearby industrial properties. Consequently, inclusion of the risks associated with the exposures to formaldehyde in these media may overstate the risks due to the former FWEC Facility or its releases.

A number of the groundwater samples collected in the PEAs had relatively high concentrations of iron and manganese. In many cases, these concentrations drove up the calculated groundwater risks significantly. In many instances, the indicated background levels of these constituents were as high or higher than most of the concentrations reported for the Site samples. Further evaluation showed that these samples were unfiltered and had been collected using low flow techniques. It appears likely that some or much of the concentrations of these constituents may have been associated with suspended particulates in the samples and was not dissolved. The variability in the reported concentrations was greater than what would typically be expected for natural variability. At the locations where the unexpectedly high groundwater concentrations were reported, this uncertainty would be considered moderate to high and may suggest risks that are higher than might actually be present.

Although a groundwater sample was submitted for chromium speciation, the results were rejected during data validation. Therefore, all chromium detected in groundwater was conservatively assumed to be hexavalent chromium. This assumption likely results in an overestimate of risks associated with groundwater use. It should be noted that chromium was infrequently detected in Former FWEC Facility monitoring wells, and all three detections were observed in deep wells (MW-6 which is screened 95 feet bgs, EB-01 which is screened 110 feet bgs, and EB-03 which is screened 128 feet bgs). Chromium was not detected in groundwater samples from the SIP area.

As noted in Section 2.5.2, the sampling results at RMS-09S-1 for the April 2014 sampling event were determined to be an outlier and consequently were removed from the groundwater data set

for the Affected Area (including the 110 Õg/L detection of TCE) and were replaced with the sampling results from the October 2014 sampling event. It should be noted, that the exclusion of this particular data point had only a minimal effect on the resulting EPC. The EPC for TCE without the data point was 0.03012 mg/L and the EPC with the data point included in the data set would have been 0.03199 mg/L. See Attachment G for the ProUCL outputs illustrating the calculation of these EPCs.

Cadmium, mercury, 1,1,2-TCA, 1,2-DCA, and vinyl chloride were selected as groundwater COPCs from the Former FWEC facility based on the results of a single detection. For the SIP area, bis(2-ethylhexyl)phthalate was only detected once. For the Affected Area, bromodichloromethane and vinyl chloride were only detected once and acrolein was only detected twice. Each of these analytes only were detected once and consequently the EPC is based on a single sample result that may not be representative of groundwater quality on a broader spatial scale. In these instances, a 95 percent UCL could not be calculated and the maximum detected result was utilized as the EPC even though the average concentration (or the 95 percent UCL of the average) was almost certainly much lower.

The current version of the ProUCLÈ statistical software package (Version 5.0) was employed to generate an EPC based on the 95 percent UCL of the mean for all COPCs with enough data points to calculate a UCL. For instances where ProUCLÈ was unable to generate a recommended UCL value or when the recommended UCL value exceeded the maximum detected concentration, then the maximum detected concentration in that medium in that area was selected as the EPC. ProUCL recommends that a data set have a minimum of 8-10 observations of a constituent in order to generate statistics. However, if there are enough observations for ProUCL to generate statistics with detected and non-detected results, and if the detection limit is sufficiently low, then using an alternative to the 95% UCL (such as the maximum concentration) as the EPC could cause a distortion in the calculated risk and may result in calculated risks and HIs that are higher than the actual risks associated with the EPC.

Unlike the Affected Area, no sub-slab soil vapor or external soil gas sampling was performed in the former FWEC Facility property. Samples were not collected because the former FWEC Facility is zoned as industrial and does not have any habitable structures present within its boundaries. No structures of any kind are currently present at the former FWEC Facility except for the groundwater treatment system building. As such, the potential indoor air concentrations for a hypothetical residential structure or a current or future commercial or industrial building in this PEA had to be estimated using modeling of vapor release and migration from the first encountered shallow groundwater using MIP data. This transport modeling has a number of inherent uncertainties associated with the soil stratigraphy, the soil properties, and the huge variability associated with actual building foundation and wall designs and materials. In addition, the USEPA screening level Johnson and Ettinger model developed for this purpose addresses these uncertainties through conservative assumptions. It is also known that modeling

indoor air concentrations from groundwater through the vadose zone layer is considerably more uncertain that modeling it from the sub-slab soil vapor. The Johnson and Ettinger model also does not account for biodegradation or bio-attenuation. As a result, some conservative assumptions were made, including that the indicated fill material would be as transmissive of VOCs as sand. Sandy soils allow for higher vapor transport rates. Also, there may be geologic features such as a clay lens that prohibit soil vapor movement. As such, the potential for vapor intrusion at the former FWEC Facility is likely to be much less than what was indicated by the screening level modeling. This uncertainty in the EPCs for the indoor air in this PEA is considered to be moderate to large, and results in risk estimates that are likely larger than any actual inhalation risk that may be present.

An extensive VI sampling program was conducted for the Affected Area. Coverage of the structures and buildings across this PEA was relatively comprehensive, and in most cases, there was sufficient vertical sampling at each location relative to the sampling points along the vapor intrusion pathway (i.e., co-located and concurrent sampling of the VI investigation groundwater samples, sub-slab soil vapor, basement air, and first floor air). In addition, adequate concurrent ambient air samples were also collected. However, access was not granted to certain properties by some property owners, and so, in some locations, air samples were unable to be collected in the same location as VI investigation or monitoring well groundwater samples. Similarly, some locations had VI investigation or monitoring well groundwater sampling data but no soil gas or indoor air samples. As noted in the Data Evaluation section, this created cases in which there was insufficient data for certain constituents to unambiguously determine if a vapor migration pathway has been established or not. This is because air samples and water samples are analyzed using different laboratory methods with different constituent reporting lists (see Section 6.2). In addition to incomplete vertical sampling information, only a single round of VI sampling was conducted. In general, multiple rounds of soil gas and/or indoor air data are needed to assess temporal variability. In general, however, this uncertainty, which may be significant at a particular location, was judged to be small relative to the overall Site.

In addition to the using transport modeling was used to estimate indoor air EPCs due to vapor intrusion (as described above), the Foster and Chrostowski model was used to estimate the concentrations of COPCs in bathroom air associated with showering and the VDEQ Trench Model was used to estimate the concentration of COPCs in a construction trench that intercepts the groundwater table. In the presence of a water table that is less than five feet bgs but more than three feet bgs (as is the case in portions of the Former FWEC, SIP, and Affected Area PEAs) the VDEQ Trench Model is overly conservative. Specifically, the air exchange rate is set to 2 per hour for all trench depths greater than the trench width (a default value of 3 feet) or 360 exchanges per hour if the depth is less than the width. In actuality, as the depth approaches the width, the air exchange also approaches 360. In fact, as the trench depth becomes shallower, approaching the value of the width, the model gives increasing large estimates of the resulting air concentration inside the trench, even though in actuality, a shallower trench would have a lower

air concentration than would a deeper trench due a higher air exchange rate (i.e., the air exchange rate would be much closer to 360 instead of 2). In addition, in the situation of a trench depth of 5 feet or less, the breathing zone of a worker standing in the trench would be above ground.

6.2 List of Analytes for Groundwater and Air

VI analyses necessarily involve mapping the path of a VOC from the media source (i.e., the first-encountered groundwater) to the exposure media (i.e., ambient or indoor air). To do this, sample results for groundwater, external soil gas, sub-slab vapor, indoor air, and outdoor air are evaluated to determine whether vapor migration is occurring and whether constituents measured in the indoor air originated with subsurface contamination, interior volatile emission sources, or contaminants in the outdoor air. The preferred analytical method for volatile organics in air samples is generally the USEPA air toxics method TO-15. TO-15 is capable of quantifying over 100 VOCs in air. This often results in a sizeable list of detected compounds for any air sample, often with low estimated concentrations of the constituents that are lower than the mandated reporting limit. Groundwater samples are typically analyzed for TCL VOCs using a different sample preparation and analytical method than is used for the TO-15 samples. The TCL list of volatile organics has considerable overlap with the TO-15 list of volatile organics, but generally reports roughly half of the VOCs on the TO-15 analyte list. As a result, when trying to compare sampling results for a location with both groundwater and air samples, the case often arises where a particular volatile constituent is detected in one or more air samples but was not analyzed in the groundwater. The other case also can occur where a TCL VOC is detected in groundwater but is not part of the set of TO-15 reported analytes. Such differences in the groundwater-air analyte lists can lead to uncertainties about whether a vapor migration linkage from the subsurface to indoor air is actually present or not.

6.3 Exposure Scenarios and Parameters

Where available, the BHHRA used site-specific exposure parameters. The BHHRA applied conservative estimates for the incidental ingestion and dermal absorption rates of soil and/or groundwater for each receptor. It is anticipated that direct contact with the soil at the former FWEC Facility property is currently infrequent and generally incidental. However, future re-use exposure scenarios assuming the default conventional exposure frequencies and durations for commercial/industrial workers were considered. Similarly, a conservative extended construction/ utility worker exposure scenario was evaluated with no credit taken for any shielding of the person from contaminants in the soil, airborne dust, or exposed shallow groundwater that might be afforded by routinely used protective clothing and safe work practices (including pumping out excavations and trenches when groundwater inflow is significant to prevent contact and unsafe working conditions or applying common dust suppression techniques). As such, the projected risks to a construction/utility worker are believed to be much higher than would actually occur.

The most conservative assumption made in the BHHRA is that the local groundwater may be used as a drinking water supply. The structures located within the Affected Area have been connected to the municipal domestic supply network or have been fitted with a point-of-use treatment system. It is extremely unlikely that the groundwater will be used for consumptive purposes. Town representatives have indicated that they will be monitoring any new developments in the area to ensure that new structures connect to the municipal supply. As was noted, however, this analysis was performed to provide a baseline estimate of the potential risks associated with unrestricted use of the groundwater. As such, these results should be evaluated only within that context. Potential use of the shallow groundwater for non-potable, non-consumptive use (e.g., for irrigation, exterior washing or potentially process water) is still considered unlikely, given the current deed restrictions, but plausible. As such, that scenario was included in the BHHRA for commercial workers. In addition, a hypothetical future resident scenario was considered at the former FWEC Facility and the SIP. As mentioned throughout the text, it is very unlikely that this receptor, and its associated health risks, is feasible at either PEA based on the zoning and property restrictions currently in place.

With the former FWEC Facility area, individual areas of soil contamination (e.g., MIP Area 1, MIP Area 2, the FSBA, and the EWA) were individually evaluated, assuming 100% of an individual receptorôs exposure was to occur within each area, as well as collectively assuming an equal amount of time was spent in each area. This approach provided separate risk estimates for each area which was conservative.

6.4 Toxicity Factors

The toxicity values used in this BHHRA were taken from the USEPA-recommended hierarchy of sources. As such, these toxicity values are conservative by design to support USEPAôs mandate to protect the public. The uncertainty associated with individual toxicity values can be appreciable, with some constituent toxicity factors having uncertainty and modifying factors applied that combine to be two to three orders of magnitude. These uncertainty and modifying factors are applied by USEPA to account for uncertainties or weaknesses in the underlying dose-response studies. Particular uncertainty is associated with TCE and vinyl chloride, two COPCs central to the BHHRA. Significant debate continues on the potency of these compounds relative to causing cancer or non-cancer health effects. Their potency relative to early life exposures is especially debated. Different guidance has been published as to whether different cancer slope factors should be applied for receptors at the early ages, or whether ADAFs should be applied to increase the indicated toxicity, or both. A conservative resolution of this uncertainty consistent with the current guidance was applied for the BHHRA. This response to the uncertainties present may have resulted in risk estimates somewhat higher than may actually be posed by the exposures to these chlorinated compounds.

Several detected analytes do not have USEPA toxicity factors. These include PAHs such as acenaphthylene, benzo(g,h,i)perylene, and phenanthrene; other SVOCs such as carbazole and 2-chlorovinyl ether; and VOCs such as p-isopropyltoluene. Although the absence of toxicity factors for these analytes results in an underestimate of risk, the magnitude of the underestimate is likely to be relatively small, as structurally similar detected analytes do have toxicity factors and were included in the quantitative risk estimates. None of the structurally similar analytes were COPCs with an ELCR greater than 1.0E-4 or an HI greater than 1.

There are, at present, no USEPA-derived CSFs or RfDs for the dermal route of exposure. Dermal toxicity values were calculated from the oral toxicity values using an oral-to-dermal adjustment factor. This adjustment is typically only done if there is at least a two-fold difference in the resulting toxicity factor (i.e., when oral absorption is less than 50 percent). It is generally acknowledged that direct-contact dermal risks (e.g., dermatitis, tumorigenic effects) cannot directly be quantified for some chemicals (e.g., PAHs) using the oral-to-dermal adjustment.

The exposure scenario for the construction/utility worker assumes exposure for less than 1 year. As such, these exposures would be considered ñsubchronicò rather than ñchronicò relative to the definitions used to classify exposures and the applicable toxicity factors. In some cases, sufficient dose-response information exists to establish separate toxicity values for long-term chronic exposures and the shorter-term subchronic exposures. When this has been possible, the subchronic toxicity factors generally are either equal to the chronic values or reflect a higher dose required to produce an adverse effect than the dose associated with the chronic toxicity factors. In a few instances the subchronic toxicity values were actually lower than the chronic toxicity values. For copper, 1,1-DCE, bromodichloromethane, and ethylbenzene, the subchronic oral RfD was lower than the chronic RfD. For formaldehyde, barium, chromium VI, cobalt, nickel, 1,1,2-TCA, 1,2,4-trichlorobenzene, 1,2-DCA, 1,4-dioxane, acrolein, benzene, carbon tetrachloride, chloroform, ethylbenzene, and xylenes the subchronic inhalation RfC was less than the chronic RfC.

7.0 SUMMARY AND CONCLUSIONS

Tetra Tech prepared this BHHRA to support the RI being performed at the Foster Wheeler Energy Corporation/Church Road TCE Site. The BHHRA assessed the potential risks to human health for current and potential future individuals posed by exposure to various chemicals within environmental media at the Site and surrounding areas. The BHHRA was conducted in accordance with the current guidance and protocols for the preparation of risk assessments published by USEPA Headquarters and USEPA Region 3, as defined in the USEPA-approved Work Plan pursuant to Section 9.1(b) of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/ Feasibility Study, Docket No. CERC-03-2009-0061DC (Tetra Tech, 2010).

The Site is located in Luzerne County, PA. The BHHRA evaluated four potential exposure areas in order to more clearly delineate and assess the potential risks to human health from the presence of constituents of concern without regard to their source. Two of the PEAs are part of the Site:

- The former FWEC Facility encompasses approximately 105 acres and is located in the northeastern portion of the Site in the Crestwood Industrial Park in Mountain Top (Wright Township) approximately 5 to 6 miles south of Wilkes-Barre, PA; and
- The Church Road TCE Site, including the Affected Area, as defined in the *Administrative Settlement Agreement and Order by Consent for Removal Response Action for the FWEC/Church Road TCE Site, dated August 29, 2005, Docket No. CERC-03-2005-0349DC* (2005 Order). The Affected Area extends from east to west along Church Road and Watering Run and is approximately 295 acres in size and is generally located south and southwest of the former FWEC Facility.

The third PEA is Watering Run and its tributaries, a surface drainage feature that includes the stream, banks, and adjacent groundwater seeps that originates at the southern portion of the former FWEC Facility and flows down-hill past the SIPs and through the Affected Area.

The fourth PEA is the SIPs area, which lies in between the former FWEC Facility and the Affected Area and includes eight industrial properties in the Crestwood Industrial Park.

Soil, groundwater, sediment, surface water, and air (including indoor air, outdoor air and soil gas or sub-slab vapor) were sampled at multiple locations within each PEA to fill the data gaps that had been identified relative to the performance of the RI/FS for the Site. Sampling results were initially screened against conservative, risk-based screening levels, and COPCs were identified relative to the exposure media highlighted by the CSMs for potential exposures developed for each PEA. EPCs were established for each COPC for each exposure medium in the four PEAs.

These EPCS were combined with site-specific exposure scenarios, chemical intake models, and toxicity values using methods defined by USEPA to calculate potential carcinogenic and non-carcinogenic risks associated with present and future use RME scenarios. The quantitative risk levels were separately summed across the set of complete and potentially complete exposure pathways and across COPCs for each exposure medium for each receptor. These total exposure risk levels were then compared to the threshold USEPA ELCR (i.e., 1E-04) and the USEPA non-cancer HI threshold (i.e., 1.0).

Table 7-1 identifies the COPCs associated with either an ELCR greater than 1E-06 or an HI greater than 1:

Table 7-1
Summary Receptor Risks with ELCR Greater Than 1.0E-6 or HI Greater Than 1.0
(Note: Receptor Totals Shown Include All Evaluated Exposure Pathways –
Not Just those Exposure Pathways that Exceed the Stated Risk Thresholds that are Shown Here)

Receptor/Exposure Point	Total ELCR for Media/Exposure Point	Risk Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/ Exposure Point	Risk Driver(s) with Individual HI Greater Than 1
CURRENT RECEPTORS (THAT MAY NOT ALSO BE POTENTIAL FUTURE RECEPTORS)				
FORMER FWEC FACILITY				
Current Site User				
Average for All Surface Soil Areas	2.3E-06		0.35	
MIP1 (FI=1)	3.7E-06		0.98	
FSBA (FI=1)	1.6E-06		0.042	
EWA (FI=1)	8.7E-7		0.050	
Total for Current Site User (All Pathways)	2.0E-06		0.35	
CURRENT AND POTENTIAL FUTURE RECEPTORS				
FORMER FWEC FACILITY				
Trespasser				
Average for All Surface Soil Areas	1.4E-06		0.64	
MIP1 (FI=1)	2.2E-06		**1.8**	TCE
FSBA (FI=1)	1.4E-06		0.060	
EWA (FI=1)	5.0E-7		0.073	
Retention Pond Sediment	1.4E-05		0.0063	
Total for Trespasser (All Pathways)	1.5E-05		0.65	
SURROUNDING INDUSTRIAL PROPERTIES				
Commercial Worker Groundwater as Tapwater (Assuming Work Place Use That Is Not Allowed)	1.2E-05		**3.7**	manganese, TCE
Total for Commercial Worker (All Pathways)	1.2E-05		**3.7**	
Construction/Utility Worker Groundwater in Trench (Potential If Encountered)	3.2E-07		**2.2**	TCE
Total for Construction/Utility Worker (All Pathways)	3.2E-07		**2.2**	
POTENTIAL FUTURE RECEPTORS				
FORMER FWEC FACILITY				
Commercial Worker				
Groundwater (as Tapwater)	**1.2E-04**	TCE	**6.4**	TCE
Average for All Soil Areas	1.5E-05		**4.2**	
MIP1 (FI=1)	5.2E-05		**17**	TCE
MIP2 (FI=1)	1.6E-06		0.082	
FSBA (FI=1)	5.0E-06		0.12	

Table 7-1
Summary Receptor Risks with ELCR Greater Than 1.0E-6 or HI Greater Than 1.0
(Note: Receptor Totals Shown Include All Evaluated Exposure Pathways –
Not Just those Exposure Pathways that Exceed the Stated Risk Thresholds that are Shown Here)

Receptor/Exposure Point	Total ELCR for Media/Exposure Point	Risk Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/ Exposure Point	Risk Driver(s) with Individual HI Greater Than 1
EWA (FI=1)	2.6E-06		0.15	
Vapor Intrusion from Groundwater to Indoor Air	**5.2E-04**	1,1-DCA	**65**	1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, naphthalene, TCE
Total for Commercial Worker (All Pathways)	**6.5E-04**		**75**	
Site User (Intrusive)				
Average for Exposure to All Soil Areas	1.8E-06		0.28	
MIP1 (Assuming sole exposure)	4.2E-06		1.0	none
MIP2 (Assuming sole exposure)	5.6E-07		0.026	
FSBA (Assuming sole exposure)	1.6E-06		0.042	
EWA (Assuming sole exposure)	8.7E-07		0.050	
Total for Site User (All Pathways)	1.8E-06		0.28	
Construction/Utility Worker				
Groundwater in Trench	3.4E-06		**28**	TCE
Average for Exposure to All Soil Areas	1.2E-06		**5.1**	
MIP1 (Assuming sole exposure)	3.0E-06		**18**	TCE
MIP2 (Assuming sole exposure)	3.5E-07		0.47	
FSBA (Assuming sole exposure)	1.0E-06		0.60	
EWA (Assuming sole exposure)	5.8E-07		0.77	
Retention Pond Sediment	6.3E-05		0.48	
Total for Construction/Utility Worker (All Pathways)	6.8E-05		**34**	
WATERING RUN AND TRIBUTARIES				
Construction/Utility Worker				
Watering Run and Tributaries Sediment	8.8E-07		**3.4**	manganese
Total for Construction/Utility Worker (All Pathways)	8.8E-07		**3.4**	
HYPOTHETICAL RECEPTORS				
FORMER FWEC FACILITY				
Hypothetical Resident – Child				
Groundwater as Tapwater	**4.7E-04**	chromium (as Cr VI), TCE	**99**	iron, manganese, TCE
Average for Exposure to All Soil Areas	7.1E-05		**22**	
MIP1 (Assuming sole exposure)	**1.4E-04**	TCE	**79**	1,1,2-TCA, TCE
MIP2 Assuming sole exposure)	1.6E-05		**1.7**	none
FSBA (Assuming sole exposure)	9.3E-05		**2.8**	cobalt
EWA (Assuming sole exposure)	3.1E-05		**3.3**	cobalt
Retention Pond Sediment	**1.2E-04**	PAHs	0.03	
Vapor Intrusion from Groundwater to Indoor Air	**5.4E-04**	1,1-DCA	**272**	1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, mercury, naphthalene, TCE, xylenes
Subtotal for Child (All Pathways)	**1.2E-03**		**393**	

Table 7-1
Summary Receptor Risks with ELCR Greater Than 1.0E-6 or HI Greater Than 1.0
(Note: Receptor Totals Shown Include All Evaluated Exposure Pathways –
Not Just those Exposure Pathways that Exceed the Stated Risk Thresholds that are Shown Here)

Receptor/Exposure Point	Total ELCR for Media/Exposure Point	Risk Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/ Exposure Point	Risk Driver(s) with Individual HI Greater Than 1
Hypothetical Resident – Adult				
Groundwater as Tapwater	**5.3E-04**	Chromium (as Cr VI), TCE	**63**	cyanide, iron, manganese, TCE
Average for Exposure to All Soil Areas	**3.2E-04**		**17**	
MIP1 (Assuming sole exposure)	**1.3E-03**	TCE	**69**	1,1,2-TCA, TCE
MIP2 (Assuming sole exposure)	3.7E-06		0.2	
FSBA (Assuming sole exposure)	1.5E-05		0.29	
EWA (Assuming sole exposure)	6.2E-06		0.35	
Retention Pond Sediment	1.9E-05		0.005	
Vapor Intrusion from Groundwater to Indoor Air	**2.3E-03**	1,1,2-TCA, 1-1-DCA, naphthalene, TCE	**272**	1,1,1-TCA, 1,1,2-TCA, 1,1-DCE, mercury, naphthalene, TCE, xylenes
Subtotal for Adult (All Pathways)	**3.1E-03**		**353**	
Total for Resident (All Pathways)	**4.3E-03**		Not Applicable	

Table 7-1
Summary Receptor Risks with ELCR Greater Than 1.0E-6 or HI Greater Than 1.0
(Note: Receptor Totals Shown Include All Evaluated Exposure Pathways –
Not Just those Exposure Pathways that Exceed the Stated Risk Thresholds that are Shown Here)

Receptor/Exposure Point	Total ELCR for Media/Exposure Point	Risk Driver(s) with Individual ELCR Greater Than 1E-04	Total HI for Media/ Exposure Point	Risk Driver(s) with Individual HI Greater Than 1
AFFECTED AREA				
Commercial Worker Groundwater as Tapwater (Assuming Drinking Is Not Allowed)	4.9E-06		**1.1**	**none**
Total for Commercial Worker	4.9E-06		**1.1**	
Resident – Child Groundwater as Tapwater (Assuming Drinking and Domestic Use That Is Not Allowed)	2.5E-05		**6.7**	iron, acrolein, TCE
Resident – Adult Groundwater as Tapwater (Assuming Drinking and Domestic Use That Is Not Allowed)	2.7E-05		**94**	acrolein, TCE
Total for Resident (All Pathways)	5.2E-05		Not Applicable	
SURROUNDING INDUSTRIAL PROPERTIES				
Hypothetical Resident - Child Groundwater as Tapwater (Assuming Drinking and Domestic Use That Is Not Allowed)	5.1E-05		**23**	iron, manganese, TCE
Subtotal for Child	5.1E-05		**23**	
Hypothetical Resident – Adult Groundwater as Tapwater (Assuming Drinking and Domestic Use That Is Not Allowed)	6.0E-05		**19**	manganese, TCE
Subtotal for Adult	6.0E-05		**19**	
Total for Resident (All Pathways)	**1.1E-04**		Not Applicable	

Note: Bolded text indicates an ELCR greater than 1.0E-04 or an HI greater than 1.0.

Based on the results of the BHHRA, potential health risks were identified for the former FWEC Facility with respect to potential exposures to (a) the soil and wastewater treatment pond (WWTP) sediments, and (b) direct contact with the shallow groundwater. In addition, a conservative analysis of potential VI indicated that indoor air exposures at a theoretical future building on the former FWEC Facility could pose an elevated inhalation risk if appropriate mitigation measures were not incorporated into the construction.

No current health risks were identified for the Affected Area residences, so long as the shallow groundwater is not used as a drinking water supply. The use of shallow groundwater as a drinking water supply has effectively been precluded by the connection of virtually every residence to the municipal water system, as well as by deed restrictions prohibiting the use of groundwater by nearly all of the property owners within the Affected Area. At one residence, where connection to the municipal water system was refused, the installation of a point-of-use groundwater treatment system mitigates this potential risk.

A comprehensive VI evaluation was performed at the residences and public buildings within the Affected Area that were identified in the Work Plan as having the greatest potential for VI based on an assessment of the distribution and measured concentrations of TCE in the groundwater beneath the Affected Area at that time. Sampling of some combination of the shallow groundwater, sub-slab vapor or soil gas from beyond the building foundation, and indoor and outdoor air was specified in the Work Plan as the methods for performing the VI investigation at these selected locations. The RI sampling results for VI were collectively evaluated at each sampled location using a three-step tiered process to determine whether the measured indoor air contaminant levels of any constituents could be due to VI from the underlying groundwater and whether they are present at levels that might pose an inhalation risk above conservative regulatory risk-based thresholds. The VI investigation approach that was employed was reviewed and approved by USEPA prior to implementation. This evaluation considered multiple lines of evidence and concluded that the levels of TCE measured in 2010 at the two residences associated with unique hydrogeologic and/or subsurface conditions (i.e., residential construction on the site of a natural spring and a leaking former well pump flooding the material beneath the foundation slab of another residence) could pose an unacceptable human health inhalation risk due to VI. However, active soil depressurization systems were installed at both of these residences in 2011 following the 2010 sampling event and analyses to mitigate the potential risks. Operation of these mitigation systems effectively eliminates this potential exposure pathway at these locations. The data and VI analysis for the Affected Area did not indicate a basis for similar VI risk to exist at other locations.

Based on approximately 10 years of groundwater data from groundwater monitoring wells and VI investigation sampling, the extent of the contaminant plume in the Affected Area is stable and the contaminant concentrations have declined over time due to the continuing operation of the Groundwater Extraction and Treatment System (GETS) at the former FWEC Facility and natural attenuation processes that are reducing the concentrations of many of the contaminants. In addition, the closure and cessation of pumping at the former private wells in the Affected Area has reduced the induced migration of groundwater toward the residences. This also has led to a reduction in the concentrations of volatile groundwater contaminants beneath the structures and a corresponding reduction in the potential VI at these locations. These ongoing activities and natural processes are expected to lead to further declines in the concentrations of the shallow volatile organic compound (VOC) groundwater contaminants in the Affected Area, and a further reduction in the potential for VI at these locations in the future. Based on the downward trend in contaminant concentrations and the installation and operation of the VI mitigation systems at the two residences associated with the unique subsurface conditions that increased the localized potential risk associated with VI, the current VI health risks for the Affected Area via the indoor air exposure pathway have been mitigated. However, a potential future VI risk will remain as long as the groundwater in the Affected Area is impacted by volatile organic compounds.

No current health risks were identified for the Watering Run PEA. However, there is the potential for direct contact risk to a future construction worker if: (1) an extensive construction or re-development project were undertaken that would both require the most impacted sediments to be handled for an extended period of time; and (2) the construction workers would not use common personal protective equipment or implement routine best practices to limit exposure to the impacted sediments. The potential risks in that scenario were primarily associated with exposure to manganese in the sediments, not TCE.

The only potential health risks identified for the SIPs PEA were associated with potential consumptive use (i.e., used for drinking water or general commercial or residential use). However, these potential exposures are unlikely to occur because these businesses also are connected to the municipal water supply and the local groundwater is not used now, nor is it likely to be used for those purposes in the future. The USEPA-approved RI/FS Work Plan did not require a targeted VI investigation for the SIPs. As a result, the data collected during the RI investigations, which included data relevant to the assessment of potential health risk relative to VI at the SIPs where TCE has been detected in the groundwater, was insufficient to perform a conclusive quantitative VI analysis for those SIPs.

In conclusion, there are no current human health risks, and there are no threats to ecological receptors that require or warrant immediate action. However, the potential for some future risks to Site users were identified if construction activities or redevelopment were to occur.

More specifically, if an extensive construction project were undertaken at the former FWEC Facility that results in handling of impacted soil or contact with groundwater in a trench and the construction workers failed to use common personal protective equipment or implement routine best practices, exposure to TCE in groundwater and TCE in MIP 1 soils could result in an unacceptable risk. Similarly, construction activity in the SIPs resulting in extensive contact with groundwater in a trench could result in an unacceptable risk due to TCE in groundwater in the absence of appropriate health and safety practices. Likewise, if construction activity were to involve extensive contact with the most contaminated Watering Run sediments, exposure to manganese in the sediments could result in an unacceptable risk in the absence of appropriate health and safety practices. .

Unacceptable risks were identified for a number of hypothetical exposure scenarios, including those resulting from vapor intrusion from groundwater into a hypothetical future building at the Former FWEC Facility, assuming no vapor mitigation is incorporated into the construction of the new structure. Unacceptable risks were identified for hypothetical domestic use of groundwater at the Former FWEC Facility, the Affected Area, and the SIPs. Unacceptable risks also were identified for hypothetical use of groundwater in the workplace by a commercial worker (e.g., drinking water, sanitary supply). However, these hypothetical exposure pathways have effectively been precluded by the connection of virtually every residence and business to the municipal water

system, as well as by deed restrictions prohibiting the use of groundwater by nearly all of the property owners in the Affected Area.

In addition, the potential for future risks associated with the groundwater in the Affected Area will remain as long as the groundwater is impacted by volatile organic compounds and residual contamination remains in the environmental media at the former FWEC Facility.

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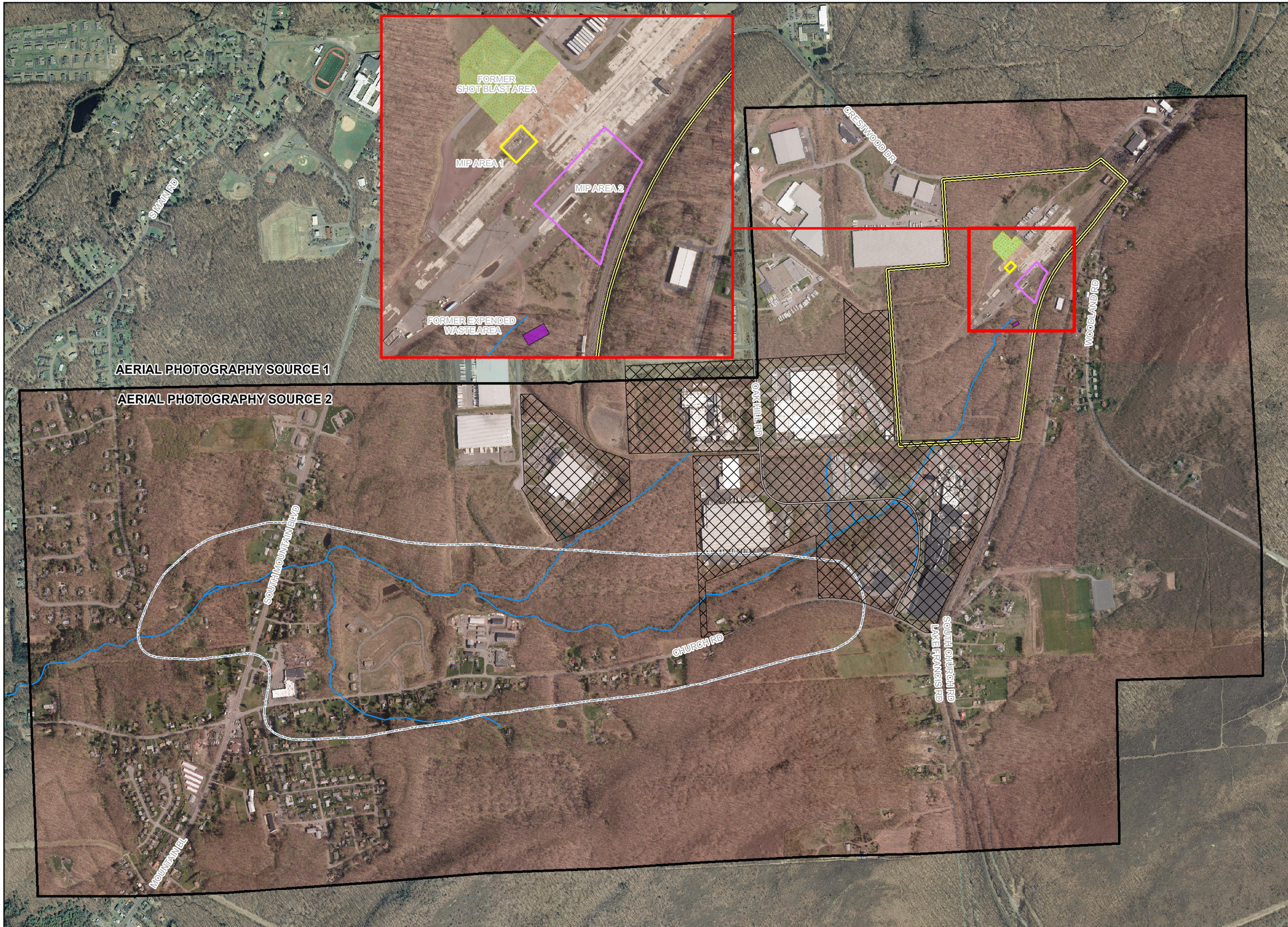
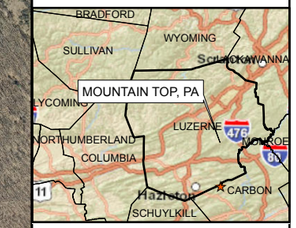
FIGURES





Legend

- Surrounding Industrial Properties
- Former Expended Waste Area
- Former Shot Blast Area
- MIP Area 1
- MIP Area 2
- Affected Area
- Former FWEC Facility
- Watering Run and Tributaries

0 250 500 1,000
FEET

SOURCES:

1) AERIAL PHOTOGRAPHY: PAMAP PROGRAM, PA DEPT. OF CONSERVATION AND NATURAL RESOURCES, BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY, 2008

2) AERIAL PHOTOGRAPHY: AXIS GEOSPATIAL, 2011

FIGURE 2-1

SITE LAYOUT

MOUNTAIN TOP, PENNSYLVANIA

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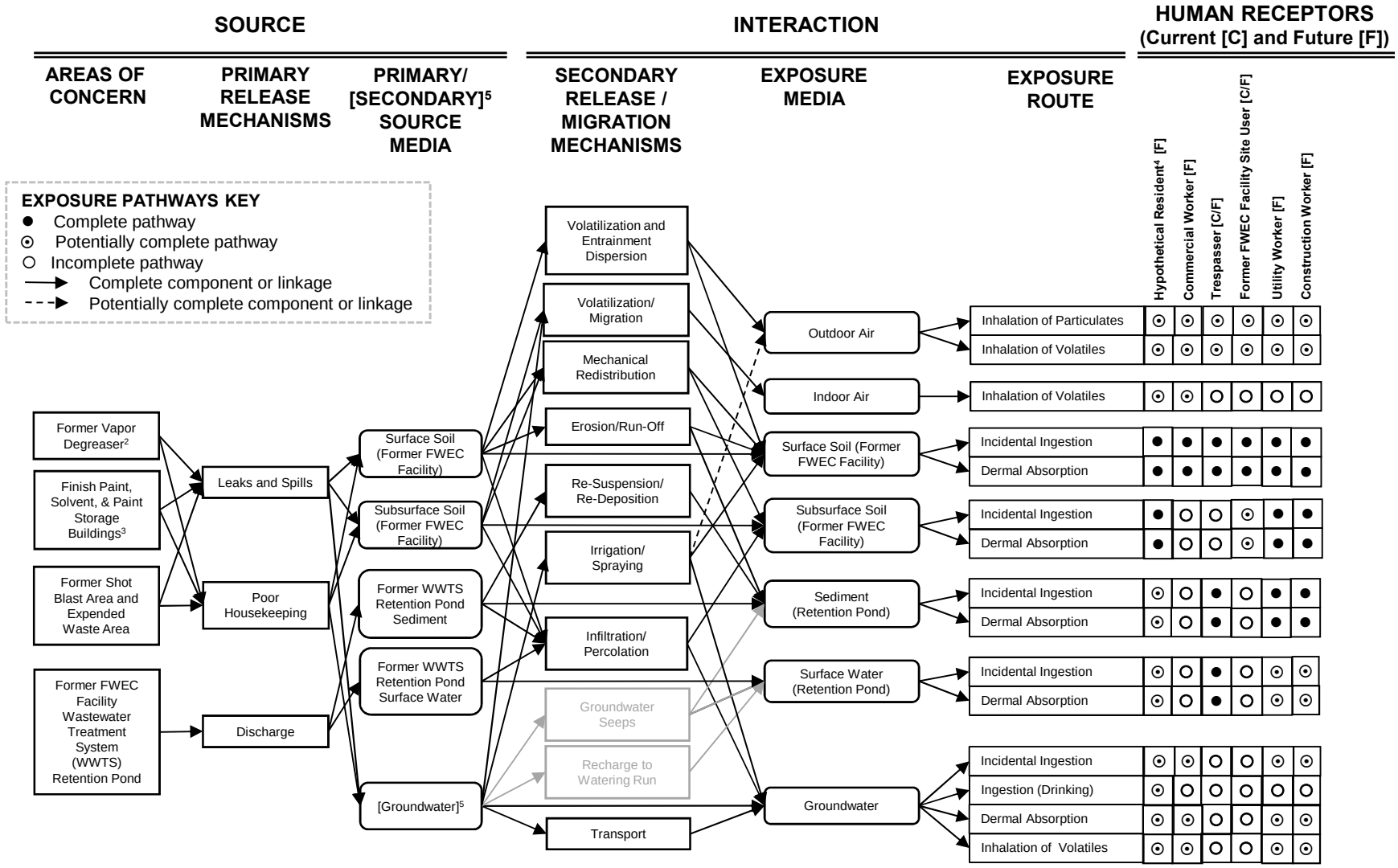
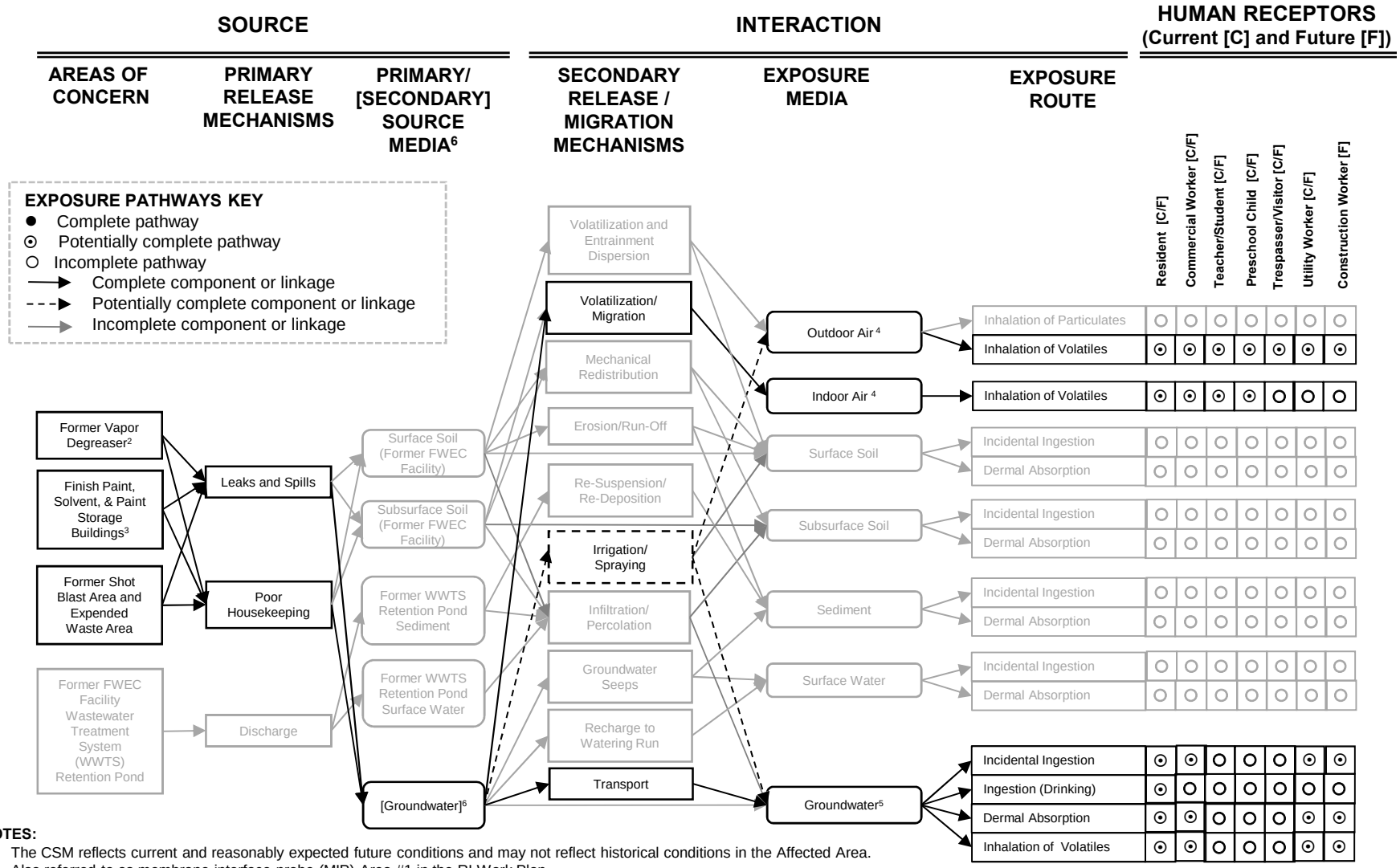
Figure 2-2. Conceptual Site Model and Human Health Exposure Pathways for the Former FWEC Facility[1]
Foster Wheeler Energy Corporation/Church Road TCE Site, Mountain Top, Pennsylvania



NOTES:

1) The CSM reflects current and reasonably expected future conditions and may not reflect historical conditions in the Former FWEC Facility.
2) Also referred to as membrane interface probe (MIP) Area #1 in the RI Work Plan.
3) Also referred to as MIP Area #2 in the RI Work Plan.
4) The Former FWEC Facility is zoned as a commercial/industrial. However, a hypothetical resident is included in this risk assessment to evaluate potential unrestricted use.
5) Groundwater is a secondary source having been impacted by direct releases to soil.

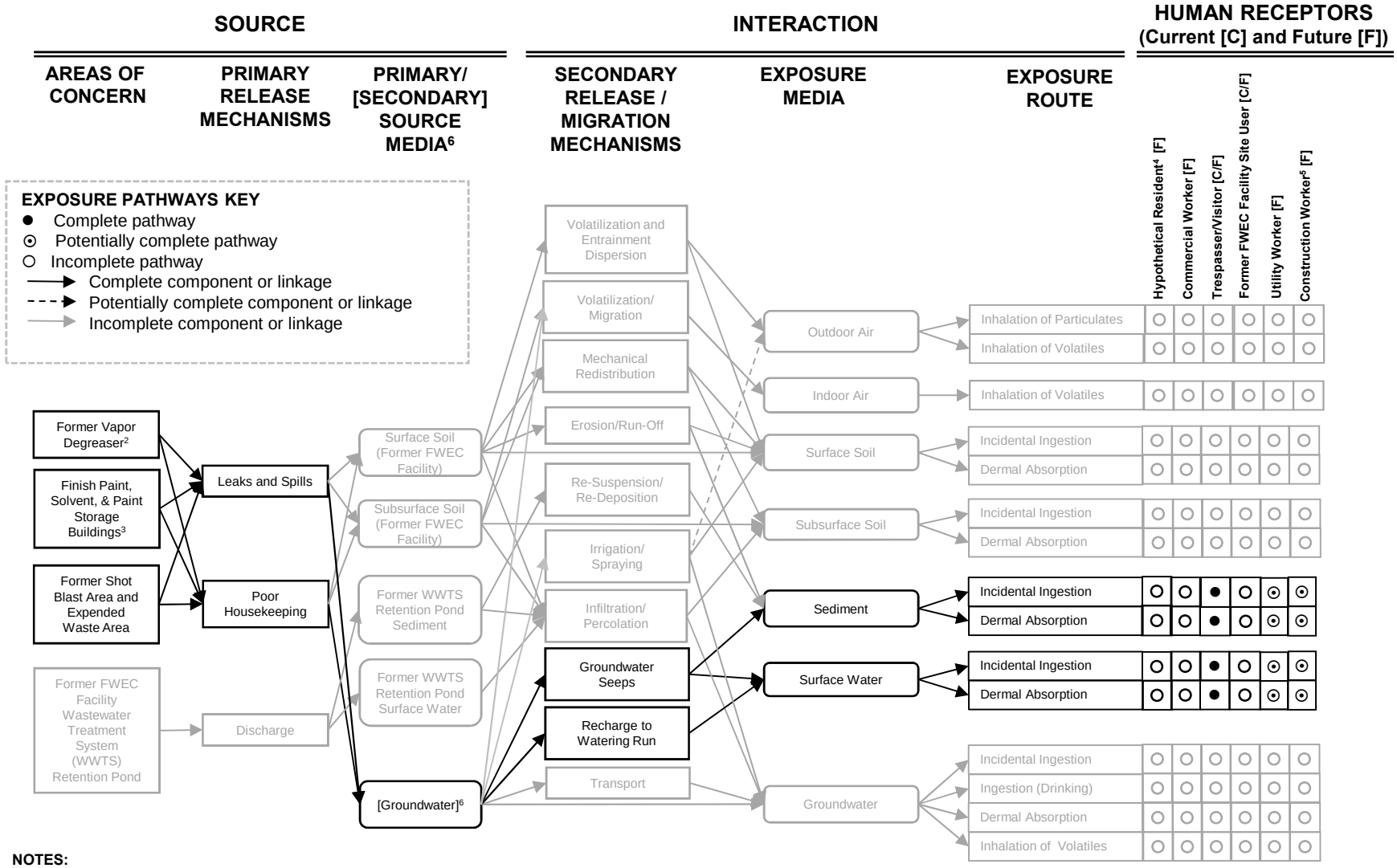
Figure 2-3. Conceptual Site Model and Human Health Exposure Pathways for the Affected Area[1]
Foster Wheeler Energy Corporation/Church Road TCE Site, Mountain Top, Pennsylvania



NOTES:

1) The CSM reflects current and reasonably expected future conditions and may not reflect historical conditions in the Affected Area.
2) Also referred to as membrane interface probe (MIP) Area #1 in the RI Work Plan.
3) Also referred to as MIP Area #2 in the RI Work Plan.
4) Vapor intrusion data results indicate that these are complete pathways for some existing residences and incomplete pathways for others. Therefore, this pathway is indicated as "potentially complete" for those receptors that could have a complete pathway.
5) All current residents in the Affected Area are now on public water or have been supplied with carbon filtration systems. Accordingly, the drinking water pathways relative to groundwater for these residents are incomplete. However, there is a small possibility that a future resident may not comply with the current town requirements for all businesses and residences in the Affected Area to connect to public water and could install a private drinking water well on a property within the Affected Area. In this case, the exposure pathways relating to irrigation or drinking may become potentially complete.
6) Groundwater is a secondary source having been impacted by direct releases to soil.

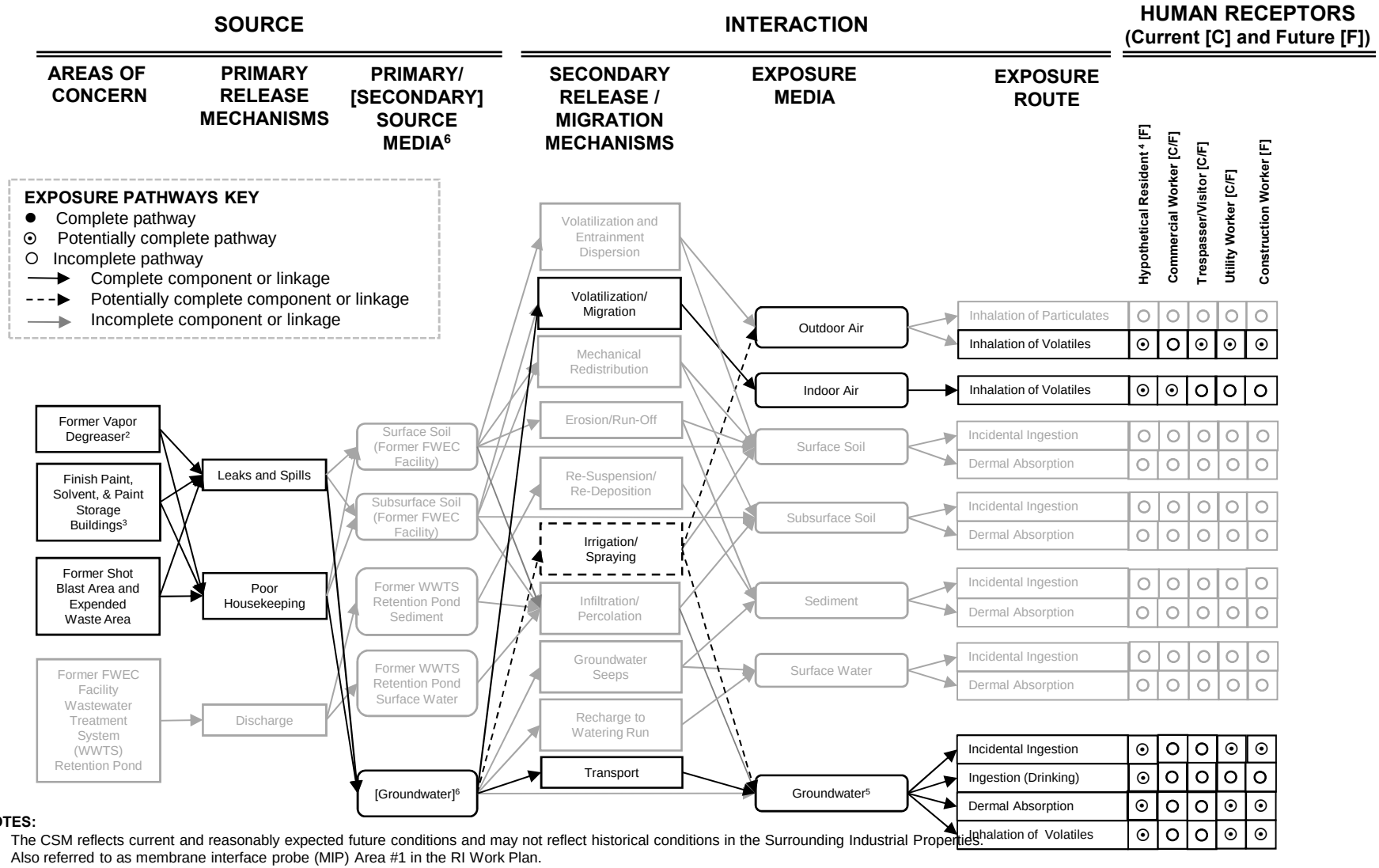
Figure 2-4. Conceptual Site Model and Human Health Exposure Pathways for Watering Run[1]
Foster Wheeler Energy Corporation/Church Road TCE Site, Mountain Top, Pennsylvania



NOTES:

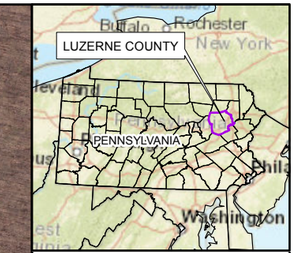
1) The CSM reflects current and reasonably expected future conditions and may not reflect historical conditions in Watering Run.
2) Also referred to as membrane interface probe (MIP) Area #1 in the RI Work Plan.
3) Also referred to as MIP Area #2 in the RI Work Plan.
4) The Watering Run Area of Concern includes Watering Run and all breakout seeps and springs located within the Former FWEC Facility, Surrounding Industrial Properties, and the Affected Area. Exposure to the media found in Watering Run is assumed to be typified by a trespasser or recreational youth and characterized by exposures of short, intermittent duration.
5) The construction worker may be exposed to the surface water and sediment while performing construction and/or maintenance activities on culverts or the channel associated with Watering Run.
6) Groundwater is a secondary source having been impacted by direct releases to soil.

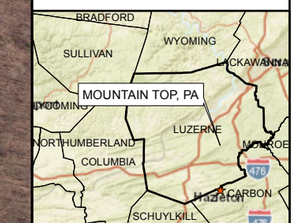
Figure 2-5. Conceptual Site Model and Human Health Exposure Pathways for the Surrounding Industrial Properties [1]
Foster Wheeler Energy Corporation/Church Road TCE Site, Mountain Top, Pennsylvania



NOTES:

1) The CSM reflects current and reasonably expected future conditions and may not reflect historical conditions in the Surrounding Industrial Properties.
2) Also referred to as membrane interface probe (MIP) Area #1 in the RI Work Plan.
3) Also referred to as MIP Area #2 in the RI Work Plan.
4) The Surrounding Industrial Properties is zoned as commercial/industrial. However, a hypothetical resident is included in this risk assessment to evaluate potential unrestricted use.
5) All current buildings in the Surrounding Industrial Properties are on public water supply.
6) Groundwater is a secondary source having been impacted by direct releases to soil.





Legend

- Groundwater Sample Locations
- Surface Water/ Sediment Locations
- MIP Area 1 Soil Locations
- MIP Area 2 Soil Locations
- EWA Soil Locations
- FSBA Soil Locations

Notes:

1) Historical samples WWT-1, WWT-2, WWT-3 and WWT-4 were taken within the retention pond and in the vicinity of SW-SD-1, SW-SD-2, SW-SD-3 and SW-SD-4.

2) Exceedances can be found in RAGS Table 2-6.

0 50 100 200 300 400
FEET

SOURCES:

1) AERIAL PHOTOGRAPHY: AXIS GEOSPATIAL, 2011

FIGURE 2-6

FORMER FWEC FACILITY SAMPLING LOCATIONS FOR GROUNDWATER, SURFACE WATER, SEDIMENT AND SOIL

MOUNTAIN TOP, PENNSYLVANIA

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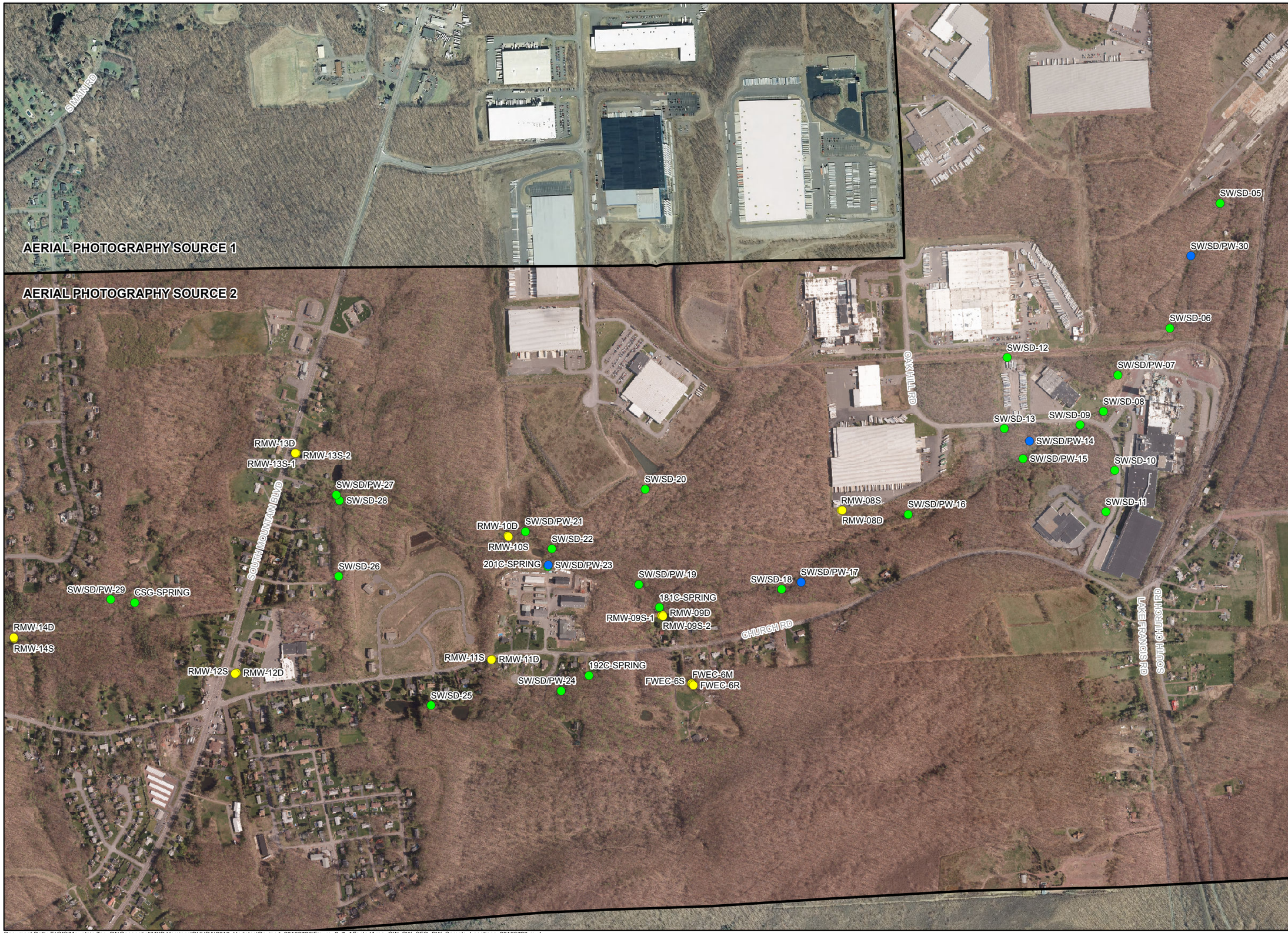

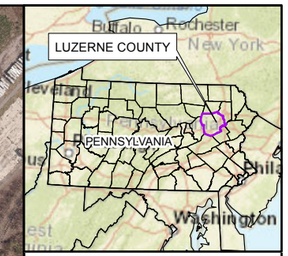

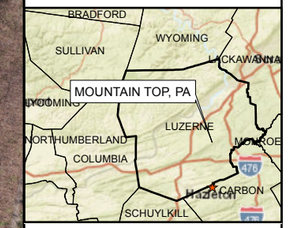

Legend

- Groundwater Sample Locations
- Surface Water/ Sediment/Pore Water/ Locations
- Spring/Sediment Sample Locations

NOTES:

1) EXACT SAMPLE LOCATIONS FOR HISTORICAL DATA COULD NOT BE IDENTIFIED.

0 250 500 1,000
FEET

SOURCES:

1) AERIAL PHOTOGRAPHY: PAMAP PROGRAM, PA DEPT. OF CONSERVATION AND NATURAL RESOURCES, BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY, 2008

2) AERIAL PHOTOGRAPHY: AXIS GEOSPATIAL, 2011

FIGURE 2-7

AFFECTED AREA AND WATERING RUN SAMPLING LOCATIONS FOR GROUNDWATER, SURFACE WATER, PORE WATER, AND SEDIMENT

MOUNTAIN TOP, PENNSYLVANIA

TETRA TECH

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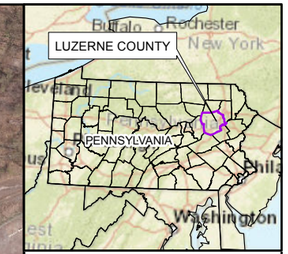

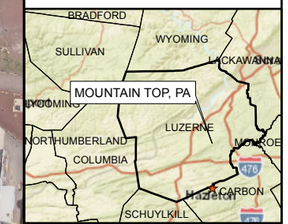

Legend

Groundwater Sample Locations

NOTES:

1) EXACT SAMPLE LOCATIONS FOR HISTORICAL DATA COULD NOT BE IDENTIFIED.

0 50 100 200
FEET

SOURCES:

1) AERIAL PHOTOGRAPHY: AXIS GEOSPATIAL, 2011

FIGURE 2-8

SURROUNDING INDUSTRIAL PROPERTIES SAMPLING LOCATIONS FOR GROUNDWATER

MOUNTAIN TOP, PENNSYLVANIA

TETRA TECH

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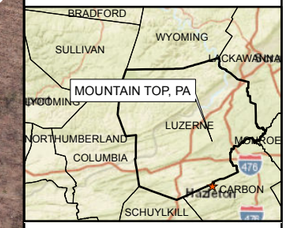

Legend

- Spring/Sediment Sample Locations
- Watering Run and Tributaries

0 250 500
FEET

SOURCES:

1) AERIAL PHOTOGRAPHY: PAMAP PROGRAM, PA DEPT. OF CONSERVATION AND NATURAL RESOURCES, BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY, 2008

2) AERIAL PHOTOGRAPHY: AXIS GEOSPATIAL, 2011

FIGURE 2-9

LOCATION OF FOUR SPRING SAMPLES

MOUNTAIN TOP, PENNSYLVANIA

TETRA TECH

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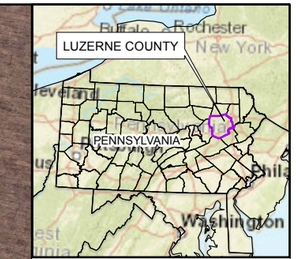

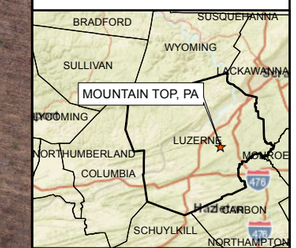

Legend

SOIL SAMPLE LOCATION

- EWA SOIL LOCATIONS
- FSBA SOIL LOCATIONS
- MIP AREA 1 SOIL LOCATIONS
- MIP AREA 2 SOIL LOCATIONS
- FORMER FWEC FACILITIES POTENTIAL SOURCES
- MIP AREA BOUNDARY
- HISTORIC SOIL SAMPLE LOCATION AREA
- FORMER FWEC FACILITY BOUNDARY

NOTES:

1) EXACT SAMPLE LOCATIONS FOR HISTORICAL DATA COULD NOT BE IDENTIFIED

0 50 100 200 300 400
FEET

SOURCES:

AERIAL PHOTOGRAPHY: AXIS GEOSPATIAL, 2011

FIGURE 2-10

AREAS WHERE SOIL SAMPLES WERE COLLECTED IN THE FORMER FWEC FACILITY

MOUNTAIN TOP, PENNSYLVANIA

TETRA TECH

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ATTACHMENT A

STANDARD RAGS TABLES FOR THE HUMAN HEALTH RISK ASSESSMENT

List of Appendix RAGS D Table 7s:

Table 7: Calculation of Chemical Cancer Risks and Non-Cancer Hazards – RME

Table 7.1 – Future Hypothetical Resident – Former FWEC Facility (Adult/Child)

Table 7.2 – Future Commercial Worker – Former FWEC Facility (Adult)

Table 7.3 – Current/Future Trespasser – Former FWEC Facility (Adolescent)

Table 7.4a – Current Site User – Former FWEC Facility (Adult)

Table 7.4b – Future Site User – Former FWEC Facility (Adult)

Table 7.5 – Future Construction/Utility Worker– Former FWEC Facility (Adult)

Table 7.6 – Future Hypothetical Resident – Affected Area (Adult/Child)

Table 7.7 – Future Hypothetical Commercial Worker – Affected Area (Adult)

Table 7.8 – Future Construction/Utility Worker– Affected Area (Adult)

Table 7.9 – Current/Future Trespasser/Visitor – Watering Run, Tributaries, and Streams (Adolescent)

Table 7.10 – Future Construction/Utility Worker– Watering Run, Tributaries, and Streams (Adult)

Table 7.11 – Future Hypothetical Resident – Surrounding Industrial Properties (Adult/Child)

Table 7.12 – Current/Future Hypothetical Commercial Worker – Surrounding Industrial Properties (Adult)

Table 7.13 – Future Construction/Utility Worker– Surrounding Industrial Properties (Adult)

List of Appendix RAGS D Table 9s:

Table 9: Summary of Receptor Risks and Hazards for COPCs – RME

Table 9.1a – Future Hypothetical Resident – Former FWEC Facility (Child)

Table 9.1b – Future Hypothetical Resident – Former FWEC Facility (Adult)

Table 9.2 – Future Commercial Worker – Former FWEC Facility (Adult)

Table 9.3 – Current/Future Trespasser – Former FWEC Facility (Adolescent)

Table 9.4a – Current Site User – Former FWEC Facility (Adult)

Table 9.4b – Future Site User – Former FWEC Facility (Adult)

Table 9.5 – Future Construction/Utility Worker– Former FWEC Facility (Adult)

Table 9.6a – Future Hypothetical Resident – Affected Area (Child)

Table 9.6b – Future Hypothetical Resident – Affected Area (Adult)

Table 9.7 – Future Hypothetical Commercial Worker – Affected Area (Adult)

Table 9.8 – Future Construction/Utility Worker– Affected Area (Adult)

Table 9.9 – Current/Future Trespasser/Visitor – Watering Run, Tributaries, and Streams (Adolescent)

Table 9.10 – Future Construction/Utility Worker– Watering Run, Tributaries, and Streams (Adult)

Table 9.11a – Future Hypothetical Resident – Surrounding Industrial Properties (Child)

Table 9.11b – Future Hypothetical Resident – Surrounding Industrial Properties (Adult)

Table 9.12 – Current/Future Hypothetical Commercial Worker – Surrounding Industrial Properties (Adult)

Table 9.13 – Future Construction/Utility Worker– Surrounding Industrial Properties (Adult)

TABLE 2.1

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (MIP Area 1)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	
Medium:	Soil
Exposure Medium:	Surface Soil (0-1 ft bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
MIP Area 1	79-34-5	1,1,2,2-Tetrachloroethane	11	11	mg/kg	SS-1	1 / 2	0.01 - 0.01	11		0.6	**Y**	ASL
	79-00-5	1,1,2-Trichloroethane	7.5	7.5	mg/kg	SS-1	1 / 2	0.02 - 0.02	7.5		0.15	**Y**	ASL
	79-01-6	Trichloroethene	0.021	29	mg/kg	SS-1	17 / 17		29		0.41	**Y**	ASL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface and subsurface horizons for red Wisconsnian Glacial Till (Ciolkosz et al., 1993; supplemented by Barnes, 2014).

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

TABLE 2.2

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (MIP Area 1)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Soil
Exposure Medium: All Soil (0 - 15 ft bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	7440-38-2	Arsenic	5.7 L	7.1	mg/kg	MIP1-B7-6.5-7.0	2 / 2		7.1	1.14 - 7.39	0.68	**Y**	ASL
	7440-48-4	Cobalt	6.7 J	8.5 J	mg/kg	MIP1-B7-6.5-7.0	2 / 2		8.5	0.372 - 7.52	2.3	**Y**	ASL
	7439-89-6	Iron	18400	20500	mg/kg	MIP1-B7-6.5-7.0	2 / 2		20500	2980 - 21700	5500	**Y**	BKG ASL
	7439-96-5	Manganese	207 L	420	mg/kg	MIP1-B7-6.5-7.0	2 / 2		420	21.9 - 538	180	**Y**	BKG ASL
	79-34-5	1,1,2,2-Tetrachloroethane	0.0029	11	mg/kg	SS-1	2 / 38	0.00072 - 1	11		0.6	**Y**	ASL
	79-00-5	1,1,2-Trichloroethane	0.0032	7.5	mg/kg	SS-1	2 / 38	0.00056 - 1	7.5		0.15	**Y**	ASL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	79-01-6	Trichloroethene	0.002 J	1900 D	mg/kg	TP-212-14	46 / 51	0.006 - 0.006	1900		0.41	**Y**	ASL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

D - Secondary dilution factor

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface (0'-1') and subsurface (1'-2') site-specific background sampling.

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Residential soil RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Soil chromium speciation data inidcates Chromium VI less than 1.5% of Total Chromium. See Section 4.5 of the RI Report.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - not statistically significantly different than background level

BSL - maximum detected concentration below screening level

TABLE 2.3

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (MIP Area 2)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Soil
Exposure Medium: All Soil (0 - 15 ft bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
MIP Area 2	57-12-5	Cyanide, total	0.2 J	0.29 J	mg/kg	MIP2-B20A-7.5-8.0	2 / 5	0.12 - 0.13	0.29	0.27 - 0.28	0.27	**Y**	BKG ASL
	7429-90-5	Aluminum	5850	6840	mg/kg	MIP2-B30-11.5-12.0	5 / 5		6840	1890 - 21000	7700	N	BKG BSL
	7440-38-2	Arsenic	5.3 L	6.7	mg/kg	MIP2-B13-13-14	5 / 5		6.7	1.14 - 7.39	0.68	**Y**	ASL
	7440-39-3	Barium	38.1 J	47.9	mg/kg	MIP2-B20A-7.5-8.0	5 / 5		47.9	17.7 - 79	1500	N	BKG BSL
	7440-41-7	Beryllium	0.46	0.59	mg/kg	MIP2-B13-13-14	5 / 5		0.59	0.148 - 0.908	16	N	BSL
	7440-70-2	Calcium	27.9 J	347 J	mg/kg	MIP2-B13-13-14	5 / 5		347	23.3 - 3860	-	N	BKG NUT
	7440-47-3	Chromium (Total)	9.2 L	11.9	mg/kg	MIP2-B13-13-14	5 / 5		11.9	3.58 - 15.7	12000	N	BKG BSL
	7440-48-4	Cobalt	6.6 J	11.9	mg/kg	MIP2-B30-11.5-12.0	5 / 5		11.9	0.372 - 7.52	2.3	**Y**	ASL
	7440-50-8	Copper	10.8	15.3	mg/kg	MIP2-B20A-7.5-8.0	5 / 5		15.3	2.6 - 21.3	310	N	BKG BSL
	7439-89-6	Iron	17700	21600	mg/kg	MIP2-B30-11.5-12.0	5 / 5		21600	2980 - 21700	5500	**Y**	ASL
	7439-92-1	Lead	10.1	12.3	mg/kg	MIP2-B13-13-14	5 / 5		12.3	10 - 165	400	N	BKG BSL
	7439-95-4	Magnesium	930 J	1250	mg/kg	MIP2-B13-13-14	5 / 5		1250	104 - 1580	-	N	NUT
	7439-96-5	Manganese	196	657 L	mg/kg	MIP2-B20A-7.5-8.0	5 / 5		657	21.9 - 538	180	**Y**	ASL
	7440-02-0	Nickel	10.3	12.3	mg/kg	MIP2-B13-13-14	5 / 5		12.3	1.4 - 14	150	N	BSL
	7440-09-7	Potassium	527 L	717 J	mg/kg	MIP2-B13-13-14	5 / 5		717	218 - 1050	-	N	BKG NUT
	7440-23-5	Sodium	69.4	127	mg/kg	MIP2-B30-11.5-12.0	3 / 5	63.2 - 64.5	127	22.3 - 75.4	-	N	BKG NUT
	7440-62-2	Vanadium	10 J	12.8	mg/kg	MIP2-B30-11.5-12.0	5 / 5		12.8	7.32 - 29.1	39	N	BKG BSL
	7440-66-6	Zinc	25.8	32.7	mg/kg	MIP2-B13-13-14	5 / 5		32.7	9.04 - 56.3	2300	N	BKG BSL
	50-29-3	4,4'-DDT	0.002 J	0.0055 J	mg/kg	MIP2-B20A-7.5-8.0	2 / 5	0.00091 - 0.00095	0.0055		1.9	N	BSL
	309-00-2	Aldrin	0.0022 J	0.0022 J	mg/kg	MIP2-B13-13-14	1 / 5	0.0016 - 0.0017	0.0022		0.039	N	BSL
	115-29-7	Endosulfan sulfate	0.0048 J	0.0048 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.00094 - 0.00097	0.0048		47	N	BSL
	72-20-8	Endrin	0.0015 J	0.0015 J	mg/kg	MIP2-B5-9-9.5	1 / 5	0.001 - 0.0011	0.0015		1.9	N	BSL
	53494-70-5	Endrin ketone	0.0053 J	0.0053 J	mg/kg	MIP2-B5-9-9.5	1 / 5	0.0011 - 0.0011	0.0053		1.9	N	BSL
	58-89-9	gamma-BHC (Lindane)	0.0024 J	0.0024 J	mg/kg	MIP2-B5-9-9.5	1 / 5	0.00085 - 0.00088	0.0024		0.57	N	BSL
	72-43-5	Methoxychlor	0.0044 J	0.0044 J	mg/kg	MIP2-B5-9-9.5	1 / 5	0.00082 - 0.00085	0.0044		32	N	BSL
	91-57-6	2-Methylnaphthalene	0.49	0.49	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.053 - 0.055	0.49		24	N	BSL
	50-32-8	Benzo[a]pyrene	0.085	0.085	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.0044 - 0.0046	0.085		0.016	**Y**	ASL
	83-32-9	Acenaphthene	0.099 J	0.099	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.051 - 0.053	0.099		360	N	BSL
	56-55-3	Benzo[a]anthracene	0.34	0.34	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.0067 - 0.0069	0.34		0.16	**Y**	ASL
	205-99-2	Benzo[b]fluoranthene	0.23	0.23	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.0054 - 0.0056	0.23		0.16	**Y**	ASL
	191-24-2	Benzo[g,h,i]perylene	0.051 J	0.051 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.038 - 0.039	0.051		-	N	NAT
	207-08-9	Benzo[k]fluoranthene	0.11	0.11	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.005 - 0.0052	0.11		1.6	N	BSL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	117-81-7	Bis(2-ethylhexyl)phthalate	0.1 J	0.1 J	mg/kg	MIP2-B5-9-9.5	1 / 5	0.048 - 0.05	0.1		39	N	BSL
	218-01-9	Chrysene	0.28 J	0.28 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.052 - 0.054	0.28		16	N	BSL
	53-70-3	Dibenz(a,h)anthracene	0.027 J	0.027 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.0043 - 0.0045	0.027		0.016	**Y**	ASL
	132-64-9	Dibenzofuran	0.096 J	0.096 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.054 - 0.056	0.096		7.3	N	BSL
	206-44-0	Fluoranthene	0.99	0.99	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.06 - 0.062	0.99		240	N	BSL
	86-73-7	Fluorene	0.13 J	0.13 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.061 - 0.063	0.13		240	N	BSL
	193-39-5	Indeno[1,2,3-cd]pyrene	0.062	0.062	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.0058 - 0.006	0.062		0.16	N	BSL
	91-20-3	Naphthalene	0.16 J	0.16 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.053 - 0.055	0.16		3.8	N	BSL
	85-01-8	Phenanthrene	1.1	1.1	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.063 - 0.065	1.1		-	N	NAT
	129-00-0	Pyrene	0.71	0.71	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.062 - 0.065	0.71		180	N	BSL
	71-55-6	1,1,1-Trichloroethane	0.0015	51	mg/kg	MIP2-B20A-7.5-8.0	5 / 5		51		810	N	BSL
	75-34-3	1,1-Dichloroethane	0.00036 J	0.55	mg/kg	MIP2-B20A-7.5-8.0	4 / 5	0.00023 - 0.00023	0.55		3.6	N	BSL
	75-35-4	1,1-Dichloroethene	0.0005 J	4.1	mg/kg	MIP2-B20A-7.5-8.0	4 / 5	0.00034 - 0.00034	4.1		23	N	BSL
	67-64-1	Acetone	0.0046	0.0047	mg/kg	MIP2-B30-11.5-12.0 / MIP2-B5-9-9.5	4 / 5	0.45 - 0.45	0.0047		6100	N	BSL
	156-59-2	cis-1,2-Dichloroethene	0.001	0.0012	mg/kg	MIP2-B30-11.5-12.0	2 / 5	0.00022 - 0.035	0.0012		16	N	BSL
	100-41-4	Ethylbenzene	0.78	0.78	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.00017 - 0.00019	0.78		5.8	N	BSL
	98-82-8	Isopropylbenzene	0.16 J	0.16 J	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.00024 - 0.00025	0.16		190	N	BSL
	127-18-4	Tetrachloroethene	0.0014	0.13 J	mg/kg	MIP2-B20A-7.5-8.0	4 / 5	0.00031 - 0.00031	0.13		8.1	N	BSL
	108-88-3	Toluene	0.031	0.031	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.00027 - 0.00029	0.031		490	N	BSL
	79-01-6	Trichloroethene	0.0036	0.046	mg/kg	MIP2-B20A-7.5-8.0	3 / 5	0.00033 - 0.00034	0.046		0.41	N	BSL
	1330-20-7	Xylenes, Total	5.7	5.7	mg/kg	MIP2-B20A-7.5-8.0	1 / 5	0.00072 - 0.00076	5.7		65	N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface (0'-1') and subsurface (1'-2') site-specific background sampling.

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Residential soil RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Soil chromium speciation data inidcates Chromium VI less than 1.5% of Total Chromium. See Section 4.5 of the RI Report.

Residential soil RSL for Endosulfan used as a surrogate for Endosulfan sulfate.

Residential soil RSL for Endrin used as a surrogate for Endrin Aldehyde and Endrin Ketone.

Residential soil RSL for m-Xylene used as a surrogate for m/p-Xylene.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - not statistically significantly different than background level

BSL - maximum detected concentration below screening level

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.4

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Expended Waste Area)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Soil
Exposure Medium: Surface Soil (0-1 ft bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Expended Waste Area	7429-90-5	Aluminum	3210 L	6260 L	mg/kg	FCR01-06_12202011	5 / 5		6260	1890 - 11600	7700	N	BKG BSL
	7440-36-0	Antimony	1.9 K	2.2 K	mg/kg	FCR01-09_12202011	2 / 5	1.3 - 1.4	2.2	0.49 - 2.26	3.1	N	BKG BSL
	7440-38-2	Arsenic	4.4	8.6	mg/kg	FCR01-07_12202011 / FCR01-09_12202011	5 / 5		8.6	1.14 - 7.38	0.68	Y	ASL
	7440-39-3	Barium	48.8	125	mg/kg	FCR01-06_12202011	5 / 5		125	17.7 - 67.8	1500	N	BSL
	7440-41-7	Beryllium	0.98	4.1	mg/kg	FCR01-06_12202011	5 / 5		4.1	0.148 - 0.645	16	N	BSL
	7440-43-9	Cadmium	1 K	4.4	mg/kg	FCR01-06_12202011	5 / 5		4.4	0.099 - 0.441	7.1	N	BSL
	7440-70-2	Calcium	1780	12200	mg/kg	FCR01-06_12202011	5 / 5		12200	23.3 - 2270	-	N	NUT
	7440-47-3	Chromium (Total)	15.4	64.3	mg/kg	FCR01-06_12202011	9 / 9		64.3	3.58 - 13.2	12000	N	BSL
	7440-48-4	Cobalt	13.8	37.3	mg/kg	FCR01-06_12202011	5 / 5		37.3	0.372 - 7.52	2.3	Y	ASL
	7440-50-8	Copper	47.8 L	358 L	mg/kg	FCR01-06_12202011	5 / 5		358	2.6 - 21.3	310	Y	ASL
	7439-89-6	Iron	13300	28100	mg/kg	FCR01-06_12202011	5 / 5		28100	2980 - 20800	5500	Y	ASL
	7439-92-1	Lead	20.6 L	241 L	mg/kg	FCR01-06_12202011	5 / 5		241	10 - 165	400	N	BSL
	7439-95-4	Magnesium	718 J	1760	mg/kg	FCR01-06_12202011	5 / 5		1760	104 - 1370	-	N	NUT
	7439-96-5	Manganese	300	1100	mg/kg	FCR01-09_12202011	5 / 5		1100	21.9 - 420	180	Y	ASL
	7440-02-0	Nickel	26.5 J	219 J	mg/kg	FCR01-06_12202011	5 / 5		219	1.4 - 14	150	Y	ASL
	7440-09-7	Potassium	375 J	579 J	mg/kg	FCR01-06_12202011	5 / 5		579	218 - 856	-	N	BKG NUT
	7440-22-4	Silver	0.35 K	0.56 K	mg/kg	FCR01-06_12202011	3 / 5	0.21 - 0.24	0.56	0.512 - 0.512	39	N	BSL
	7440-23-5	Sodium	197 J	228 J	mg/kg	FCR01-06_12202011	2 / 5	165 - 187	228	22.3 - 75.4	-	N	BKG NUT
	7440-62-2	Vanadium	8.3 J	14.3	mg/kg	FCR01-09_12202011	5 / 5		14.3	7.32 - 20.7	39	N	BKG BSL
	7440-66-6	Zinc	170 L	2260 L	mg/kg	FCR01-06_12202011	5 / 5		2260	9.04 - 56.3	2300	N	BSL
	50-32-8	Benzo[a]pyrene	0.016 J	0.33	mg/kg	FCR01-08_12202011	5 / 5		0.33		0.016	Y	ASL
	120-12-7	Anthracene	0.078 J	0.078 J	mg/kg	FCR01-08_12202011	1 / 5	0.065 - 0.07	0.078		1800	N	BSL
	56-55-3	Benzo[a]anthracene	0.032 J	0.34	mg/kg	FCR01-08_12202011	3 / 5	0.0068 - 0.0068	0.34		0.16	Y	ASL
	205-99-2	Benzo[b]fluoranthene	0.031 J	0.48	mg/kg	FCR01-08_12202011	5 / 5		0.48		0.16	Y	ASL
	191-24-2	Benzo[g,h,i]perylene	0.13 J	0.21 J	mg/kg	FCR01-08_12202011	2 / 5	0.039 - 0.042	0.21		-	N	NAT
	207-08-9	Benzo[k]fluoranthene	0.12	0.17	mg/kg	FCR01-08_12202011	2 / 5	0.0051 - 0.0055	0.17		1.6	N	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	0.11 J	0.15 J	mg/kg	FCR01-07_12202011	4 / 5	0.052 - 0.052	0.15		39	N	BSL
	218-01-9	Chrysene	0.24 J	0.39	mg/kg	FCR01-08_12202011	2 / 5	0.053 - 0.057	0.39		16	N	BSL
	53-70-3	Dibenz(a,h)anthracene	0.034 J	0.054	mg/kg	FCR01-08_12202011	2 / 5	0.0044 - 0.0047	0.054		0.016	Y	ASL
	206-44-0	Fluoranthene	0.099 J	0.66	mg/kg	FCR01-08_12202011	3 / 5	0.061 - 0.066	0.66		240	N	BSL
	193-39-5	Indeno[1,2,3-cd]pyrene	0.012 J	0.22	mg/kg	FCR01-08_12202011	4 / 5	0.0059 - 0.0059	0.22		0.16	Y	ASL
	91-20-3	Naphthalene	0.067 J	0.067 J	mg/kg	FCR01-06_12202011	1 / 5	0.054 - 0.058	0.067		3.8	N	BSL
	85-01-8	Phenanthrene	0.11 J	0.28 J	mg/kg	FCR01-08_12202011	2 / 5	0.064 - 0.069	0.28		-	N	NAT
	129-00-0	Pyrene	0.077 J	0.61	mg/kg	FCR01-08_12202011	3 / 5	0.063 - 0.068	0.61		180	N	BSL

Notes:

(1) Concentrations reflect data available from 0 - 0.5 ft bgs. Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

K - Reported value may be biased high

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface (0'-1') site-specific background sampling.

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Residential soil RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Chromium VI was not detected in any of the four soil samples collected from the Expended Waste Area. See Section 4.5 of the RI Report.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - not statistically significantly different than background level

BSL - maximum detected concentration below screening level

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.5

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Shot Blast Area)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	
Medium:	Soil
Exposure Medium:	Surface Soil (0-1 ft bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Shot Blast Area	7429-90-5	Aluminum	3860 L	8400 L	mg/kg	FCR01-04_12202011	10 / 10		8400	1890 - 11600	7700	**Y**	BKG ASL
	7440-36-0	Antimony	1.3 J	2.2 K	mg/kg	FCR01-04_12202011	2 / 10	1.3 - 1.4	2.2	0.49 - 2.26	3.1	N	BKG BSL
	7440-38-2	Arsenic	4.5	8.2	mg/kg	FCR01-03_12202011	10 / 10		8.2	2.8 - 7.38	0.68	**Y**	ASL
	7440-39-3	Barium	20.5 J	162	mg/kg	FCR01-04_12202011	10 / 10		162	17.7 - 79	1500	N	BSL
	7440-41-7	Beryllium	0.33 J	3.4	mg/kg	FCR01-04_12202011	10 / 10		3.4	0.148 - 0.908	16	N	BSL
	7440-43-9	Cadmium	0.26 J	3.3	mg/kg	FCR01-04_12202011	9 / 10	0.16 - 0.16	3.3	0.099 - 0.441	7.1	N	BSL
	7440-70-2	Calcium	689 J	14900	mg/kg	FCR01-01_12202011	10 / 10		14900	51.9 - 2270	-	N	NUT
	7440-47-3	Chromium (Total)	8	84.2	mg/kg	FCR01-04_12202011	13 / 13		84.2	3.58 - 13.2	12000	N	BSL
	18540-29-9	Chromium (VI)	0.184	0.945	mg/kg	FCR--03-C-GB-SS	3 / 3		0.945		0.3	**Y**	ASL
	7440-48-4	Cobalt	4.7 J	42.6	mg/kg	FCR01-04_12202011	10 / 10		42.6	0.372 - 7.52	2.3	**Y**	ASL
	7440-50-8	Copper	9.6	469 L	mg/kg	FCR01-04_12202011	10 / 10		469	2.6 - 21.3	310	**Y**	ASL
	7439-89-6	Iron	12000	33400	mg/kg	FCR01-04_12202011	10 / 10		33400	2980 - 20800	5500	**Y**	ASL
	7439-92-1	Lead	9.6	419 L	mg/kg	FCR01-04_12202011	10 / 10		419	10 - 165	400	**Y**	BKG ASL
	7439-95-4	Magnesium	836 J	2280	mg/kg	FCR01-03_12202011	10 / 10		2280	104 - 1370	-	N	NUT
	7439-96-5	Manganese	294	695	mg/kg	FCR01-03_12202011	10 / 10		695	21.9 - 420	180	**Y**	ASL
	7439-97-6	Mercury	0.14	0.14	mg/kg	FCR01-05_12202011	1 / 10	0.023 - 0.025	0.14	0.023 - 0.235	0.94	N	BKG BSL
	7440-02-0	Nickel	9.5	301 J	mg/kg	FCR01-04_12202011	10 / 10		301	1.4 - 14	150	**Y**	ASL
	7440-09-7	Potassium	308 J	889 J	mg/kg	FCR01-04_12202011	10 / 10		889	218 - 856	-	N	NUT
	7782-49-2	Selenium	1.5 J	1.5 J	mg/kg	FCR01-04_12202011	1 / 10	0.51 - 1.5	1.5	0.764 - 2.58	39	N	BKG BSL
	7440-22-4	Silver	0.22 K	0.71 K	mg/kg	FCR01-04_12202011	4 / 10	0.2 - 0.22	0.71	0.512 - 0.512	39	N	BSL
	7440-23-5	Sodium	265 J	353 J	mg/kg	FCR01-04_12202011	2 / 10	161 - 177	353	22.3 - 75.4	-	N	BKG NUT
	7440-62-2	Vanadium	6 J	16.1	mg/kg	FCR01-04_12202011	10 / 10		16.1	7.32 - 20.7	39	N	BKG BSL
	7440-66-6	Zinc	29	2210 L	mg/kg	FCR01-04_12202011	10 / 10		2210	9.04 - 56.3	2300	N	BKG BSL
	50-32-8	Benzo[a]pyrene	0.019 J	1.7	mg/kg	FCR01-04_12202011	9 / 10	0.0046 - 0.0046	1.7		0.016	**Y**	ASL
	83-32-9	Acenaphthene	0.099 J	0.16 J	mg/kg	FCR01-04_12202011	3 / 10	0.051 - 0.056	0.16		360	N	BSL
	120-12-7	Anthracene	0.26 J	0.55	mg/kg	FCR01-04_12202011	3 / 10	0.063 - 0.069	0.55		1800	N	BSL
	56-55-3	Benzo[a]anthracene	0.043	1.9	mg/kg	FCR01-04_12202011	7 / 10	0.0068 - 0.0069	1.9		0.16	**Y**	ASL
	205-99-2	Benzo[b]fluoranthene	0.033 J	2	mg/kg	FCR01-04_12202011	9 / 10	0.0055 - 0.0055	2		0.16	**Y**	ASL
	191-24-2	Benzo[g,h,i]perylene	0.046 J	0.98	mg/kg	FCR01-04_12202011	8 / 10	0.039 - 0.039	0.98		-	N	NAT
	207-08-9	Benzo[k]fluoranthene	0.058	0.81	mg/kg	FCR01-04_12202011	6 / 10	0.0051 - 0.0055	0.81		1.6	N	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	0.25 J	2.8	mg/kg	FCR01-04_12202011	2 / 10	0.048 - 0.052	2.8		39	N	BSL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	85-68-7	Butyl benzyl phthalate	0.12 J	0.16 J	mg/kg	FCR01-02_11302011	2 / 10	0.042 - 0.046	0.16		290	N	BSL
	86-74-8	Carbazole	0.13 J	0.31 J	mg/kg	FCR01-04_12202011	3 / 10	0.057 - 0.062	0.31		-	N	NAT
	218-01-9	Chrysene	0.14	2	mg/kg	FCR01-04_12202011	6 / 10	0.053 - 0.057	2		16	N	BSL
	53-70-3	Dibenz(a,h)anthracene	0.01 J	0.33	mg/kg	FCR01-04_12202011	6 / 10	0.0043 - 0.0045	0.33		0.016	**Y**	ASL
	132-64-9	Dibenzofuran	0.069 J	0.085 J	mg/kg	FCR01-04_12202011	3 / 10	0.054 - 0.059	0.085		7.3	N	BSL
	206-44-0	Fluoranthene	0.074 J	3.3	mg/kg	FCR01-04_12202011	7 / 10	0.061 - 0.062	3.3		240	N	BSL
	86-73-7	Fluorene	0.12 J	0.18 J	mg/kg	FCR01-04_12202011	3 / 10	0.061 - 0.066	0.18		240	N	BSL
	193-39-5	Indeno[1,2,3-cd]pyrene	0.041	1.1	mg/kg	FCR01-04_12202011	8 / 10	0.0059 - 0.0059	1.1		0.16	**Y**	ASL
	85-01-8	Phenanthrene	0.12 J	2.2	mg/kg	FCR01-04_12202011	6 / 10	0.064 - 0.068	2.2		-	N	NAT
	129-00-0	Pyrene	0.23 J	2.7	mg/kg	FCR01-04_12202011	6 / 10	0.064 - 0.068	2.7		180	N	BSL
	100-41-4	Ethylbenzene	0.00026	0.00026	mg/kg	FCR01-02_12202011	1 / 2	0.00018 - 0.00018	0.00026		5.8	N	BSL
	75-09-2	Methylene chloride	0.00067 JB	0.00067 JB	mg/kg	FCR01-02_11302011	1 / 2	0.00043 - 0.00043	0.00067		35	N	BSL

Notes:

(1) Concentrations reflect data available from 0 - 0.5 ft bgs. Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

K - Reported value may be biased high

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface (0'-1') site-specific background sampling.

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Residential soil RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Soil chromium speciation data inidcates Chromium VI less than 1.5% of Total Chromium. Chromium VI evaluated separately. See Section 4.5 of the RI Report.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - not statistically significantly different than background level

BSL - maximum detected concentration below screening level

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.6

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Former FWEC Facility)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration (Date)		Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Upgradient Range May 2013 (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Former FWEC Facility	50-00-0	Formaldehyde	5.26 B	18.8 B	µg/L	MW-16S-052013-43.5	5/20/2013	4 / 41	5 - 5	18.8		0.43	-		Y	ASL
	57-12-5	Cyanide	0.006 B	0.0068 B	mg/L	MW-10D-051513-146	5/15/2013	7 / 16	0.004 - 0.004	0.0068		0.00015	0.2		Y	ASL
	7429-90-5	Aluminum	0.0774 J	2.3	mg/L	CH-7-051613-35	5/16/2013	15 / 23	0.0721 - 0.0721	2.3	1.93 B - 2.3	2	-		Y	BKG ASL
	7440-39-3	Barium	0.01 J	0.627 L	mg/L	EB-03-051713-128	5/17/2013	23 / 23		0.627	0.0489 J - 0.108 J	0.38	2		Y	ASL
	7440-43-9	Cadmium	0.0029 J	0.0029 J	mg/L	MW-16S-052013-43.5	5/20/2013	1 / 23	0.00082 - 0.005	0.0029		0.00092	0.005		Y	ASL
	7440-70-2	Calcium	1.49 J	728	mg/L	EB-01-052213-110	5/22/2013	23 / 23		728	12.3 - 26.2	-	-		N	NUT
	18540-29-9	Chromium	0.008 L	0.0199	mg/L	EB-01-052213-110	5/22/2013	3 / 23	0.0045 - 0.0045	0.0199		0.000035	-		Y	ASL
	7440-48-4	Cobalt	0.0043 J	0.0117 J	mg/L	CH-8-051613-35	5/16/2013	2 / 23	0.0043 - 0.0043	0.0117	0.0043 J - 0.0117 J	0.0006	-		Y	ASL
	7440-50-8	Copper	0.0083 J	0.0083 J	mg/L	EB-01-052213-110	5/22/2013	1 / 23	0.0078 - 0.0078	0.0083		0.08	1.3		N	BSL
	7439-89-6	Iron	0.0766 J	53.4	mg/L	MW-6-052213-95	5/22/2013	15 / 23	0.0736 - 0.0736	53.4	2.26 L - 7.57 L	1.4	-		Y	ASL
	7439-92-1	Lead	0.0058	0.0682 L	mg/L	EB-03-051713-128	5/17/2013	4 / 23	0.004 - 0.004	0.0682		0.015	0.015		Y	ASL
	7439-95-4	Magnesium	0.336 J	8.03	mg/L	MW-16S-052013-43.5	5/20/2013	22 / 23	0.321 - 0.321	8.03	3 J - 6.61	-	-		N	NUT
	7439-96-5	Manganese	0.0051 J	7.61	mg/L	MW-16S-052013-43.5	5/20/2013	18 / 23	0.0043 - 0.0043	7.61	2.66 - 2.98	0.043	-		Y	ASL
	7439-97-6	Mercury	0.00023	0.00023	mg/L	MD-01-051613-52.5	5/16/2013	1 / 23	0.00016 - 0.00018	0.00023		0.000063	0.002		Y	ASL
	7440-02-0	Nickel	0.0062 J	0.0078 L	mg/L	EB-03-051713-128	5/17/2013	5 / 23	0.005 - 0.005	0.0078		0.039	-		N	BSL
	7440-09-7	Potassium	0.528 J	293	mg/L	EB-01-052213-110	5/22/2013	21 / 23	0.525 - 0.525	293	2.19 J - 2.68 J	-	-		N	NUT
	7440-23-5	Sodium	1.45 J	117 L	mg/L	EB-03-051713-128	5/17/2013	23 / 23		117	5.36 - 12.9	-	-		N	NUT
	7440-66-6	Zinc	0.008 J	0.0937	mg/L	EB-01-052213-110	5/22/2013	12 / 23	0.0058 - 0.0058	0.0937	0.0107 J - 0.019 J	0.6	-		N	BSL
	120-82-1	1,2,4-Trichlorobenzene	0.36 J	0.54 J	µg/L	MD-01-051613-52.5	5/16/2013	2 / 41	0.19 - 0.58	0.54		0.4	70		Y	ASL
	67-72-1	Hexachloroethane	0.2 J	0.2 J	µg/L	MW-10D-051513-146	5/15/2013	1 / 23	0.15 - 0.56	0.2		0.33	-		N	BSL
	71-55-6	1,1,1-Trichloroethane	0.11 J	380	µg/L	MW-7S-091613-47.5	9/16/2013	29 / 81	0.06 - 0.6	380		800	200		N	BSL
	79-00-5	1,1,2-Trichloroethane	0.34 J	0.34 J	µg/L	MW-7S-091613-47.5	9/16/2013	1 / 81	0.1 - 4.8	0.34		0.041	5		Y	ASL
	75-34-3	1,1-Dichloroethane	0.13 J	29	µg/L	MW-7S-091613-47.5	9/16/2013	21 / 81	0.13 - 3.3	29		2.7	-		Y	ASL
	75-35-4	1,1-Dichloroethene	0.13 J	56	µg/L	MW-7S-091613-47.5	9/16/2013	19 / 81	0.09 - 2.3	56		28	7		Y	ASL
	107-06-2	1,2-Dichloroethane	0.21 J	0.21 J	µg/L	MW-7S-091613-47.5	9/16/2013	1 / 81	0.19 - 24	0.21		0.17	5		Y	ASL
	123-91-1	1,4-Dioxane	0.74 J	45 J	µg/L	MW-7S-091613-47.5	9/16/2013	11 / 54	0.31 - 0.5	45		0.46	-		Y	ASL
	78-93-3	2-Butanone	2.4 J	6.9	µg/L	EB-03-091813-128	9/18/2013	2 / 80	0.82 - 82	6.9		560	-		N	BSL
	67-64-1	Acetone	26	35	µg/L	EB-01-052213-110	5/22/2013	4 / 62	2.5 - 67	35		1400	-		N	BSL
	71-43-2	Benzene	0.11 J	0.45 J	µg/L	MW-9D-091713-151.5	9/17/2013	18 / 81	0.08 - 13	0.45		0.45	5		Y	ASL
	75-15-0	Carbon disulfide	0.15 J	1.1	µg/L	CH-6	4/8/2014	5 / 81	0.13 - 15	1.1		81	-		N	BSL
	108-90-7	Chlorobenzene	0.81 J	0.81 J	µg/L	MD-01-051613-52.5	5/16/2013	1 / 81	0.11 - 16	0.81		7.8	100		N	BSL
	67-66-3	Chloroform	0.16 J	0.27 J	µg/L	MW-7S	4/10/2014	5 / 81	0.08 - 15	0.27		0.22	8.0E+01(F)		Y	ASL
	74-87-3	Chloromethane	0.3	0.3	µg/L	EB-01-09182013-172.5	9/18/2013	1 / 81	0.1 - 21	0.3		19	-		N	BSL
	156-59-2	cis-1,2-Dichloroethene	0.21 J	10	µg/L	MW-7S-091613-47.5	9/16/2013	27 / 81	0.18 - 20	10		3.6	70		Y	ASL
	75-71-8	Dichlorodifluoromethane	0.23 J	7.7	µg/L	MW-9D-052013-151	5/20/2013	10 / 81	0.22 - 29	7.7		20	-		N	BSL
	100-41-4	Ethylbenzene	0.1 J	0.34 J	µg/L	CH-8-091313-33.5	9/13/2013	15 / 81	0.1 - 2.5	0.34		1.5	700		N	BSL
	108-38-3	m/p-Xylene	0.3 J	1.2 J	µg/L	Multiple Locations	9/13/2013, 9/18/2013	23 / 81	0.25 - 6.3	1.2		19	-		N	BSL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration (Date)		Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Upgradient Range May 2013 (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	95-47-6	o-Xylene	0.13 J	0.73 J	µg/L	MW-6-091313-68	9/13/2013	23 / 81	0.13 - 3.3	0.73		19	-		N	BSL
	127-18-4	Tetrachloroethene	0.12 J	16	µg/L	MW-7S	4/10/2014	25 / 81	0.1 - 0.1	16		4.1	5		**Y**	ASL
	108-88-3	Toluene	0.16 J	4.4	µg/L	EB-03-051713-128	5/17/2013	64 / 81	0.15 - 9	4.4		110	1000		N	BSL
	79-01-6	Trichloroethene	0.11 J	4900	µg/L	MD-01-091713-52.5	9/17/2013	61 / 81	0.09 - 18	4900		0.28	5		**Y**	ASL
	75-69-4	Trichlorofluoromethane	0.17 J	6.1 J	µg/L	MW-9D-052013-151	5/20/2013	10 / 81	0.15 - 16	6.1		110	-		N	BSL
	75-01-4	Vinyl chloride	0.33 J	0.33 J	µg/L	MW-3-091713-50	9/17/2013	1 / 81	0.13 - 13	0.33		0.019	2		**Y**	ASL
	1330-20-7	Xylenes, Total	0.43 J	2	µg/L	MW-6-091313-68	9/13/2013	23 / 81	0.13 - 3.3	2		19	10000		N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Range of concentrations detected in upgradient monitoring wells CH-7 and CH-8.

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential tapwater, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Tapwater RSL for Chromium VI used as a surrogate for Total Chromium due to absence of Chromium speciation data for groundwater. See Section 4.2.3 of the RI Report.

Tapwater RSL for m-Xylene used as a surrogate for m/p-Xylene.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - maximum detected concentration consistent with background levels.

BSL - maximum detected concentration below screening level

FOD - frequency of detection

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.7

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Surrounding Industrial Properties)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration (Date)		Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Upgradient Range May 2013 (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surrounding Industrial Properties	50-00-0	Formaldehyde	5.1	J	125	J	µg/L	GW-HP04-40	12/1/2010	22 / 84	5 - 5	125		0.43	-		Y	ASL
	7429-90-5	Aluminum	0.179	J	0.569		mg/L	RMW-02S-2	12/21/2011	4 / 4		0.569	1.93 B - 2.3	2	-		N	BKG BSL
	7440-39-3	Barium	0.0296	J	0.062	J	mg/L	RMW-04S-2	12/21/2011	4 / 4		0.062	0.0489 J - 0.108 J	0.38	2		N	BKG BSL
	7440-70-2	Calcium	8.6		15.9		mg/L	RMW-04S-2	12/21/2011	4 / 4		15.9	12.3 - 26.2	-	-		N	BKG NUT
	7439-89-6	Iron	0.0921	J	21.4	L	mg/L	RMW-06S-051313-120	5/13/2013	14 / 16	0.0736 - 0.0736	21.4	2.26 L - 7.57 L	1.4	-		Y	ASL
	7439-95-4	Magnesium	2.21	J	4.77	J	mg/L	RMW-04S-2	12/21/2011	4 / 4		4.77	3 J - 6.61	-	-		N	BKG NUT
	7439-96-5	Manganese	0.0153		7.82		mg/L	RMW-04S-2	12/21/2011	4 / 4		7.82	2.66 - 2.98	0.043	-		Y	ASL
	7440-09-7	Potassium	0.823	J	1.49	J	mg/L	RMW-04S-2	12/21/2011	4 / 4		1.49	2.19 J - 2.68 J	-	-		N	BKG NUT
	7440-23-5	Sodium	6.25		102		mg/L	RMW-04S-2	12/21/2011	4 / 4		102	5.36 - 12.9	-	-		N	NUT
	7440-66-6	Zinc	0.0059	J	0.0534		mg/L	RMW-02S-1	12/21/2011	4 / 4		0.0534	0.0107 J - 0.019 J	0.6	-		N	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	6.2	J	6.2	J	µg/L	RMW-04S-2	12/21/2011	1 / 5	2 - 2.3	6.2		5.6	6		Y	ASL
	71-55-6	1,1,1-Trichloroethane	0.095	J	21		µg/L	RMW-01S-1	9/11/2013; 4/8/2014	51 / 146	0.06 - 0.25	21		800	200		N	BSL
	75-34-3	1,1-Dichloroethane	0.15	J	41		µg/L	RMW-01S-1-09112013-42	9/11/2013	19 / 146	0.1 - 0.13	41		2.7	-		Y	ASL
	75-35-4	1,1-Dichloroethene	0.12	J	4.6		µg/L	RMW-01S-1	4/8/2014	42 / 146	0.09 - 0.14	4.6		28	7		N	BSL
	123-91-1	1,4-Dioxane	0.5		74		µg/L	RMW-01S-1-09112013-42	9/11/2013	26 / 61	0.31 - 8.4	74		0.46	-		Y	ASL
	78-93-3	2-Butanone	1.2	J	16		µg/L	GW-HP03-24	11/30/2010	9 / 125	0.82 - 2.3	16		560	-		N	BSL
	110-75-8	2-Chloroethyl vinyl ether	2.3	J	2.3	J	µg/L	RMW-01S-1-052113-42	5/21/2013	1 / 146	0.19 - 20	2.3		-	-		N	NAT, FOD
	591-78-6	2-Hexanone	1.8	J	1.8	J	µg/L	GW-HP03-24	11/30/2010	1 / 139	0.5 - 0.55	1.8		3.8	-		N	BSL
	108-10-1	4-Methyl-2-pentanone	0.81	J	0.81	J	µg/L	GW-HP03-24	11/30/2010	1 / 146	0.68 - 0.99	0.81		120	-		N	BSL
	67-64-1	Acetone	6.1		1400	D	µg/L	GWE-HP17-105	8/23/2012	33 / 134	2.5 - 2.7	1400		1400	-		Y	ASL
	71-43-2	Benzene	0.092	J	0.95	J	µg/L	RMW-01D-138-153	4/18/2013	28 / 146	0.08 - 0.13	0.95		0.45	5		Y	ASL
	75-27-4	Bromodichloromethane	0.39	J	1.3		µg/L	GWE-HP08-60-63	6/22/2011	8 / 146	0.093 - 0.12	1.3		0.13	8.0E+01(F)		Y	ASL
	75-15-0	Carbon disulfide	0.15	J	4.5	B	µg/L	RMW-06D-TAG	4/10/2014	14 / 146	0.13 - 0.15	4.5		81	-		N	BSL
	56-23-5	Carbon tetrachloride	0.16	J	1		µg/L	RMW-06D-5-051613	5/16/2013	27 / 146	0.06 - 0.19	1		0.45	5		Y	ASL
	108-90-7	Chlorobenzene	0.23	J	0.23	J	µg/L	RMW-06D-TAG	4/10/2014	1 / 146	0.11 - 0.16	0.23	Y ASL	7.8	100		N	BSL
	67-66-3	Chloroform	0.11	J	19		µg/L	GWE-HP09-75-78	6/20/2011	58 / 146	0.08 - 0.15	19		0.22	8.0E+01(F)		Y	ASL
	74-87-3	Chloromethane	0.66	J	0.67	J	µg/L	GWE-HP07-60-63	6/29/2011	2 / 146	0.1 - 0.21	0.67		19	-		N	BSL
	156-59-2	cis-1,2-Dichloroethene	0.19	J	7.4		µg/L	GW-HP01-24_11162010	11/16/2010	43 / 146	0.18 - 0.2	7.4		3.6	70		Y	ASL
	75-71-8	Dichlorodifluoromethane	0.34	J	6.5		µg/L	FWEC-5R-050813-120.3	5/8/2013	35 / 146	0.22 - 0.29	6.5		20	-		N	BSL
	100-41-4	Ethylbenzene	0.12	J	0.38	J	µg/L	RMW-06D-7 / FWEC-5R-09132013-120.3	12/20/2012; 9/13/2013	17 / 146	0.1 - 0.25	0.38		1.5	700		N	BSL
	108-38-3	m/p-Xylene	0.3	J	1.5	J	µg/L	FWEC-5R-09132013-120.3	9/13/2013	21 / 131	0.25 - 0.29	1.5		19	-		N	BSL
	75-09-2	Methylene chloride	0.24	J	0.78	J	µg/L	RMW-06D-TAG	4/10/2014	4 / 146	0.18 - 0.19	0.78		11	5		N	BSL
	95-47-6	o-Xylene	0.13	J	0.75	J	µg/L	RMW-07D-09122013-148.5	9/12/2013	21 / 131	0.13 - 0.15	0.75		19	-		N	BSL
	127-18-4	Tetrachloroethene	0.11	J	0.39	J	µg/L	RMW-01D-1	4/8/2014	29 / 146	0.1 - 0.2	0.39		4.1	5		N	BSL
	108-88-3	Toluene	0.14	J	170		µg/L	GWE-HP08-60-63	6/22/2011	104 / 146	0.09 - 0.15	170		110	1000		Y	ASL
	156-60-5	trans-1,2-Dichloroethene	0.19	J	0.19	J	µg/L	GW-HP01-24_11162010	11/16/2010	1 / 146	0.13 - 0.14	0.19		36	100		N	BSL
	79-01-6	Trichloroethene	0.13	J	310		µg/L	RMW-01D-1	4/8/2014	114 / 146	0.09 - 0.18	310		0.28	5		Y	ASL
	75-69-4	Trichlorofluoromethane	0.18	J	8.2	J	µg/L	RMW-06D-6	1/30/2013	61 / 146	0.15 - 0.16	8.2		110	-		N	BSL
	75-01-4	Vinyl chloride	0.29	J	4.2		µg/L	RMW-01S-1-09112013-42	9/11/2013	5 / 146	0.13 - 0.14	4.2		0.019	2		Y	ASL
	1330-20-7	Xylenes, Total	0.14	J	2.2	J	µg/L	FWEC-5R-09132013-120.3	9/13/2013	22 / 146	0.13 - 0.43	2.2		19	10000		N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

D - Secondary dilution factor

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Range of concentrations detected in upgradient monitoring wells CH-7 and CH-8.

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential tapwater, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Tapwater RSL for m-Xylene used as a surrogate for m/p-Xylene.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - maximum detected concentration consistent with background levels.

BSL - maximum detected concentration below screening level

FOD - frequency of detection

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.8

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Affected Area)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration (Date)	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Upgradient Range May 2013 (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Affected Area	7439-89-6	Iron	0.322 L	46 L	mg/L	RMW-11D-1-051313 5/13/2013	8 / 9	0.0736 - 0.0736	46	2.26 L - 7.57 L	1.4	-		Y	ASL
	84-66-2	Diethyl phthalate	0.19 J	0.19	µg/L	SW17-082411 8/25/2011	1 / 7	0.14 - 1.4	0.19		1500	-		N	BSL
	71-55-6	1,1,1-Trichloroethane	0.12 J	0.77 J	µg/L	RMW-09S-2 4/11/2012	39 / 97	0.06 - 0.57	0.77		800	200		N	BSL
	75-35-4	1,1-Dichloroethene	0.13 J	0.28 J	µg/L	RMW-09S2-10132014 9/12/2013	3 / 97	0.09 - 0.59	0.28		28	7		N	BSL
	95-50-1	1,2-Dichlorobenzene	0.46 J	0.46 J	µg/L	RMW-14D-050713-61 5/7/2013	1 / 97	0.15 - 0.3	0.46		30	600		N	BSL
	106-46-7	1,4-Dichlorobenzene	0.32 J	0.32 J	µg/L	RMW-14D-050713-61 5/7/2013	1 / 97	0.15 - 0.41	0.32		0.48	75		N	BSL
	123-91-1	1,4-Dioxane	0.5 J	0.85	µg/L	RMW-09D-5 4/9/2014	5 / 43	0.14 - 8.4	0.85		0.46	-		Y	ASL
	78-93-3	2-Butanone	6.2	8.1	µg/L	RMW-09D-6-091213 9/12/2013	3 / 90	0.55 - 2.3	8.1		560	-		N	BSL
	108-10-1	4-Methyl-2-pentanone	2.2	2.2	µg/L	RMW-09D-6-091213 9/12/2013	1 / 97	0.53 - 1.1	2.2		120	-		N	BSL
	67-64-1	Acetone	5.8	550	µg/L	RMW-09D-6-091213 9/12/2013	15 / 95	2.5 - 5	550		1400	-		N	BSL
	107-02-8	Acrolein	3 J	130 J	µg/L	RMW-09D-6-091213 9/12/2013	2 / 75	1.3 - 1.9	130		0.0042	-		Y	ASL, FOD
	71-43-2	Benzene	0.11 J	0.94 J	µg/L	RMW-14D-09102013-61 9/10/2013	24 / 97	0.08 - 0.21	0.94		0.45	5		Y	ASL
	75-27-4	Bromodichloromethane	0.18 J	0.18 J	µg/L	RMW-11D-3-051313 5/13/2013	1 / 97	0.093 - 0.26	0.18		0.13	8.0E+01(F)		Y	ASL, FOD
	75-15-0	Carbon disulfide	0.18 B	2.5	µg/L	RMW-10D-09162013-210 9/16/2013	5 / 97	0.13 - 0.42	2.5		81	-		N	BSL
	56-23-5	Carbon tetrachloride	0.1 J	1.9	µg/L	RMW-08S-09122013-75 9/12/2013	13 / 97	0.06 - 0.27	1.9		0.45	5		Y	ASL
	108-90-7	Chlorobenzene	0.16 J	0.29 J	µg/L	RMW-14D-050713-61 5/7/2013	2 / 97	0.11 - 0.27	0.29		7.8	100		N	BSL
	67-66-3	Chloroform	0.089 J	4.6	µg/L	RMW-11D-3-051313 5/13/2013	42 / 97	0.08 - 0.34	4.6		0.22	8.0E+01(F)		Y	ASL
	156-59-2	cis-1,2-Dichloroethene	0.18 J	1.2	µg/L	PW 23 091511 9/15/2011	4 / 97	0.18 - 0.47	1.2		3.6	70		N	BSL
	75-71-8	Dichlorodifluoromethane	0.29 J	15	µg/L	RMW-09D-6 4/10/2014	50 / 97	0.19 - 0.39	15		20	-		N	BSL
	100-41-4	Ethylbenzene	0.11 J	0.53 J	µg/L	RMW-14D-09102013-61 9/10/2013	9 / 97	0.1 - 0.45	0.53		1.5	700		N	BSL
	108-38-3	m/p-Xylene	0.26 J	2.3	µg/L	RMW-14D-09102013-61 9/10/2013	17 / 97	0.25 - 0.81	2.3		19	-		N	BSL
	75-09-2	Methylene chloride	0.51 J	0.78 J	µg/L	RMW-11D-3 4/10/2014	2 / 97	0.15 - 0.3	0.78		11	5		N	BSL
	95-47-6	o-Xylene	0.16 J	1.5	µg/L	RMW-14D-09102013-61 9/10/2013	14 / 97	0.11 - 0.22	1.5		19	-		N	BSL
	99-87-6	p-Isopropyltoluene	0.15 J	0.15 J	µg/L	RMW-14D-09102013-61 9/10/2013	1 / 97	0.14 - 0.37	0.15		-	-		N	NAT
	127-18-4	Tetrachloroethene	0.11 J	0.19 J	µg/L	RMW-09D-1-050813 5/8/2013	3 / 97	0.1 - 0.3	0.19		4.1	5		N	BSL
	108-88-3	Toluene	0.14 J	80	µg/L	RMW-09D-205-215 4/18/2013	69 / 97	0.09 - 0.3	80		110	1000		N	BSL
	79-01-6	Trichloroethene	0.12 J	86	µg/L	RMW-09S-2 / RWW-09D 5/8/2013	78 / 97	0.09 - 0.18	86		0.28	5		Y	ASL
	75-69-4	Trichlorofluoromethane	0.2 J	20	µg/L	RMW-13S-2-050813-125 5/8/2013	64 / 97	0.15 - 0.2	20		110	-		N	BSL
	75-01-4	Vinyl chloride	0.14 J	0.14 J	µg/L	RMW-14D-050713-61 5/7/2013	1 / 97	0.13 - 0.45	0.14		0.019	2		Y	ASL
	1330-20-7	Xylenes, Total	0.26 J	3.8	µg/L	RMW-14D-09102013-61 9/10/2013	15 / 97	0.13 - 0.98	3.8		19	10000		N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Range of concentrations detected in upgradient monitoring wells CH-7 and CH-8.

(4) Screening toxicity value based on USEPA Regional Screening Level (RSL) for residential tapwater, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Tapwater RSL for m-Xylene used as a surrogate for m/p-Xylene.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - maximum detected concentration consistent with background levels.

BSL - maximum detected concentration below screening level

FOD - frequency of detection

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.9A

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Retention Pond)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Retention Pond	50-00-0	Formaldehyde	0.35 J	1.4 J	mg/kg	SD02-082411	5 / 5		1.4		170	N	BSL
	57-12-5	Cyanide, total	0.0023	1.5	mg/kg	SD04-082411	8 / 9	0.00081 - 0.00081	1.5	0.27 - 0.28	2.7	N	BSL
	7429-90-5	Aluminum	4.84	12000	mg/kg	SD02-082411 / SD04-082411	9 / 9		12000	1890 - 21000	77000	N	BKG BSL
	7440-36-0	Antimony	0.28 L	1.1 J	mg/kg	SD01-082411	5 / 9	0.0101 - 0.0184	1.1	0.49 - 2.26	31	N	BKG BSL
	7440-38-2	Arsenic	0.0037	12	mg/kg	SD04-082411	9 / 9		12	1.14 - 7.39	6.8	**Y**	ASL
	7440-39-3	Barium	0.0295 B	88 B	mg/kg	SD04-082411	9 / 9		88	17.7 - 79	15000	N	BSL
	7440-41-7	Beryllium	0.0009 B	0.73	mg/kg	SD04-082411	8 / 9	0.00018 - 0.00018	0.73	0.148 - 0.908	160	N	BKG BSL
	7440-43-9	Cadmium	0.0014 B	3.4 L	mg/kg	SD04-082411	9 / 9		3.4	0.099 - 0.441	71	N	BSL
	7440-70-2	Calcium	0.51 B	3600 B	mg/kg	SD04-082411	9 / 9		3600	23.3 - 3860	-	N	BKG NUT
	16065-83-1	Chromium (Total)	0.0093	32 JB	mg/kg	SD-02-C-GB-SS-DUP	13 / 13		32	3.58 - 15.7	120000	N	BSL
	7440-48-4	Cobalt	0.0045 B	19 K	mg/kg	SD04-082411	9 / 9		19	0.372 - 7.52	23	N	BSL
	7440-50-8	Copper	0.0385	98 J	mg/kg	SD02-082411	9 / 9		98	2.6 - 21.3	3100	N	BSL
	7439-89-6	Iron	7.22	23000 JB	mg/kg	SD04-082411	9 / 9		23000	2980 - 21700	55000	N	BSL
	7439-92-1	Lead	0.0471	130 L	mg/kg	SD04-082411	9 / 9		130	10 - 165	4000	N	BKG BSL
	7439-95-4	Magnesium	1.14 B	2500 JB	mg/kg	SD02-082411	9 / 9		2500	104 - 1580	-	N	NUT
	7439-96-5	Manganese	0.0697	2000 J	mg/kg	SD04-082411	9 / 9		2000	21.9 - 538	1800	**Y**	ASL
	7439-97-6	Mercury	0.032	0.15	mg/kg	SD02-082411	5 / 9	0.00015 - 0.00024	0.15	0.023 - 0.235	9.4	N	BKG BSL
	7440-02-0	Nickel	0.0137	30 J	mg/kg	SD04-082411	9 / 9		30	1.4 - 14	1500	N	BSL
	7440-09-7	Potassium	0.862	1300	mg/kg	SD02-082411	6 / 9	0.554 - 1.01	1300	218 - 1050	-	N	NUT
	7782-49-2	Selenium	0.00052 B	0.75	mg/kg	SD02-082411	8 / 9	0.67 - 0.67	0.75	0.764 - 2.58	390	N	BKG BSL
	7440-22-4	Silver	0.0737	170 L	mg/kg	SD02-082411	9 / 9		170	0.512 - 0.712	390	N	BSL
	7440-23-5	Sodium	25 B	63 B	mg/kg	SD02-082411	5 / 9	0.497 - 0.907	63	22.3 - 75.4	-	N	BKG NUT
	7440-62-2	Vanadium	0.0083 B	27	mg/kg	SD04-082411	9 / 9		27	7.32 - 29.1	390	N	BKG BSL
	7440-66-6	Zinc	0.253	550 B	mg/kg	SD01-082411	9 / 9		550	9.04 - 56.3	23000	N	BSL
	12672-29-6	Aroclor 1248	1.3	1.3	mg/kg	SD01-082411	1 / 8	0.00099 - 0.0019	1.3		2.3	N	BSL
	11096-82-5	Aroclor 1260	0.049	0.63	mg/kg	WWT-2S	6 / 8	0.6 - 0.71	0.63		2.4	N	BSL
	72-54-8	4,4'-DDD	0.00036 J	0.012 J	mg/kg	SD01-082411	5 / 8	0.047 - 0.071	0.012		23	N	BSL
	72-55-9	4,4'-DDE	0.00048 J	0.0013 J	mg/kg	SD02-082411	3 / 8	0.0015 - 0.0017	0.0013		20	N	BSL
	50-29-3	4,4'-DDT	0.0066 J	0.014 J	mg/kg	SD02-082411	2 / 8	0.00016 - 0.0015	0.014		19	N	BSL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	309-00-2	Aldrin	0.00053 J	0.00053 J	mg/kg	SD04-082411	1 / 8	0.00019 - 0.0021	0.00053		0.39	N	BSL
	319-85-7	beta-BHC	0.00079 J	0.00079 J	mg/kg	SD02-082411	1 / 8	0.00027 - 0.003	0.00079		3	N	BSL
	608-73-1	delta-BHC	0.00045 J	0.014 J	mg/kg	SD01-082411	2 / 8	0.00016 - 0.0015	0.014		3	N	BSL
	60-57-1	Dieldrin	0.00052 J	0.0059 J	mg/kg	SD01-082411	4 / 8	0.0017 - 0.0017	0.0059		0.34	N	BSL
	115-29-7	Endosulfan II	0.00077 J	0.0082 J	mg/kg	SD02-082411	4 / 8	0.002 - 0.002	0.0082		470	N	BSL
	115-29-7	Endosulfan sulfate	0.00064 J	0.0084 J	mg/kg	SD02-082411	4 / 8	0.0012 - 0.0012	0.0084		470	N	BSL
	72-20-8	Endrin	0.00056 J	0.017 J	mg/kg	SD01-082411	5 / 8	0.047 - 0.071	0.017		19	N	BSL
	7421-93-4	Endrin aldehyde	0.00031 J	0.0041 J	mg/kg	SD02-082411	3 / 5	0.00029 - 0.0022	0.0041		19	N	BSL
	53494-70-5	Endrin ketone	0.00058 J	0.0092 J	mg/kg	SD02-082411	4 / 8	0.0018 - 0.0018	0.0092		19	N	BSL
	58-89-9	gamma-BHC (Lindane)	0.0022 J	0.0054 J	mg/kg	SD02-082411	3 / 8	0.00018 - 0.00029	0.0054		5.7	N	BSL
	76-44-8	Heptachlor	0.00034 J	0.0073 J	mg/kg	SD01-082411	3 / 8	0.00023 - 0.0022	0.0073		1.3	N	BSL
	1024-57-3	Heptachlor epoxide	0.00027 J	0.018 J	mg/kg	SD01-082411	5 / 8	0.024 - 0.036	0.018		0.7	N	BSL
	72-43-5	Methoxychlor	0.0015 J	0.031 J	mg/kg	SD01-082411	5 / 8	0.24 - 0.36	0.031		320	N	BSL
	106-46-7	1,4-Dichlorobenzene	0.1 J	0.2 J	mg/kg	WWT-4S	2 / 4	1.1 - 7.3	0.2		26	N	BSL
	91-57-6	2-Methylnaphthalene	0.016 J	5.3	mg/kg	SD01-082411	5 / 9	0.0038 - 0.0038	5.3		240	N	BSL
	106-47-8	4-Chloroaniline	0.08 J	2.5 J	mg/kg	SD01-082411	2 / 9	0.017 - 0.027	2.5		27	N	BSL
	106-44-5	4-Methylphenol	0.11 J	0.15 J	mg/kg	WWT-3S	2 / 4	0.97 - 7.3	0.15		6300	N	BSL
	83-32-9	Acenaphthene	0.035 J	29	mg/kg	SD01-082411	8 / 9	0.0041 - 0.0041	29		3600	N	BSL
	208-96-8	Acenaphthylene	0.017 J	1.6	mg/kg	SD01-082411	4 / 9	0.0049 - 0.0049	1.6		-	N	NAT
	120-12-7	Anthracene	0.02 J	56	mg/kg	SD01-082411	9 / 9		56		18000	N	BSL
	56-55-3	Benzo[a]anthracene	0.093	140	mg/kg	SD01-082411	9 / 9		140		1.6	**Y**	ASL
	50-32-8	Benzo[a]pyrene	0.13	110	mg/kg	SD01-082411	9 / 9		110		0.16	**Y**	ASL
	205-99-2	Benzo[b]fluoranthene	0.18	110	mg/kg	SD01-082411	9 / 9		110		1.6	**Y**	ASL
	191-24-2	Benzo[g,h,i]perylene	0.13	72	mg/kg	SD01-082411	8 / 9	0.62 - 0.62	72		-	N	NAT
	207-08-9	Benzo[k]fluoranthene	0.088	51	mg/kg	SD01-082411	9 / 9		51		16	**Y**	ASL
	65-85-0	Benzoic Acid	0.26 J	0.45 JB	mg/kg	WWT-2S	3 / 4	36 - 36	0.45		250000	N	BSL
	117-81-7	Bis(2-ethylhexyl)phthalate	0.035 J	2.2	mg/kg	WWT-4S	8 / 9	0.45 - 0.45	2.2		390	N	BSL
	85-68-7	Butyl benzyl phthalate	0.042 J	0.34 J	mg/kg	WWT-2S	2 / 9	0.029 - 0.38	0.34		2900	N	BSL
	86-74-8	Carbazole	0.03 J	46	mg/kg	SD01-082411	5 / 5		46		-	N	NAT
	218-01-9	Chrysene	0.17	150	mg/kg	SD01-082411	9 / 9		150		160	N	BSL
	53-70-3	Dibenz(a,h)anthracene	0.026 J	32	mg/kg	SD01-082411	7 / 9	0.62 - 0.97	32		0.16	**Y**	ASL
	132-64-9	Dibenzofuran	0.036 J	22	mg/kg	SD01-082411	7 / 9	0.021 - 0.021	22		73	N	BSL
	84-74-2	Di-n-butyl phthalate	0.16 J	0.16 J	mg/kg	WWT-2S	1 / 9	0.027 - 0.35	0.16		6300	N	BSL
	206-44-0	Fluoranthene	0.27	310 J	mg/kg	SD01-082411	9 / 9		310		2400	N	BSL
	86-73-7	Fluorene	0.052 J	36	mg/kg	SD01-082411	8 / 9	0.0056 - 0.0056	36		2400	N	BSL
	193-39-5	Indeno[1,2,3-cd]pyrene	0.12	67	mg/kg	SD01-082411	9 / 9		67		1.6	**Y**	ASL
	91-20-3	Naphthalene	0.018 J	7.4	mg/kg	SD01-082411	2 / 9	0.0037 - 0.0058	7.4		38	N	BSL
	87-86-5	Pentachlorophenol	1.5 J	1.5 J	mg/kg	WWT-1S	1 / 9	0.019 - 0.25	1.5		10	N	BSL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	85-01-8	Phenanthrene	0.16	280	mg/kg	SD01-082411	9 / 9		280		-	N	NAT
	129-00-0	Pyrene	0.21	220	mg/kg	SD01-082411	9 / 9		220		1800	N	BSL
	106-46-7	1,4-Dichlorobenzene	0.042 J	0.07 J	mg/kg	SD02-082411	2 / 10	0.00082 - 0.2	0.07		26	N	BSL
	78-93-3	2-Butanone	0.006 J	0.024	mg/kg	WWT-3S	3 / 9	0.0011 - 0.0022	0.024		27000	N	BSL
	67-64-1	Acetone	0.099 B	0.28 B	mg/kg	WWT-1S	4 / 9	0.0064 - 0.012	0.28		61000	N	BSL
	67-66-3	Chloroform	0.002 J	0.005 J	mg/kg	WWT-2S	3 / 9	0.00075 - 0.0014	0.005		3.2	N	BSL
	75-09-2	Methylene Chloride	0.036 B	0.22 B	mg/kg	WWT-1S	4 / 9	0.00086 - 0.0017	0.22		350	N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

K - Reported value may be biased high

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface and subsurface horizons for red Wisconsnian Glacial Till (Ciolkosz et al., 1993; supplemented by Barnes, 2014).

(4) Screening toxicity value based on 10 x USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Residential soil RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Chromium VI was not detected in either the orignai or duplicate sediment samples collected from the Retention Pond.

Residential soil RSL for Endosulfan used as a surrogate for Endosulfan sulfate.

Residential soil RSL for Endrin used as a surrogate for Endrin Aldehyde and Endrin Ketone.

Residential soil RSL for Hexachlorocyclohexane (Technical) used as a surrogate for delta-BHC (Hexachlorocyclohexane).

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - maximum detected concentration consistent with background levels.

BSL - maximum detected concentration below screening level

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.9B

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Outflow Channel)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Retention Pond	7429-90-5	Aluminum	4,500		10,000		mg/kg	SD-40-10132014	5 / 5		10000	1890 - 21000	77000	N	BKG BSL
Outlflow Channel	7440-36-0	Antimony	0.24	L	0.57	L	mg/kg	SD-40-10132014	5 / 5		0.57	0.49 - 2.26	31	N	BKG BSL
	7440-38-2	Arsenic	3.7		6.5		mg/kg	SD-37-10132014	5 / 5		6.5	1.14 - 7.39	6.8	N	BKG BSL
	7440-39-3	Barium	28	B	55	B	mg/kg	SD-40-10132014	5 / 5		55	17.7 - 79	15000	N	BKG BSL
	7440-41-7	Beryllium	0.29		0.79		mg/kg	SD-40-10132014	5 / 5		0.79	0.148 - 0.908	160	N	BKG BSL
	7440-43-9	Cadmium	0.25	B	1.3	B	mg/kg	SD-37-10132014	5 / 5		1.3	0.099 - 0.441	71	N	BSL
	7440-70-2	Calcium	1,000		1,700		mg/kg	SD-37-10132014	5 / 5		1700	23.3 - 3860	-	N	BKG NUT
	16065-83-1	Chromium (Total)	7		21		mg/kg	SD-40-10132014	5 / 5		21	3.58 - 15.7	120000	N	BSL
	7440-48-4	Cobalt	7.4		11		mg/kg	SD-41-10132014	5 / 5		11	0.372 - 7.52	23	N	BSL
	7440-50-8	Copper	12		39		mg/kg	SD-40-10132014	5 / 5		39	2.6 - 21.3	3100	N	BSL
	7439-89-6	Iron	11,000	J	17,000	J	mg/kg	SD-37-10132014	5 / 5		17000	2980 - 21700	55000	N	BKG BSL
	7439-92-1	Lead	29		88		mg/kg	SD-40-10132014	5 / 5		88	10 - 165	4000	N	BKG BSL
	7439-95-4	Magnesium	1,100		1,700		mg/kg	SD-40-10132014	5 / 5		1700	104 - 1580	-	N	NUT
	7439-96-5	Manganese	190	J	690	J	mg/kg	SD-41-10132014	5 / 5		690	21.9 - 538	1800	N	BSL
	7439-97-6	Mercury	0.34		0.099		mg/kg	SD-39-10132014	5 / 5		0.099	0.023 - 0.235	9.4	N	BKG BSL
	7440-02-0	Nickel	13		18		mg/kg	SD-40-10132014	5 / 5		18	1.4 - 14	1500	N	BSL
	7440-09-7	Potassium	260	J	610		mg/kg	SD-40-10132014	5 / 5		610	218 - 1050	-	N	BKG NUT
	7782-49-2	Selenium	0.3	J	0.84		mg/kg	SD-40-10132014	5 / 5		0.84	0.764 - 2.58	390	N	BKG BSL
	7440-22-4	Silver	4.7		43		mg/kg	SD-38-10132014	5 / 5		43	0.512 - 0.712	390	N	BSL
	7440-23-5	Sodium	30	J	100	J	mg/kg	SD-38-10132014	5 / 5		100	22.3 - 75.4	-	N	NUT
	7440-62-2	Vanadium	11		18		mg/kg	SD-40-10132014	5 / 5		18	7.32 - 29.1	390	N	BKG BSL
	7440-66-6	Zinc	48	J	230	J	mg/kg	SD-37-10132014	5 / 5		230	9.04 - 56.3	23000	N	BSL
	83-32-9	Acenaphthene	0.015	J	0.018	J	mg/kg	SD-37-10132014	2 / 5	0.0019 - 0.039	0.018		3600	N	BSL
	208-96-8	Acenaphthylene	0.0095	J	0.011	J	mg/kg	SD-37-10132014	2 / 5	0.0022 - 0.046	0.011		-	N	NAT
	120-12-7	Anthracene	0.025	J	0.051		mg/kg	SD-37-10132014	4 / 5	0.0019 - 0.04	0.051		18000	N	BSL
	56-55-3	Benzo[a]anthracene	0.1	J	0.24		mg/kg	SD-37-10132014	4 / 5	0.0024 - 0.051	0.24		1.6	N	BSL
	50-32-8	Benzo[a]pyrene	0.11	J	0.31		mg/kg	SD-37-10132014	4 / 5	0.0019 - 0.041	0.31		0.16	**Y**	ASL
	205-99-2	Benzo[b]fluoranthene	0.15	J	0.6		mg/kg	SD-37-10132014	4 / 5	0.0031 - 0.064	0.6		1.6	N	BSL
	191-24-2	Benzo[g,h,i]perylene	0.1	J	0.36		mg/kg	SD-37-10132014	4 / 5	0.0019 - 0.04	0.36		-	N	NAT
	207-08-9	Benzo[k]fluoranthene	0.082	J	0.17		mg/kg	SD-37-10132014	4 / 5	0.0039 - 0.082	0.17		16	N	BSL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	218-01-9	Chrysene	0.16	0.47	mg/kg	SD-37-10132014	4 / 5	0.0023 - 0.048	0.47		160	N	BSL
	53-70-3	Dibenz(a,h)anthracene	0.051	0.079	mg/kg	SD-37-10132014	2 / 5	0.0022 - 0.045	0.079		0.16	N	BSL
	206-44-0	Fluoranthene	0.26 J	0.85	mg/kg	SD-37-10132014	5 / 5	0.0021 - 0.043	0.85		2400	N	BSL
	86-73-7	Fluorene	0.017 J	0.02	mg/kg	SD-37-10132014	2 / 5	0.0026 - 0.053	0.02		2400	N	BSL
	193-39-5	Indeno[1,2,3-cd]pyrene	0.092 J	0.3	mg/kg	SD-37-10132014	4 / 5	0.002 - 0.042	0.3		1.6	N	BSL
	91-20-3	Naphthalene	0.0054 J	0.0082 J	mg/kg	SD-38-10132014	2 / 5	0.0017 - 0.35	0.0082		38	N	BSL
	85-01-8	Phenanthrene	0.14 J	0.36	mg/kg	SD-37-10132014	5 / 5	0.0031 - 0.064	0.36		-	N	NAT
	129-00-0	Pyrene	0.17 J	0.52	mg/kg	SD-37-10132014	5 / 5	0.002 - 0.041	0.52		180	N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

K - Reported value may be biased high

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface and subsurface horizons for red Wisconsnian Glacial Till (Ciolkosz et al., 1993; supplemented by Barnes, 2014).

(4) Screening toxicity value based on 10 x USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Residential soil RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Chromium VI was not detected in either the orignai or duplicate sediment samples collected from the Retention Pond.

Residential soil RSL for Endosulfan used as a surrogate for Endosulfan sulfate.

Residential soil RSL for Endrin used as a surrogate for Endrin Aldehyde and Endrin Ketone.

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - maximum detected concentration consistent with background levels.

BSL - maximum detected concentration below screening level

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.10

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Watering Run, Tributaries, and Streams)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Watering Run,	50-00-0	Formaldehyde	0.38 J	1.7 J	mg/kg	SD08-082411	27 / 27		1.7		170	N	BSL
Tributaries, and	57-12-5	Cyanide, total	0.14 J	0.87	mg/kg	SD11-082411	10 / 10		0.87	0.27 - 0.28	2.7	N	BSL
Streams	7429-90-5	Aluminum	2000	12000	mg/kg	SD06-082411	6 / 6		12000	1890 - 21000	77000	N	BKG BSL
	7440-36-0	Antimony	0.12 L	0.9 J	mg/kg	SD19-082511	5 / 6	1.3 - 1.3	0.9	0.49 - 2.26	31	N	BKG BSL
	7440-38-2	Arsenic	2.1	28	mg/kg	SD19-082511	6 / 6		28	1.14 - 7.39	6.8	**Y**	ASL
	7440-39-3	Barium	31 B	2900 B	mg/kg	SD19-082511	6 / 6		2900	17.7 - 79	15000	N	BSL
	7440-41-7	Beryllium	0.21 JB	2.3	mg/kg	SD19-082511	6 / 6		2.3	0.148 - 0.908	160	N	BSL
	7440-43-9	Cadmium	0.2 L	3.3	mg/kg	SD19-082511	6 / 6		3.3	0.099 - 0.441	71	N	BSL
	7440-70-2	Calcium	170 JB	2100 B	mg/kg	SD19-082511	6 / 6		2100	23.3 - 3860	-	N	BKG NUT
	16065-83-1	Chromium (Total)	3.1 JB	19 B	mg/kg	SD19-082511	6 / 6		19	3.58 - 15.7	120000	N	BSL
	7440-48-4	Cobalt	3.5 K	58 L	mg/kg	SD19-082511	6 / 6		58	0.372 - 7.52	23	**Y**	ASL
	7440-50-8	Copper	3.5 J	27	mg/kg	SD19-082511	6 / 6		27	2.6 - 21.3	3100	N	BSL
	7439-89-6	Iron	5600 JB	53000 B	mg/kg	SD19-082511	6 / 6		53000	2980 - 21700	55000	N	BSL
	7439-92-1	Lead	5.4 L	41	mg/kg	SD06-082411	6 / 6		41	10 - 165	4000	N	BKG BSL
	7439-95-4	Magnesium	400 JB	1300 JB	mg/kg	SD09-082411	6 / 6		1300	104 - 1580	-	N	BKG NUT
	7439-96-5	Manganese	490 JB	26000 B	mg/kg	SD19-082511	6 / 6		26000	21.9 - 538	1800	**Y**	ASL
	7439-97-6	Mercury	0.0087 J	0.077	mg/kg	SD05-082411	7 / 7		0.077	0.023 - 0.235	9.4	N	BKG BSL
	7440-02-0	Nickel	5.4 J	140 L	mg/kg	SD19-082511	6 / 6		140	1.4 - 14	1500	N	BSL
	7440-09-7	Potassium	240 J	540 J	mg/kg	SD19-082511	6 / 6		540	218 - 1050	-	N	BKG NUT
	7782-49-2	Selenium	0.14 J	0.69	mg/kg	SD16-082411	2 / 6	0.13 - 6	0.69	0.764 - 2.58	390	N	BKG BSL
	7440-23-5	Sodium	28 B	140 B	mg/kg	SD19-082511	6 / 6		140	22.3 - 75.4	-	N	NUT
	7440-28-0	Thallium	0.14 J	1.8 J	mg/kg	SD06-082411	2 / 6	0.13 - 6	2	0.826 - 1.36	0.78	**Y**	ASL
	7440-62-2	Vanadium	3.4	37	mg/kg	SD06-082411	6 / 6		37	7.32 - 29.1	390	N	BSL
	7440-66-6	Zinc	40 JB	680 JB	mg/kg	SD19-082511	6 / 6		680	9.04 - 56.3	23000	N	BSL
	95-48-7	2-Methylphenol	0.064 J	0.064 J	mg/kg	SD13-082511	1 / 27	0.0015 - 0.054	0.064		3200	N	BSL
	120-12-7	Anthracene	0.00078 J	0.087	mg/kg	SD05-082411	16 / 27	0.00041 - 0.01	0.087		18000	N	BSL

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	86-74-8	Carbazole	0.00055 J	0.068	mg/kg	SD05-082411	9 / 27	0.00041 - 0.014	0.068		-	N	NAT
	67-64-1	Acetone	0.02 J	0.02 J	mg/kg	SD25-082511	1 / 27	0.0059 - 0.012	0.02		61000	N	BSL
	67-66-3	Chloroform	0.001 J	0.001 J	mg/kg	SD25-082511	1 / 27	0.00069 - 0.0014	0.001		3.2	N	BSL
	75-09-2	Methylene chloride	0.00086 J	0.014	mg/kg	SD25-082511	3 / 27	0.00079 - 0.0016	0.014		350	N	BSL
	79-01-6	Trichloroethene	0.012	0.037	mg/kg	SD25-082511	2 / 27	0.00077 - 0.0015	0.037		4.1	N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Minimum and maximum for surface and subsurface horizons for red Wisconsnian Glacial Till (Ciolkosz et al., 1993; supplemented by Barnes, 2014).

(4) Screening toxicity value based on 10 x USEPA Regional Screening Level (RSL) for residential soil, June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Residential soil RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Chromium VI was not detected in either the orignai or duplicate sediment samples collected from the Re

(5) Rationale for Selection or Deletion Codes:

ASL - maximum detected concentration above screening level

BKG - maximum detected concentration consistent with background levels.

BSL - maximum detected concentration below screening level

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.11

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Retention Pond)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value	Organism Only Value (3)	Tapwater RSL x 10 (4)	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Retention Pond	7429-90-5	Aluminum	0.013 B	0.015 B	mg/l	SW02-082411 / SW03-082411	4 / 4		0.015			20	N	BSL
	7440-39-3	Barium	0.01 J	0.02 J	mg/l	SW01-082411	4 / 4		0.02			3.8	N	BSL
	7440-70-2	Calcium	23	44	mg/l	SW01-082411	4 / 4		44			-	N	NUT
	7440-48-4	Cobalt	0.00042 J	0.00042 J	mg/l	SW02-082411	1 / 4	0.0004 - 0.0004	0.00042			0.006	N	BSL
	7440-50-8	Copper	0.0029 J	0.0029	mg/l	SW01-082411 / SW02-082411	2 / 4	0.0027 - 0.0027	0.0029			0.8	N	BSL
	7439-89-6	Iron	0.046 J	0.064 J	mg/l	SW03-082411	4 / 4		0.064			14	N	BSL
	7439-95-4	Magnesium	0.81 J	1.4 J	mg/l	SW01-082411	4 / 4		1.4			-	N	NUT
	7439-96-5	Manganese	0.0014 J	0.0038 J	mg/l	SW01-082411	4 / 4		0.0038		0.1	0.43	N	BSL
	7440-02-0	Nickel	0.0022	0.0076	mg/l	SW01-082411	2 / 4	0.0016 - 0.0016	0.0076		4.6	0.39	N	BSL
	7440-09-7	Potassium	0.9 J	1.6 J	mg/l	SW01-082411	4 / 4		1.6			-	N	NUT
	7440-23-5	Sodium	0.77 J	2.9 J	mg/l	SW01-082411	4 / 4		2.9			-	N	NUT
	7440-66-6	Zinc	0.011 J	0.018 J	mg/l	SW01-082411	4 / 4		0.018		26	6	N	BSL
	85-68-7	Butyl benzyl phthalate	0.00041 J	0.00058 J	mg/L	SW02-082411	4 / 4		0.00058		1.9	0.16	N	BSL
	206-44-0	Fluoranthene	0.000041 J	0.000055 J	mg/L	SW01-082411	2 / 4	0.000016 - 0.000016	0.000055		0.14	0.8	N	BSL
	85-01-8	Phenanthrene	0.00005 J	0.000061 J	mg/L	SW01-082411	2 / 4	0.000042 - 0.000042	0.000061			-	N	NAT
	129-00-0	Pyrene	0.000027 J	0.000031 J	mg/L	SW01-082411	2 / 4	0.000016 - 0.000016	0.000031		4	0.12	N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

(2) Maximum detected concentration used for screening.

(3) Screening toxicity value based on USEPA Updated National Recommended Water Quality Criteria - Human Health Organism Only value (http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#Z2)

(4) Screening toxicity value based on 10 x USEPA Regional Screening Level (RSL) for tapwater June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

(5) Rationale for Selection or Deletion Codes:

BSL - maximum detected concentration below screening level

NUT - essential nutrient

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

TABLE 2.12

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Watering Run, Tributaries, and Streams)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value	Organism Only Value (3)	Tapwater RSL x 10 (4)	COPC Flag (6) (Y/N)	Rationale for Selection or Deletion (5)
Watering Run, Tributaries, and Streams	50-00-0	Formaldehyde	0.0093 J	0.0093 J	mg/L	SW11-082411	1 / 46	0.005 - 0.005	0.0093			0.0043	**Y**	ASL
	7429-90-5	Aluminum	0.0097 B	0.73 B	mg/l	SW06-082411	5 / 6	0.0097 - 0.0097	0.73			20	N	BSL
	7440-36-0	Antimony	0.0018 J	0.0023 J	mg/l	SW19-082411	2 / 6	0.0013 - 0.0013	0.0023		0.64	0.0078	N	BSL
	7440-39-3	Barium	0.031 J	0.044 J	mg/l	SW27-082411	6 / 6		0.044			3.8	N	BSL
	7440-41-7	Beryllium	0.00038 B	0.00038 B	mg/l	SW06-082411	1 / 6	0.00023 - 0.00023	0.00038			0.025	N	BSL
	7440-70-2	Calcium	7.9	13	mg/l	SW27-082411 / SW29-082411	6 / 6		13			-	N	NUT
	16065-83-1	Chromium (Total)	0.000365 K	0.0012 J	mg/l	SW06-082411	10 / 10	0.00057 - 0.00057	0.0012			22	N	BSL
	18540-29-9	Chromium VI	0.000106	0.000112	mg/l	SW-06-GB-DUP	2 / 2		0.000112			0.00035	N	BSL
	7440-50-8	Copper	0.0029 J	0.0037 J	mg/l	SW16-082411	2 / 6	0.0027 - 0.0027	0.0037			0.8	N	BSL
	7439-89-6	Iron	0.1	0.72	mg/l	SW06-082411	3 / 6	0.012 - 0.012	0.72			14	N	BSL
	7439-95-4	Magnesium	1.6 J	3.1 J	mg/l	SW09-082411	6 / 6		3.1			-	N	NUT
	7439-96-5	Manganese	0.0015 J	0.083	mg/l	SW09-082411	6 / 6		0.083		0.10	0.43	N	BSL
	7440-02-0	Nickel	0.0016 J	0.0019 J	mg/l	SW06-082411	3 / 6	0.0016 - 0.0016	0.0019		4.6	0.39	N	BSL
	7440-09-7	Potassium	0.84 J	1.1 J	mg/l	SW16-082411 / SW19-082411	6 / 6		1.1			-	N	NUT
	7440-23-5	Sodium	13	26	mg/l	SW09-082411 / SW16-082411	6 / 6		26			-	N	NUT
	7440-66-6	Zinc	0.0061 K	0.018 K	mg/l	SW06-082411	6 / 6		0.018		26	6	N	BSL
	86-74-8	Carbazole	0.000053 J	0.000053 J	mg/L	SW19-082411	1 / 24	0.000015 - 0.0012	0.000053			-	N	NSL
	84-66-2	Diethyl phthalate	0.00099 J	0.0013	mg/L	SW16-082411	2 / 24	0.00014 - 0.0014	0.0013		44	15	N	BSL
	71-55-6	1,1,1-Trichloroethane	0.00021 J	0.00071 J	mg/L	181 CHURCH RD - SPRING	4 / 49	0.00006 - 0.00029	0.00071			8	N	BSL
	78-93-3	2-Butanone	0.0031 J	0.0039 J	mg/L	SW13-050511	3 / 29	0.00055 - 0.0023	0.0039			5.6	N	BSL
	108-10-1	4-Methyl-2-pentanone	0.00079 J	0.00079 J	mg/L	SW13-082411	1 / 49	0.00053 - 0.00099	0.00079			1.2	N	BSL
	67-64-1	Acetone	0.0033 J	0.031	mg/L	SW13-082411	6 / 49	0.0025 - 0.0027	0.031			14	N	BSL
	75-27-4	Bromodichloromethane	0.00026 J	0.00026 J	mg/L	Camp St. George Spring -	1 / 49	0.000093 - 0.00013	0.00026			0.0013	N	BSL
	67-66-3	Chloroform	0.000085 J	0.0035	mg/L	Camp St. George Spring -	2 / 49	0.00008 - 0.00017	0.0035		0.47	0.0022	N	BSL
	75-71-8	Dichlorodifluoromethane	0.00053 J	0.00053 J	mg/L	Camp St. George Spring -	1 / 49	0.00019 - 0.00029	0.00053			0.2	N	BSL
	79-01-6	Trichloroethene	0.00016 J	0.061	mg/L	201 CHURCH RD-SPRING	16 / 49	0.00009 - 0.00018	0.061		0.030	0.0028	**Y**	ASL
	75-69-4	Trichlorofluoromethane	0.00088 J	0.0026	mg/L	Camp St. George Spring -	3 / 49	0.00015 - 0.0002	0.0026			1.1	N	BSL

Notes:

(1) Qualifier Codes:

B - Reported value may be wholly or partially due to contamination in an associated blank sample

J - Estimated

K - Reported value may be biased high

L - Reported value may be biased low

(2) Maximum detected concentration used for screening.

(3) Screening toxicity value based on USEPA Updated National Recommended Water Quality Criteria - Human Health Organism Only value (http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#Z2)

(4) Screening toxicity value based on 10 x USEPA Regional Screening Level (RSL) for tapwater June 2015, for hazard index = 0.1 and/or excess lifeimte cancer risk of 1x10-6.

Tapwater RSL for Chromium III, Insoluable Salts used as a surrogate for Total Chromium. Chromium VI evaluated separately. .

(5) Rationale for Selection or Deletion Codes:

BSL - maximum detected concentration below screening level

NAT - no avaialble toxicity data; addressed qualitatively in uncertainty section

NSL - no screening value

NUT - essential nutrient

(6) Formaldehyde and TCE were qualitatively discussed in Section 2.6.4.2 of the text and were exlcuded from the BHHRA therefore, Table 3 will not include these compounds.

Table 2.13

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

FWEC/Church Road TCE Site (Former FWEC Facility/MIP Area 2)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Indoor Air

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration (Depth in feet)	Detection Frequency	Concentration Used for Screening (2)	Screening Toxicity Value (3)	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Indoor Air	71-55-6	1,1,1-Trichloroethane	25	34000	µg/L	GW-MIP2-B20A 2.25	3 / 3	34000	740	Y	ASL
Former FWEC Facility	79-00-5	1,1,2-Trichloroethane	29 J	31 J	µg/L	GW-MIP2-B20A 2.25	2 / 3	31 J	0.62	Y	ASL
MIP Area 2	75-34-3	1,1-Dichloroethane	3.6	2400	µg/L	GW-MIP2-B20A 2.25	3 / 3	2400	7.6	Y	ASL
	75-35-4	1,1-Dichloroethene	12	4500	µg/L	GW-MIP2-B20A 2.25	3 / 3	4500	20	Y	ASL
	107-06-2	1,2-Dichloroethane	0.42 J	0.42 J	µg/L	GW-MIP2-B30 4.71	1 / 3	0.42 J	2.2	N	BSL
	123-91-1	1,4-Dioxane	13 L	760 L	µg/L	GW-MIP2-B20A 2.25	3 / 3	760 L	2900	N	BSL
	91-57-6	2-Methylnaphthalene	4.5	6.9	µg/L	GW-MIP2-B20A 2.25	2 / 3	6.9	No Value	N	NAT
	50-29-3	4,4'-DDT	0.037	0.037	µg/L	GW-MIP2-B20A 2.25	1 / 2	0.037	No Value	N	NVOL
	67-64-1	Acetone	1600	1600	µg/L	GW-MIP2-B20A 2.25	2 / 3	1600	2300000	N	BSL
	7429-90-5	Aluminum	5420	513000	µg/L	GW-MIP2-B30 4.71	3 / 3	513000	No Value	N	NVOL
	7440-36-0	Antimony	4.9	4.9	µg/L	GW-MIP2-B20A 2.25	1 / 3	4.9	No Value	N	NVOL
	7440-38-2	Arsenic	6.7	180	µg/L	GW-MIP2-B30 4.71	3 / 3	180	No Value	N	NVOL
	7440-39-3	Barium	168	3490	µg/L	GW-MIP2-B30 4.71	3 / 3	3490	No Value	N	NVOL
	71-43-2	Benzene	0.51 J	0.51 J	µg/L	GW-MIP2-B30 4.71	1 / 3	0.51 J	1.6	N	BSL
	56-55-3	Benzo(a)anthracene	0.73	0.73	µg/L	GW-MIP2-B30 4.71	1 / 3	0.73	No Value	N	NVOL
	50-32-8	Benzo(a)pyrene (3,4-Benzopyrene)	0.42	0.42	µg/L	GW-MIP2-B30 4.71	1 / 3	0.42	No Value	N	NVOL
	205-99-2	Benzo(b)fluoranthene	0.58	0.58	µg/L	GW-MIP2-B30 4.71	1 / 3	0.58	No Value	N	NVOL
	7440-41-7	Beryllium	41.2	41.2	µg/L	GW-MIP2-B20A 4.71	1 / 3	41.2	No Value	N	NVOL
	7440-70-2	Calcium	7430	94900	µg/L	GW-MIP2-B30 4.71	3 / 3	94900	No Value	N	NVOL
	67-66-3	Chloroform	0.3 J	0.3 J	µg/L	GW-MIP2-B30 4.71	1 / 3	0.3 J	0.81	N	BSL
	7440-47-3	Chromium	12	2170	µg/L	GW-MIP2-B30 4.71	3 / 3	2170	No Value	N	NVOL
	156-59-2	cis-1,2-Dichloroethene	4	4	µg/L	GW-MIP2-B30 4.71	1 / 3	4	No Value	N	NAT
	7440-48-4	Cobalt	83.8	878	µg/L	GW-MIP2-B30 4.71	3 / 3	878	No Value	N	NVOL
	7440-50-8	Copper	35.8	1150	µg/L	GW-MIP2-B30 4.71	3 / 3	1150	No Value	N	NVOL
	319-86-8	delta-BHC	0.015	0.015	µg/L	GW-MIP2-B20A 2.25	1 / 2	0.015	No Value	N	NVISL
	100-41-4	Ethylbenzene	28 J	35 J	µg/L	GW-MIP2-B20A 2.25	2 / 3	35 J	3.5	Y	ASL
	50-00-0	Formaldehyde	11.7	37.9	µg/L	GW-MIP2-B20A 2.25	3 / 3	37.9	16000	N	BSL
	58-89-9	gamma-BHC (Lindane)	0.018	0.018	µg/L	GW-MIP2-B20A 2.25	1 / 2	0.018	No Value	N	NVOL
	7439-89-6	Iron	8710	1160000	µg/L	GW-MIP2-B30 4.71	3 / 3	1160000	No Value	N	NVOL
	7439-92-1	Lead	9.9	2460	µg/L	GW-MIP2-B30 4.71	3 / 3	2460	No Value	N	NVOL
	7439-95-4	Magnesium	5990	110000	µg/L	GW-MIP2-B30 4.71	3 / 3	110000	No Value	N	NVOL
	7439-96-5	Manganese	9040	64300	µg/L	GW-MIP2-B30 4.71	3 / 3	64300	No Value	N	NVOL
	7439-97-6	Mercury	1.7	1.7	µg/L	GW-MIP2-B30 4.71	1 / 3	1.7	0.067	Y	ASL
	72-43-5	Methoxychlor	0.18	0.18	µg/L	GW-MIP2-B20A 2.25	1 / 2	0.18	No Value	N	NVOL
	91-20-3	Naphthalene	13	20	µg/L	GW-MIP2-B20A 2.25	2 / 3	20	4.6	Y	ASL
	7440-02-0	Nickel	39.1	1190	µg/L	GW-MIP2-B30 4.71	3 / 3	1190	No Value	N	NVOL
	85-01-8	Phenanthrene	4.5	5.4	µg/L	GW-MIP2-B20A 2.25	2 / 3	5.4	No Value	N	NVISL
	7440-09-7	Potassium	3430	29700	µg/L	GW-MIP2-B30 4.71	3 / 3	29700	No Value	N	NVOL
	7440-23-5	Sodium	9800	13300	µg/L	GW-MIP2-B20A 2.25	3 / 3	13300	No Value	N	NVOL
	127-18-4	Tetrachloroethene	30	55 J	µg/L	GW-MIP2-B20A 2.25	3 / 3	55 J	5.8	Y	ASL
	108-88-3	Toluene	0.2 J	0.2 J	µg/L	GW-MIP2-B30 4.71	1 / 3	0.2 J	1900	N	BSL
	79-01-6	Trichloroethene	6.3	53 J	µg/L	GW-MIP2-B20A 2.25	2 / 3	53 J	0.52	Y	ASL
	7440-62-2	Vanadium	5.8	575	µg/L	GW-MIP2-B30 4.71	3 / 3	575	No Value	N	NVOL
	1330-20-7	Xylenes, Total	210 J	260 J	µg/L	GW-MIP2-B20A 2.25	2 / 3	260 J	49	Y	ASL
	7440-66-6	Zinc	80.7	3770	µg/L	GW-MIP2-B30	3 / 3	3770	No Value	N	NVOL

Notes:

(1) Qualifier Codes:

J - Estimated

L - Reported value may be biased low

(2) Maximum detected concentration used for screening

(3) USEPA Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, June 2015 RSLs, Residential Target Groundwater Concentration @ TCR=1E-6 or THQ=0.1

(4) Rationale for Selection or Deletion Codes:

ASL = Above Screening Level

BSL = Below Screening Level

NAT = No Available Toxicity Screening Value

NVISL = Not addressed in the VISL Calculator

NVOL = No Sufficently volatile to pose an inhalation risk under this scenario

The three acrolein groundwater sample results were rejected

TABLE 3.1.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (MIP Area 1)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current
Medium:	Soil
Exposure Medium:	Surface Soil (0-1 ft bgs)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
MIP Area 1	1,1,2,2-Tetrachloroethane	mg/kg	1 Detection		11	11	mg/kg	Max	(1)
	1,1,2-Trichloroethane	mg/kg	1 Detection		7.5	7.5	mg/kg	Max	(1)
	Trichloroethene	mg/kg	3.89	9.66	29	9.66	mg/kg	95% UCL-ApG	(2)

Notes:

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) There was only one detection of the chemical. It is presented here as the maximum concentration, and was used as the EPC (Max)

(2) 95% Approximate Gamma UCL (95% UCL-ApG)

TABLE 3.2.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (MIP Area 1)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	All Soil (0 - 15 ft bgs)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (2)	Rationale
MIP Area 1	Arsenic	mg/kg	6.4		7.1		7.1	mg/kg	Max	(2)
	Cobalt	mg/kg	7.6		8.5	J	8.5	mg/kg	Max	(2)
	Iron	mg/kg	19450		20500		20500	mg/kg	Max	(2)
	Manganese	mg/kg	313.5		420		420	mg/kg	Max	(2)
	1,1,2,2-Tetrachloroethane	mg/kg	0.29	4.31	11		4.31	mg/kg	99% UCL-C	(1)
	1,1,2-Trichloroethane	mg/kg	0.199	2.94	7.5		2.94	mg/kg	99% UCL-C	(1)
	Trichloroethene	mg/kg	39.22	410	1900	D	410	mg/kg	99% UCL-C	(1)

Notes:

Qualifier Definitions: J - Estimated value

D-Secondary dilution factor

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 99% KM (Chebyshev) UCL (99% UCL-C)

(2) There were only two detections of the chemical. ProUCL was unable to calculate an EPC. The maximum is presented here as the EPC (Max)

TABLE 3.3.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (MIP Area 2)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	All Soil (0 - 15 ft bgs)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (2)	Rationale
MIP Area 2	Cyanide, total	mg/kg	0.17	0.261	0.29	J	0.29	mg/kg	Max	(2)
	Arsenic	mg/kg	5.7	6.26	6.7		6.26	mg/kg	95% UCL-S	(3)
	Cobalt	mg/kg	9	10.8	11.9		10.8	mg/kg	95% UCL-S	(3)
	Iron	mg/kg	19720	21255	21600		21255	mg/kg	95% UCL-S	(3)
	Manganese	mg/kg	523.4	704	657	L	704	mg/kg	95% UCL-S	(3)
	Benzo[a]anthracene	mg/kg	1 Detection		0.34		0.34	mg/kg	Max	(1)
	Benzo[a]pyrene	mg/kg	1 Detection		0.085		0.085	mg/kg	Max	(1)
	Benzo[b]fluoranthene	mg/kg	1 Detection		0.23		0.23	mg/kg	Max	(1)
	Dibenz(a,h)anthracene	mg/kg	1 Detection		0.027	J	0.027	mg/kg	Max	(1)

Notes:

Qualifier Definitions: J - Estimated value

L - Reported value may be biased low

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(1) The arithmetic mean is the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method.

(2) Codes used for the EPC Statistic:

(1) There was only one detection of the chemical. It is presented here as the maximum concentration, and was used as the EPC (Max)

(2) The calculated EPC was higher than the maximum detected concentration. The maximum was therefore used as the EPC (Max)

(3) 95% Student's-t (95% UCL-S)

TABLE 3.4.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Expended Waste Area)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Surface Soil (0 - 0.5 ft bgs) (3)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (2)	Rationale
Expended Waste Area	Arsenic	mg/kg	6.58	8.40	8.6		8.40	mg/kg	95% UCL-S	(1)
	Cobalt	mg/kg	23.8	34.0	37.3		34.0	mg/kg	95% UCL-S	(1)
	Copper	mg/kg	198	327	358	L	327	mg/kg	95% UCL-S	(1)
	Iron	mg/kg	22540	28179	28100		28100	mg/kg	Max	(3)
	Manganese	mg/kg	557.4	859	1100		859	mg/kg	95% UCL-S	(1)
	Nickel	mg/kg	116	191	219	J	191	mg/kg	95% UCL-S	(1)
	Benzo[a]anthracene	mg/kg	0.121	0.279	0.34		0.279	mg/kg	95% UCL-KMt	(2)
	Benzo[a]pyrene	mg/kg	0.121	0.257	0.33		0.257	mg/kg	95% UCL-S	(1)
	Benzo[b]fluoranthene	mg/kg	0.195	0.402	0.48		0.402	mg/kg	95% UCL-S	(1)
	Dibenz(a,h)anthracene	mg/kg	0.0202	0.0478	0.054		0.0478	mg/kg	95% UCL-KMt	(2)
	Indeno[1,2,3-cd]pyrene	mg/kg	0.0868	0.186	0.22		0.186	mg/kg	95% UCL-KMt	(2)

Notes:

Qualifier Definitions: J - Estimated value

Qualifier Definitions: D15:D25 J - Estimated value

L - Reported value may be biased low

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 95% Student's-t (95% UCL-S)

(2) 95% KM (t) UCL (95% UCL-KMt)

(3) The calculated EPC was higher than the maximum detected concentration. The maximum was therefore used as the EPC (Max)

(3) The data reflected in this table are only from surface soil samples. Only surface soil samples were collected during the RI and there were no historical data for this area. Therefore surface soil EPCs were used to evaluate the exposure scenarios associated with both surface and subsurface soil.

TABLE 3.5.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Shot Blast Area)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Surface Soil (0 - 0.5 ft bgs) (3)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
Shot Blast Area	Aluminum	mg/kg	5304	6202	8400	6202	mg/kg	95% UCL-S	(5)
	Arsenic	mg/kg	6.06	6.66	8.20	6.66	mg/kg	95% UCL-S	(5)
	Chromium VI	mg/kg	0.487	1.17	0.945	0.945	mg/kg	Max	(6)
	Cobalt	mg/kg	13.1	30.0	42.6	30.0	mg/kg	95% UCL-CM	(1)
	Copper	mg/kg	103	311	469 L	311	mg/kg	95% UCL-CM	(1)
	Iron	mg/kg	20160	23743	33400	23743	mg/kg	95% UCL-S	(5)
	Lead	mg/kg	104	271	419 L	271	mg/kg	95% UCL-AdG	(2)
	Manganese	mg/kg	409	487	695	487	mg/kg	95% UCL-S	(5)
	Nickel	mg/kg	69.8	206	301 J	206	mg/kg	95% UCL-CM	(1)
	Benzo[a]anthracene	mg/kg	0.4	0.756	1.90	0.756	mg/kg	95% UCL-KMt	(4)
	Benzo[a]pyrene	mg/kg	0.361	1.09	1.70	1.09	mg/kg	95% UCL-C	(3)
	Benzo[b]fluoranthene	mg/kg	0.432	0.791	2.00	0.791	mg/kg	95% UCL-KMt	(4)
	Dibenz(a,h)anthracene	mg/kg	0.073	0.139	0.33	0.139	mg/kg	95% UCL-KMt	(4)
	Indeno[1,2,3-cd]pyrene	mg/kg	0.284	0.498	1.10	0.498	mg/kg	95% UCL-KMt	(4)

Notes:

Qualifier Definitions: J - Estimated value

L - Reported value may be biased low

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 95%Chebyshev (Mean,Sd) UCL (95% UCL-CM)

(2) 95% Adjusted Gamma UCL (95% UCL-AdG)

(3) 95% KM (Chebyshev) UCL (95% UCL-C)

(4) 95% KM (t) UCL (95% UCL-KMt)

(5) 95% Student's-t (95% UCL-S)

(6) the calculated 95% UCL is above the maximum concentration, and so the maximum concentration was selected as the EPC (Max)

(3) The data reflected in this table are only from surface soil samples. Only surface soil samples were collected during the RI and there were no historical data for this area. Therefore surface soil EPCs were used to evaluate the exposure scenarios associated with both surface and subsurface soil.

TABLE 3.6.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Former FWEC Facility)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (2)	Rationale
Former FWEC Facility	Formaldehyde	µg/L	5.55	6.24	18.8	B	0.00624	mg/L	95% UCL-KMt	(1)
	Cyanide	mg/L	0.00505	0.00562	0.00680	B	0.00562	mg/L	95% UCL-KMt	(1)
	Aluminum	mg/L	0.409	0.631	2.30		0.631	mg/L	99% UCL-BCA	(2)
	Barium	mg/L	0.0975	0.140	0.627	L	0.14	mg/L	95% UCL-H	(3)
	Cadmium	mg/L	1 Detection		0.00290	J	0.0029	mg/L	Max	(5)
	Chromium	mg/L	0.0055	0.00692	0.0199		0.00692	mg/L	95% UCL-KMt	(1)
	Cobalt	mg/L	0.00462	0.00539	0.0117	J	0.00539	mg/L	95% UCL-KMt	(1)
	Iron	mg/L	4.33	30.9	53.4		30.9	mg/L	99% UCL - C	(4)
	Lead	mg/L	0.00978	0.0165	7.61		0.0165	mg/L	95% UCL-KMt	(1)
	Manganese	mg/L	0.657	4.24	7.61		4.24	mg/L	99% UCL-C	(4)
	Mercury	mg/L	1 Detection		0.00023		0.00023	mg/L	Max	(5)
	1,2,4-Trichlorobenzene	µg/L	0.203	0.225	0.540	J	0.000225	mg/L	95% UCL-KMt	(1)
	1,1,2-Trichloroethane	µg/L	1 Detection		0.340	J	0.00034	mg/L	Max	(5)
	1,1-Dichloroethane	µg/L	1.22	1.76	29.0		0.00176	mg/L	99% UCL - C	(4)
	1,1-Dichloroethene	µg/L	20.6	6.18	56.0		0.00618	mg/L	95% UCL-ApG	(6)
	1,2-Dichloroethane	µg/L	1 Detection		0.21	J	0.00021	mg/L	Max	(5)
	1,4-Dioxane	µg/L	3.13	5.43	45	J	0.00543	mg/L	99% UCL - C	(4)
	Benzene	µg/L	0.114	0.129	0.45	J	0.000129	mg/L	95% UCL-KMt	(1)
	Chloroform	µg/L	0.0888	0.0963	0.27	J	0.0000963	mg/L	95% UCL-KMt	(1)
	cis-1,2-Dichloroethene	µg/L	1.05	1.42	10		0.00142	mg/L	99% UCL - C	(4)
	Tetrachloroethene	µg/L	1.02	1.45	16		0.00145	mg/L	99% UCL - C	(4)
	Trichloroethene	µg/L	218	746	4900		0.746	mg/L	97.5% UCL-C	(7)
	Vinyl chloride	µg/L	1 Detection		0.33	J	0.00033	mg/L	Max	(5)

Notes:

Qualifier Definitions: J - Estimated value

B - Reported value may be wholly or partially due to contamination in an associated blank sample

L - Reported value may be biased low

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 95% KM (t) UCL (95% UCL-KMt)

(2) 99% KM (BCA) UCL (99% UCL-BCA)

(3) 95% H (H-Statistic) UCL (95% UCL-H)

(4) 99% KM (Chebyshev) UCL (99% UCL-C)

(5) There was only one detection of the chemical. It is presented here as the maximum concentration, and was used as the EPC (Max)

(6) 95% GROS Approximate Gamma UCL (95% UCL-ApG)

(7) 97.5% KM (Chebyshev) UCL (95% UCL-C)

TABLE 3.7.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Surrounding Industrial Properties)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
Surrounding Industrial Properties	Formaldehyde	µg/L	11.9	16.5	125 J	0.0165	mg/L	95% UCL-ApG	(8)
	Iron	mg/L	2.88	18.4	21.4 L	18.4	mg/L	99% UCL-C	(1)
	Manganese	mg/L	2.04	6.58	7.82	6.58	mg/L	95% UCL-S	(2)
	Bis(2-ethylhexyl)phthalate	µg/L	1 Detection		6.20 J	0.00620	mg/L	Max	(3)
	1,1-Dichloroethane	µg/L	0.911	2.84	41.0	0.00284	mg/L	95% UCL-C	(4)
	1,4-Dioxane	µg/L	3.59	7.361	74.0	0.007361	mg/L	95% UCL-BCA	(5)
	Acetone	µg/L	21.6	42.0	1400 D	0.0420	mg/L	95% UCL-BCA	(5)
	Benzene	µg/L	0.127	0.146	0.950 J	0.000146	mg/L	95% UCL-KMt	(6)
	Bromodichloromethane	µg/L	0.127	0.150	1.30	0.000150	mg/L	95% UCL-KMt	(6)
	Carbon tetrachloride	µg/L	0.156	0.188	1.00	0.000188	mg/L	95% UCL-KMt	(6)
	Chloroform	µg/L	1.05	2.19	19.0	0.00219	mg/L	95% UCL-C	(4)
	cis-1,2-Dichloroethene	µg/L	0.318	0.408	7.40	0.000408	mg/L	95% UCL-KMt	(6)
	Toluene	µg/L	4.84	15.7	170	0.0157	mg/L	97.5% UCL-C	(7)
	Trichloroethene	µg/L	34.2	59.5	310	0.0595	mg/L	97.5% UCL-C	(7)
	Vinyl chloride	µg/L	0.193	0.263	4.20	0.000263	mg/L	95% UCL-KMt	(6)

Notes:

Qualifier Definitions: J - Estimated value

D-Secondary dilution factor

L - Reported value may be biased low

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 99% KM (Chebyshev) UCL (99% UCL-C)

(2) 95% Student's-t (95% UCL-S)

(3) There was only one detection of the chemical. It is presented here as the maximum concentration, and was used as the EPC (Max)

(4) 95% KM (Chebyshev) UCL (95% UCL-C)

(5) 95% KM (BCA) UCL (95% UCL-BCA)

(6) 95% KM (t) UCL (95% UCL-KMt)

(7) 97.5% KM (Chebyshev) UCL (97.5% UCL-C)

(8) 95% Approximate Gamma UCL (95% UCL-ApG)

TABLE 3.8.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Affected Area)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (2)	Rationale
Affected Area	Iron	mg/L	10.6	19.9	46.0	L	19.9	mg/L	95% UCL-KMt	(1)
	1,4-Dioxane	µg/L	0.206	0.259	0.850		0.000259	mg/L	95% UCL-KMt	(1)
	Acrolein	µg/L	3.04	18.1	130	J	0.0181	mg/L	97.5% UCL-C	(5)
	Benzene	µg/L	0.131	0.152	0.940	J	0.000152	mg/L	95% UCL-KMt	(1)
	Bromodichloromethane	µg/L	1 Detection		0.180	J	0.000180	mg/L	Max	(6)
	Carbon tetrachloride	µg/L	0.126	0.172	1.90		0.000172	mg/L	95% UCL-KMt	(1)
	Chloroform	µg/L	0.356	0.487	4.60		0.000487	mg/L	95% UCL-BCA	(3)
	Trichloroethene	µg/L	20.0	30.1	86.0		0.0301	mg/L	95% UCL-C	(2)
	Vinyl chloride	µg/L	1 Detection	NA	0.140	J	0.000140	mg/L	Max	(4)

Notes:

Qualifier Definitions: J - Estimated value

L - Reported value may be biased low

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 95% KM (t) UCL (95% UCL-KMt)

(2) 95% KM (Chebyshev) UCL (95% UCL-C)

(3) 95% KM (BCA) UCL (95% UCL-BCA)

(4) There was only one detection of the chemical. It is presented here as the maximum concentration, and was used as the EPC (Max)

(5) 97.5% KM (Chebyshev) UCL (97.5% UCL-C)

(6) There were only two detections of the chemical. ProUCL was unable to calculate an EPC. The maximum is presented here as the maximum concentration, and was used as the EPC (Max)

TABLE 3.9A.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Retention Pond)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Sediment
Exposure Medium:	Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (2)	Rationale
Retention Pond	Arsenic	mg/kg	4.714	7.758	12		7.758	mg/kg	95% UCL-S	(4)
	Manganese	mg/kg	277.3	2479	2000	J	2000	mg/kg	Max	(5)
	Benzo[a]anthracene	mg/kg	18.74	114.8	140		114.8	mg/kg	97.5% UCL-CM	(2)
	Benzo[a]pyrene	mg/kg	14.74	89.94	110		89.94	mg/kg	97.5% UCL-CM	(2)
	Benzo[b]fluoranthene	mg/kg	15.04	134.3	110		110	mg/kg	Max	(5)
	Benzo[k]fluoranthene	mg/kg	8.51	64.98	51		51	mg/kg	Max	(5)
	Dibenz(a,h)anthracene	mg/kg	3.917	39.55	32		32	mg/kg	Max	(5)
	Indeno[1,2,3-cd]pyrene	mg/kg	8.488	54.33	67		54.33	mg/kg	97.5% UCL-CM	(2)

Notes:

Qualifier Definitions: J - Estimated value

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 99% KM (Chebyshev) UCL (99% UCL-C)

(2) 97.5%Chebyshev (Mean,Sd) UCL (97.5% UCL-CM)

(3) 99%Chebyshev (Mean,Sd) UCL (99% UCL-CM)

(4) 95% Student's-t (95% UCL-S)

(5) The calculated EPC was higher than the maximum detected concentration. The maximum was therefore used as the EPC (Max)

TABLE 3.10.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Watering Run, Tributaries and Streams)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Sediment
Exposure Medium:	Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (2)	Rationale
Watering Run, Tributaries, and Streams	Arsenic	mg/kg	11.5	20.9	28.0		20.9	mg/kg	95% UCL-S	(1)
	Cobalt	mg/kg	21.4	39.5	58.0	L	39.5	mg/kg	95% UCL-S	(1)
	Manganese	mg/kg	6142	14441	26000	B	14441	mg/kg	95% UCL-S	(1)
	Thallium	mg/kg	0.467	3.10	1.80	J	1.80	mg/kg	97.5% UCL-C	(2)

Notes:

Qualifier Definitions: J - Estimated value

B - Reported value may be wholly or partially due to contamination in an associated blank sample

L - Reported value may be biased low

(1) The mean is the arithmetic mean (if the dataset contains only detected concentrations) or the mean of the detected and non-detected values as calculated by ProUCL using the Kaplan-Meier method (if the dataset contains detected and non-detected concentrations).

(2) Codes used for the EPC Statistic:

(1) 95% Student's-t (95% UCL-S)

(2) 97.5% KM(Chebyshev) UCL (97.5% UCL-C)

TABLE 3.11

EXPOSURE POINT CONCENTRATION SUMMARY FOR INDOOR AIR

FWEC/Church Road TCE Site (Former FWEC Facility/MIP Area 2)

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Medium:	Groundwater (by Membrane Interface Probe)
Exposure Medium:	Indoor Air

Exposure Point	Chemical	CAS Number	Maximum Detected Groundwater Concentration in the Exposure Area	Units	Estimated Groundwater-to-Indoor Air Attenuation Factor (1)	Estimated Indoor Air EPC	Units
Indoor Air Former FWEC Facility MIP Area 2	1,1,1-Trichloroethane	71-55-6	34000	µg/L	0.001239	42.13	mg/m^3
	1,1,2-Trichloroethane	79-00-5	31	µg/L	0.001267	0.0393	mg/m^3
	1,1-Dichloroethane	75-34-3	2400	µg/L	0.001198	2.8752	mg/m^3
	1,1-Dichloroethene	75-35-4	4500	µg/L	0.001376	6.192	mg/m^3
	Mercury	7439-97-6	1.7	µg/L	0.0005773	0.000981	mg/m^3
	Naphthalene	91-20-3	20	µg/L	0.001052	0.0210	mg/m^3
	Ethylbenzene	100-41-4	35	µg/L	0.001204	0.0421	mg/m^3
	Tetrachloroethene	127-18-4	55	µg/L	0.001166	0.0641	mg/m^3
	Trichloroethene	79-01-6	53	µg/L	0.001252	0.0664	mg/m^3
	Xylenes, Total	1330-20-7	260	µg/L	0.001143	0.2972	mg/m^3

Notes:

(1) Calculated using the USEPA Screening-Level Johnson and Ettinger Model, Target Media Concentration Results, https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/JnE_lite_forward.html

Key inputs were:

Soil Type	Sand
Soil Properties	Determined based on soil type
Depth to GW from Bottom of Foundation	0.68m +/- 0.068m
Average Groundwater Temperature	24 C
Air Properties	From the model
Soil-Gas Flow rate	5 L/min
Building Type	Slab-on-Grade
Structure	default 1-story (conservative assumption for screening)
Air Exchange Rate	0.25 exchanges per hour (default)
Building Mixing Height	2.44 m (default)
Building Footprint Area	100 m2 (default)
Subsurface Foundation Area	106 m2 (default)
Building Crack Ratio	0.00038 [unitless] (default)
Foundation Slab Thickness	0.1 m (default)

TABLE 3.12.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Exposure Point: Former FWEC Facility	
Medium:	Groundwater
Exposure Medium:	Shower Room Air

For Mass-Transfer Coefficents

Gas film Mass Transfer Coefficient for Water -	3000	cm//hr
Molecular Weight of Water - MWH2O	18.02	
Liquid Film Mass Transfer Coefficient for Carb	20	cm/hr
Molecular Weight of Carbon Dioxide - MWCO	44.00995	
Temperature at Air-Water Interface - T1	293	K
Shower Water Temperature - Ts	**112**	F
Shower Water Temperature - Ts	318	K
Water Viscosity at T1	1.005	cp
Water Viscosity at Ts	0.596	cp
Universal Gas Constant - R	8.20E-05	atm-m3/mol-K

For Emission Flux and Concentration in Shower

CF1	3600	sec/hr
CF2	10	mm/cm
Shower Droplet Diameter - d	1.0	mm
Shower Droplet Drop Time - ts	2.0	sec
Specific Interfacial Surface Area for a Shperical Droplet of Diameter d	6	(1/mm)

Shower Room Properties

Shower Flow Rate - FR	**10**	L/min
Shower Room Air Volume - SV	**6**	m3
Air Exchange Rate in the Shower Room - R	**0.0083**	1/min
Shower Event Duration - Ds	**15**	min/event
Duration in Shower Room After Spray is Turned Off - Dafter	**5**	min/event
Total Exposure Duration in the Spray Area per Event - Dt	20	min/event

Parameter	MW	H	kg [as]	kl [iquid]	KL	KAL	CwdExpFac	Cwd/Cw0	Sprime	Cgw	S		Con(ave)	Coff(ave)	Con/off(ave)
Parameter Description	Molecular Weight	Henry's Law Constant	Gas Film Mass Transfer Coefficient	Liquid Film Mass Transfer Coefficient	Overall Mass Transfer Coefficient	Adjusted Overall Mass Transfer Coefficient	Exponential Factor in Multiplier Equation	Multiplier for the Water Droplet Concentration	Normalized VOC Generation Rate in the Shower Room	Ground- water Concentration	VOC generation rate in the Shower Room	Maximum Indoor Air VOC Concentration At t=Ds	Average Indoor Air VOC Concentration From t=0 to t=Ds	Average Indoor Air VOC Concentration From t=Ds to t=Dt	Average Indoor Air VOC Concentration From t=0 to t=Dt
Chemical Name	(g/mol)	(atm-m^3/mol-K)	(cm/hr)	(cm/hr)	(cm/hr)	(cm/hr)	(Unitless)	(Unitless)	(µg/m^3-min per µg/L)	(µg/l)	(µg/m^3-min)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)
Formaldehyde	30.03	3.37E-07	2,324	24.21	0.03	0.04	0.00	0.001	0.002	6.24E+00	**1.53E-02**	**2.15E-01**	**1.10E-01**	**2.11E-01**	**1.35E-01**
Cyanide	26.02	2.42E-02	2,497	26.01	25.75	34.83	-1.16	0.687	1.145	5.62E+00	**6.43E+00**	**9.07E+01**	**4.63E+01**	**8.88E+01**	**5.69E+01**
Aluminum	26.98		2,452	25.54	-	-	-	-	-	6.31E+02	-	-	-	-	-
Barium	137.33		1,087	11.32	-	-	-	-	-	1.40E+02	-	-	-	-	-
Cadmium	112.41		1,201	12.51	-	-	-	-	-	2.90E+00	-	-	-	-	-
Chromium	52.00		1,766	18.40	-	-	-	-	-	6.92E+00	-	-	-	-	-
Cobalt	58.93		1,659	17.28	-	-	-	-	-	5.39E+00	-	-	-	-	-
Iron	55.85		1,704	17.75	-	-	-	-	-	3.09E+04	-	-	-	-	-
Lead	207.20		885	9.22	-	-	-	-	-	1.65E+01	-	-	-	-	-
Manganese	54.94		1,718	17.90	-	-	-	-	-	2.30E-01	-	-	-	-	-
Mercury	200.59	1.14E-02	899	9.37	9.17	12.40	-0.41	0.339	0.564	2.25E-01	**1.27E-01**	**1.79E+00**	**9.14E-01**	**1.75E+00**	**1.12E+00**
1,2,4-Trichlorobenzene	181.45	1.42E-03	945	9.85	8.37	11.33	-0.38	0.314	0.524	2.25E-01	**1.18E-01**	**1.66E+00**	**8.49E-01**	**1.63E+00**	**1.04E+00**
1,1,2-Trichloroethane	133.41	8.24E-04	1,103	11.49	8.81	11.92	-0.40	0.328	0.546	3.40E-01	**1.86E-01**	**2.62E+00**	**1.34E+00**	**2.57E+00**	**1.64E+00**
1,1-Dichloroethane	98.96	5.62E-03	1,280	13.34	12.77	17.27	-0.58	0.438	0.730	1.76E-03	**1.28E-03**	**1.81E-02**	**9.23E-03**	**1.77E-02**	**1.13E-02**
1,1-Dichloroethene	96.94	2.61E-02	1,293	13.48	13.35	18.06	-0.60	0.452	0.754	6.18E-03	**4.66E-03**	**6.57E-02**	**3.35E-02**	**6.43E-02**	**4.12E-02**
1,2-Dichloroethane	98.96	1.18E-03	1,280	13.34	11.00	14.89	-0.50	0.391	0.652	2.10E-01	**1.37E-01**	**1.93E+00**	**9.85E-01**	**1.89E+00**	**1.21E+00**
1,4-Dioxane	88.11	4.80E-06	1,357	14.13	0.27	0.36	-0.01	0.012	0.020	5.43E-03	**1.08E-04**	**1.52E-03**	**7.76E-04**	**1.49E-03**	**9.55E-04**
Benzene	78.11	5.55E-03	1,441	15.01	14.36	19.43	-0.65	0.477	0.795	1.29E-04	**1.03E-04**	**1.45E-03**	**7.38E-04**	**1.42E-03**	**9.07E-04**
Chloroform	119.38	3.67E-03	1,166	12.14	11.37	15.38	-0.51	0.401	0.668	9.63E-05	**6.44E-05**	**9.08E-04**	**4.63E-04**	**8.89E-04**	**5.70E-04**
cis-1,2-Dichloroethene	96.94	4.08E-03	1,293	13.48	12.70	17.18	-0.57	0.436	0.727	1.42E-03	**1.03E-03**	**1.45E-02**	**7.40E-03**	**1.42E-02**	**9.10E-03**
Tetrachloroethene	165.83	1.77E-02	989	10.30	10.16	13.74	-0.46	0.368	0.613	1.45E-03	**8.91E-04**	**1.26E-02**	**6.41E-03**	**1.23E-02**	**7.88E-03**
Trichloroethene	131.39	9.85E-03	1,111	11.58	11.29	15.27	-0.51	0.399	0.665	7.46E-01	**4.96E-01**	**7.00E+00**	**3.57E+00**	**6.85E+00**	**4.39E+00**
Vinyl chloride	62.50	2.78E-02	1,611	16.78	16.63	22.50	-0.75	0.528	0.879	3.30E-01	**2.90E-01**	**4.09E+00**	**2.09E+00**	**4.01E+00**	**2.57E+00**
Source(s)	[S2]	[S2]	[S1,pg3,Eq2]	[S1,pg3,Eq3]	[S1,pg3,Eq1]	[S1,pg3,Eq4]	[S1,pg3,Eq5]	[S1,pg3,Eq5]	[S1,pg4,Eq6]	Site-Specific	[S1,pg4]	[First or Second Ca(t) Eqn in S1,pg5]	[Integration of First Ca(t) Eqn in S1,pg5]	[Integration of Second Ca(t) Eqn in S1,pg5]	

SOURCES

S1 Sarah A. Foster and Paul C. Chrostowski, 1987. "Inhalation Exposures to Volatile Organic Contaminants in the Shower" ICF-Clement Associates, Inc '80th Annual Meeting of APCA, June 21-26, 1987

S2 RSL June 2015

TABLE 3.13.RME

FWEC/Church Road TCE Site (Surrounding Industrial Properties)

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Exposure Point: Surrounding Industrial Properties	
Medium:	Groundwater
Exposure Medium:	Shower Room Air

For Mass-Transfer Coefficents

Gas film Mass Transfer Coefficient for Water	3000	cm/hr
Molecular Weight of Water - MWH2O	18.02	
Liquid Film Mass Transfer Coefficient for Carb	20	cm/hr
Molecular Weight of Carbon Dioxide - MWCO	44.00995	
Temperature at Air-Water Interface - T1	293	K
Shower Water Temperature - Ts	**112**	F
Shower Water Temperature - Ts	318	K
Water Viscosity at T1	1.005	cp
Water Viscosity at Ts	0.596	cp
Universal Gas Constant - R	8.20E-05	atm-m3/mol-K

For Emission Flux and Concentration in Shower

CF1	3600	sec/hr
CF2	10	mm/cm
Shower Droplet Diameter - d	1.0	mm
Shower Droplet Drop Time - ts	2.0	sec
Specific Interfacial Surface Area for a	6	(1/mm)
Shperical Droplet of Diameter d		

Shower Room Properties

Shower Flow Rate - FR	**10**	L/min
Shower Room Air Volume - SV	**6**	m3
Air Exchange Rate in the Shower Room - R	**0.0083**	1/min
Shower Event Duration - Ds	**15**	min/event
Duration in Shower Room After Spray is Turned Off - Dafter	**5**	min/event
Total Exposure Duration in the Spray Area per Event - Dt	20	min/event

Parameter	MW	H	kg [as]	kl [iquid]	KL	KAL	CwdExpFac	Cwd/Cw0	Sprime	Cgw	S		Con(ave)	Coff(ave)	Con/off(ave)
Parameter Description	Molecular Weight	Henry's Law Constant	Gas Film Mass Transfer Coefficient	Liquid Film Mass Transfer Coefficient	Overall Mass Transfer Coefficient	Adjusted Overall Mass Transfer Coefficient	Exponential Factor in Multiplier Equation	Multiplier for the Water Droplet Concentration	Normalized VOC Generation Rate in the Shower Room	Ground- water Concentration	VOC generation rate in the Shower Room	Maximum Indoor Air VOC Concentration At t=Ds	Average Indoor Air VOC Concentration From t=0 to t=Ds	Average Indoor Air VOC Concentration From t=Ds to t=Dt	Average Indoor Air VOC Concentration From t=0 to t=Dt
Chemical Name	(g/mol)	(atm-m^3/mol-K)	(cm/hr)	(cm/hr)	(cm/hr)	(cm/hr)	(Unitless)	(Unitless)	(µg/m^3-min per µg/L)	(µg/l)	(µg/m^3-min)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)
Formaldehyde	30.03	3.37E-07	2,324	24.21	0.03	0.04	0.00	0.001	0.002	1.65E+01	4.04E-02	5.69E-01	2.91E-01	5.58E-01	3.57E-01
Iron	55.85		1,704	17.75	-	-	-	-	-	1.84E+04	-	-	-	-	-
Manganese	54.94		1,718	17.90	-	-	-	-	-	6.58E+03	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	390.57	2.70E-07	644	6.71	0.01	0.01	0.00	0.000	0.001	6.20E+00	3.37E-03	4.75E-02	2.43E-02	4.65E-02	2.98E-02
1,1-Dichloroethane	98.96	5.62E-03	1,280	13.34	12.77	17.27	-0.58	0.438	0.730	2.84E+00	2.07E+00	2.92E+01	1.49E+01	2.86E+01	1.83E+01
1,4-Dioxane	88.11	4.80E-06	1,357	14.13	0.27	0.36	-0.01	0.012	0.020	6.57E+00	1.31E-01	1.84E+00	9.40E-01	1.80E+00	1.16E+00
Acetone	58.08	3.50E-05	1,671	17.41	2.14	2.89	-0.10	0.092	0.153	4.20E+01	6.42E+00	9.06E+01	4.62E+01	8.87E+01	5.68E+01
Benzene	78.11	5.55E-03	1,441	15.01	14.36	19.43	-0.65	0.477	0.795	1.46E-01	1.16E-01	1.64E+00	8.35E-01	1.60E+00	1.03E+00
Bromodichloromethane	163.83	2.12E-03	995	10.37	9.27	12.54	-0.42	0.342	0.569	1.50E-01	8.54E-02	1.20E+00	6.15E-01	1.18E+00	7.56E-01
Carbon tetrachloride	153.82	2.76E-02	1,027	10.70	10.60	14.34	-0.48	0.380	0.633	1.88E-01	1.19E-01	1.68E+00	8.57E-01	1.64E+00	1.05E+00
Chloroform	119.38	3.67E-03	1,166	12.14	11.37	15.38	-0.51	0.401	0.668	2.19E+00	1.46E+00	2.06E+01	1.05E+01	2.02E+01	1.29E+01
cis-1,2-Dichloroethene	96.94	4.08E-03	1,293	13.48	12.70	17.18	-0.57	0.436	0.727	4.08E-01	2.96E-01	4.18E+00	2.13E+00	4.09E+00	2.62E+00
Toluene	92.14	6.64E-03	1,327	13.82	13.32	18.02	-0.60	0.452	0.753	1.57E+01	1.18E+01	1.66E+02	8.48E+01	1.63E+02	1.04E+02
Trichloroethene	131.39	9.85E-03	1,111	11.58	11.29	15.27	-0.51	0.399	0.665	5.95E+01	3.95E+01	5.58E+02	2.85E+02	5.46E+02	3.50E+02
Vinyl chloride	62.50	2.78E-02	1,611	16.78	16.63	22.50	-0.75	0.528	0.879	2.63E-01	2.31E-01	3.26E+00	1.66E+00	3.19E+00	2.05E+00
Source(s)	[S2]	[S2]	[S1,pg3,Eq2]	[S1,pg3,Eq3]	[S1,pg3,Eq1]	[S1,pg3,Eq4]	[S1,pg3,Eq5]	[S1,pg3,Eq5]	[S1,pg4,Eq6]	Site-Specific	[S1,pg4]	[First or Second Ca(t) Eqn in S1,pg5]	[Integration of First Ca(t) Eqn in S1,pg5]	[Integration of Second Ca(t) Eqn in S1,pg5]	

SOURCES

S1 Sarah A. Foster and Paul C. Chrostowski, 1987. "Inhalation Exposures to Volatile Organic Contaminants in the Shower" ICF-Clement Associates, Inc '80th Annual Meeting of APCA, June 21-26, 1987

S2 RSL June 2015

TABLE 3.14.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Affected Area)

Mountain Top, Luzerne County, Pennsylvania

Exposure Point: Affected Area	
Medium:	Groundwater
Exposure Medium:	Shower Room Air

For Mass-Transfer Coefficents

Gas film Mass Transfer Coefficient for Water	3000	cm/hr
Molecular Weight of Water - MWH2O	18.02	
Liquid Film Mass Transfer Coefficient for Carb	20	cm/hr
Molecular Weight of Carbon Dioxide - MWCO	44.00995	
Temperature at Air-Water Interface - T1	293	K
Shower Water Temperature - Ts	**112**	F
Shower Water Temperature - Ts	318	K
Water Viscosity at T1	1.005	cp
Water Viscosity at Ts	0.596	cp
Universal Gas Constant - R	8.20E-05	atm-m3/mol-K

For Emission Flux and Concentration in Shower

CF1	3600	sec/hr
CF2	10	mm/cm
Shower Droplet Diameter - d	1.0	mm
Shower Droplet Drop Time - ts	2.0	sec
Specific Interfacial Surface Area for a	6	(1/mm)
Shperical Droplet of Diameter d		

Shower Room Properties

Shower Flow Rate - FR	**10**	L/min
Shower Room Air Volume - SV	**6**	m3
Air Exchange Rate in the Shower Room - R	**0.0083**	1/min
Shower Event Duration - Ds	**15**	min/event
Duration in Shower Room After Spray is Turned Off - Dafter	**5**	min/event
Total Exposure Duration in the Spray Area per Event - Dt	20	min/event

Parameter	MW	H	kg [as]	kl [iquid]	KL	KAL	CwdExpFac	Cwd/Cw0	Sprime	Cgw	S		Con(ave)	Coff(ave)	Con/off(ave)
Parameter Description	Molecular Weight	Henry's Law Constant	Gas Film Mass Transfer Coefficient	Liquid Film Mass Transfer Coefficient	Overall Mass Transfer Coefficient	Adjusted Overall Mass Transfer Coefficient	Exponential Factor in Multiplier Equation	Multiplier for the Water Droplet Concentration	Normalized VOC Generation Rate in the Shower Room	Ground- water Concentration	VOC generation rate in the Shower Room	Maximum Indoor Air VOC Concentration At t=Ds	Average Indoor Air VOC Concentration From t=0 to t=Ds	Average Indoor Air VOC Concentration From t=Ds to t=Dt	Average Indoor Air VOC Concentration From t=0 to t=Dt
Chemical Name	(g/mol)	(atm-m^3/mol-K)	(cm/hr)	(cm/hr)	(cm/hr)	(cm/hr)	(Unitless)	(Unitless)	(µg/m^3-min per µg/L)	(µg/l)	(µg/m^3-min)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)
Iron	55.85		1,704	17.75	-	-	-	-	-	1.99E+04	-	-	-	-	-
1,4-Dioxane	88.11	4.80E-06	1,357	14.13	0.27	0.36	-0.01	0.012	0.020	2.59E-01	5.15E-03	7.26E-02	3.70E-02	7.11E-02	4.55E-02
Acrolein	56.06	1.22E-04	1,701	17.72	5.81	7.86	-0.26	0.230	0.384	1.81E+01	6.95E+00	9.79E+01	5.00E+01	9.59E+01	6.15E+01
Benzene	78.11	5.55E-03	1,441	15.01	14.36	19.43	-0.65	0.477	0.795	1.52E-01	1.21E-01	1.70E+00	8.69E-01	1.67E+00	1.07E+00
Bromodichloromethane	163.83	2.12E-03	995	10.37	9.27	12.54	-0.42	0.342	0.569	1.80E-01	1.03E-01	1.45E+00	7.38E-01	1.42E+00	9.07E-01
Carbon tetrachloride	153.82	2.76E-02	1,027	10.70	10.60	14.34	-0.48	0.380	0.633	1.72E-01	1.09E-01	1.54E+00	7.84E-01	1.50E+00	9.64E-01
Chloroform	119.38	3.67E-03	1,166	12.14	11.37	15.38	-0.51	0.401	0.668	4.87E-01	3.26E-01	4.59E+00	2.34E+00	4.50E+00	2.88E+00
Trichloroethene	131.39	9.85E-03	1,111	11.58	11.29	15.27	-0.51	0.399	0.665	3.01E+01	2.00E+01	2.82E+02	1.44E+02	2.77E+02	1.77E+02
Vinyl chloride	62.50	2.78E-02	1,611	16.78	16.63	22.50	-0.75	0.528	0.879	1.40E-01	1.23E-01	1.74E+00	8.86E-01	1.70E+00	1.09E+00
Source(s)	[S2]	[S2]	[S1,pg3,Eq2]	[S1,pg3,Eq3]	[S1,pg3,Eq1]	[S1,pg3,Eq4]	[S1,pg3,Eq5]	[S1,pg3,Eq5]	[S1,pg4,Eq6]	Site-Specific	[S1,pg4]	[First or Second Ca(t) Eqn in S1,pg5]	[Integration of First Ca(t) Eqn in S1,pg5]	[Integration of Second Ca(t) Eqn in S1,pg5]	

SOURCES

S1 Sarah A. Foster and Paul C. Chrostowski, 1987. "Inhalation Exposures to Volatile Organic Contaminants in the Shower" ICF-Clement Associates, Inc '80th Annual Meeting of APCA, June 21-26, 1987

S2 RSL June 2015

TABLE 3.15.RME

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Exposure Point: Former FWEC Facility	
Medium:	Groundwater
Exposure Medium:	Trench Air

For Mass-Transfer Coefficients

Kg,H2O	0.833	cm/s
MWH2O	18	
Kl,O2	0.002	cm/s
MWO2	32	
T	**77**	F
T	298	K
R	8.20E-05	atm-m3/mol-K

For Emission Flux and Concentration in Trench

CF1	1.00E-03	L/cm3
CF2	1.00E+04	cm2/m2
CF3	3600	s/hr
F	**1**	
ACH	2	hr-1

Trench dimensions

Length	**8**	ft
	2.44	m
Width	**3**	ft
	0.91	m
Depth	**3.5**	ft
	1.07	m
Width/Depth	0.86	

Table 3.8 Exposure-point concentrations (inhalation) for construction/utility workers in a trench: Groundwater less than 15 feet deep revised 10/5/07	CAS No.	Molecular Weight MWi g/mol	Henry's Law Constant Hi atm-m3/mol	Gas-Phase Mass Transfer Coefficient KiG cm/s	Liquid-Phase Mass Transfer Coefficient KiL cm/s	Overall Mass Transfer Coefficient Ki cm/s	Concentration of Contaminant in Groundwater Cgw ug/L	Volatilization Factor VF L/m3	Concentration of Contaminant in Trench Ctrench ug/m3	Concentration of Contaminant in Trench Ctrench mg/m3
TAL Inorganics										
Aluminum	7429-90-5	26.98					6.31E+02			
Barium	7440-39-3	137.33					1.40E+02			
Cadmium (water)	7440-43-9	112.41					2.90E+00			
Chromium	7440-47-3	52.00					6.92E+00			
Cobalt	7440-48-4	58.93					5.39E+00			
Cyanide	57-12-5	26.02					5.62E+00			
Iron	7439-89-6	55.85					3.09E+04			
Lead	7439-92-1	207.20					1.65E+01			
Manganese (nonfood)	7439-96-5	54.94					4.24E+03			
Mercury	7439-97-6	200.59	1.14E-02	3.71E-01	7.99E-04	7.95E-04	2.30E-01	1.34E+01	3.09E+00	3.09E-03
TCL Volatile Organic Compounds (VOCs)										
Benzene	71-43-2	78.11	5.55E-03	5.09E-01	1.28E-03	1.27E-03	1.29E-01	2.14E+01	2.76E+00	2.76E-03
Chloroform	67-66-3	119.38	3.67E-03	4.42E-01	1.04E-03	1.02E-03	9.63E-02	1.72E+01	1.66E+00	1.66E-03
1,1-Dichloroethane	75-34-3	98.96	5.62E-03	4.71E-01	1.14E-03	1.13E-03	1.76E+00	1.90E+01	3.34E+01	3.34E-02
1,2-Dichloroethane	107-06-2	98.96	9.79E-04	4.71E-01	1.14E-03	1.07E-03	2.10E-01	1.81E+01	3.80E+00	3.80E-03
1,1-Dichloroethene	75-35-4	96.94	2.61E-02	4.74E-01	1.15E-03	1.15E-03	6.18E+00	1.93E+01	1.20E+02	1.20E-01
cis-1,2-Dichloroethene	156-59-2	96.94	4.08E-03	4.74E-01	1.15E-03	1.13E-03	1.42E+00	1.91E+01	2.70E+01	2.70E-02
1,4-dioxane	123-91-1	88.11	4.80E-06	4.89E-01	1.21E-03	8.90E-05	5.43E+00	1.50E+00	8.15E+00	8.15E-03
Tetrachloroethene	127-18-4	165.83	1.84E-02	3.96E-01	8.79E-04	8.76E-04	1.45E+00	1.48E+01	2.15E+01	2.15E-02
1,2,4-Trichlorobenzene	120-82-1	181.45	1.42E-03	3.84E-01	8.40E-04	8.09E-04	2.25E-01	1.37E+01	3.07E+00	3.07E-03
1,1,2-Trichloroethane	79-00-5	133.40	9.13E-04	4.26E-01	9.80E-04	9.23E-04	3.40E-01	1.56E+01	5.29E+00	5.29E-03
Trichloroethene	79-01-6	131.39	1.03E-02	4.28E-01	9.87E-04	9.82E-04	7.46E+02	1.66E+01	1.24E+04	1.24E+01
Vinyl Chloride	75-01-4	62.50	2.70E-02	5.49E-01	1.43E-03	1.43E-03	3.30E-01	2.41E+01	7.95E+00	7.95E-03

SOURCE: VDEQ, 2016. Table 3.8 Groundwater Less than or equal 15 feet Deep http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance.aspx

TABLE 3.16

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Surrounding Industrial Properties)

Mountain Top, Luzerne County, Pennsylvania

Exposure Point:	Surrounding Industrial Properties
Medium:	Groundwater
Exposure Medium:	Trench Air

For Mass-Transfer Coefficients

Kg,H2O	0.833	cm/s
MWH2O	18	
Kl,O2	0.002	cm/s
MWO2	32	
T	**77**	F
T	298	K
R	8.20E-05	atm-m3/mol-K

For Emission Flux and Concentration in Trench

CF1	1.00E-03	L/cm3
CF2	1.00E+04	cm2/m2
CF3	3600	s/hr
F	**1**	
ACH	2	hr-1

Trench dimensions

Length	**8**	ft
	2.44	m
Width	**3**	ft
	0.91	m
Depth	**3.7**	ft
	1.13	m
Width/Depth	0.81	

Table 3.8 Exposure-point concentrations (inhalation) for construction/utility workers in a trench: Groundwater less than 15 feet deep revised 10/5/07	CAS No.	Molecular Weight MWi g/mol	Henry's Law Constant Hi atm-m3/mol	Gas-Phase Mass Transfer Coefficient KiG cm/s	Liquid-Phase Mass Transfer Coefficient KiL cm/s	Overall Mass Transfer Coefficient Ki cm/s	Concentration of Contaminant in Groundwater Cgw ug/L	Volatilization Factor VF L/m3	Concentration of Contaminant in Trench Ctrench ug/m3	Concentration of Contaminant in Trench Ctrench mg/m3
TAL Inorganics										
Iron	7439-89-6	55.85					1.84E+04			
Manganese (nonfood)	7439-96-5	54.94					6.58E+03			
TCL Volatile Organic Compounds (VOCs)										
Acetone	67-64-1	58.08	3.88E-05	5.63E-01	1.48E-03	5.58E-04	4.20E+01	8.90E+00	3.74E+02	3.74E-01
Benzene	71-43-2	78.11	5.55E-03	5.09E-01	1.28E-03	1.27E-03	1.46E-01	2.02E+01	2.95E+00	2.95E-03
Bromodichloromethane	75-27-4	163.83	1.60E-03	3.98E-01	8.84E-04	8.55E-04	1.50E-01	1.36E+01	2.05E+00	2.05E-03
Carbon tetrachloride	56-23-5	153.82	3.04E-02	4.06E-01	9.12E-04	9.11E-04	1.88E-01	1.45E+01	2.73E+00	2.73E-03
Chloroform	67-66-3	119.38	3.67E-03	4.42E-01	1.04E-03	1.02E-03	2.19E+00	1.63E+01	3.56E+01	3.56E-02
1,1-Dichloroethane	75-34-3	98.96	5.62E-03	4.71E-01	1.14E-03	1.13E-03	2.84E+00	1.80E+01	5.10E+01	5.10E-02
cis-1,2-Dichloroethene	156-59-2	96.94	4.08E-03	4.74E-01	1.15E-03	1.13E-03	4.08E-01	1.81E+01	7.38E+00	7.38E-03
1,4-dioxane	123-91-1	88.11	4.80E-06	4.89E-01	1.21E-03	8.90E-05	6.57E+00	1.42E+00	9.34E+00	9.34E-03
Toluene	108-88-3	92.14	6.64E-03	4.82E-01	1.18E-03	1.17E-03	1.57E+01	1.86E+01	2.92E+02	2.92E-01
Trichloroethene	79-01-6	131.39	1.03E-02	4.28E-01	9.87E-04	9.82E-04	5.95E+01	1.57E+01	9.32E+02	9.32E-01
Vinyl Chloride	75-01-4	62.50	2.70E-02	5.49E-01	1.43E-03	1.43E-03	2.63E-01	2.28E+01	5.99E+00	5.99E-03
bis-(2-Ethylhexyl)phthalate	117-81-7	390.56	1.02E-07	2.97E-01	5.72E-04	1.24E-06	6.20E+00	1.98E-02	1.22E-01	1.22E-04

SOURCE: VDEQ, 2016. Table 3.8 Groundwater Less than or equal 15 feet Deep http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance.aspx

TABLE 3.17

EXPOSURE POINT CONCENTRATION SUMMARY

FWEC/Church Road TCE Site (Affected Area)

Mountain Top, Luzerne County, Pennsylvania

Exposure Point: Affected Area	
Medium:	Groundwater
Exposure Medium:	Trench Air

For Mass-Transfer Coefficients

Kg,H2O	0.833	cm/s
MWH2O	18	
Kl,O2	0.002	cm/s
MWO2	32	
T	**77**	F
T	298	K
R	8.20E-05	atm-m3/mol-K

For Emission Flux and Concentration in Trench

CF1	1.00E-03	L/cm3
CF2	1.00E+04	cm2/m2
CF3	3600	s/hr
F	**1**	
ACH	2	hr-1

Trench dimensions

Length	**8**	ft
	2.44	m
Width	**3**	ft
	0.91	m
Depth	**5.5**	ft
	1.68	m
Width/Depth	0.55	

Table 3.8 Exposure-point concentrations (inhalation) for construction/utility workers in a trench: Groundwater less than 15 feet deep revised 10/5/07	CAS No.	Molecular Weight MWi g/mol	Henry's Law Constant Hi atm-m3/mol	Gas-Phase Mass Transfer Coefficient KiG cm/s	Liquid-Phase Mass Transfer Coefficient KiL cm/s	Overall Mass Transfer Coefficient Ki cm/s	Concentration of Contaminant in Groundwater Cgw ug/L	Volatilization Factor VF L/m3	Concentration of Contaminant in Trench Ctrench ug/m3	Concentration of Contaminant in Trench Ctrench mg/m3
TAL Inorganics										
Iron	7439-89-6	55.85					1.99E+04			
TCL Volatile Organic Compounds (VOCs)										
Benzene	71-43-2	78.11	5.55E-03	5.09E-01	1.28E-03	1.27E-03	1.52E-01	1.36E+01	2.07E+00	2.07E-03
Bromodichloromethane	75-27-4	163.83	1.60E-03	3.98E-01	8.84E-04	8.55E-04	1.80E-01	9.18E+00	1.65E+00	1.65E-03
Carbon tetrachloride	56-23-5	153.82	3.04E-02	4.06E-01	9.12E-04	9.11E-04	1.72E-01	9.78E+00	1.68E+00	1.68E-03
Chloroform	67-66-3	119.38	3.67E-03	4.42E-01	1.04E-03	1.02E-03	4.87E-01	1.09E+01	5.33E+00	5.33E-03
1,4-dioxane	123-91-1	88.11	4.80E-06	4.89E-01	1.21E-03	8.90E-05	2.59E-01	9.56E-01	2.48E-01	2.48E-04
Trichloroethene	79-01-6	131.39	1.03E-02	4.28E-01	9.87E-04	9.82E-04	3.01E+01	1.05E+01	3.17E+02	3.17E-01
Vinyl Chloride	75-01-4	62.50	2.70E-02	5.49E-01	1.43E-03	1.43E-03	1.40E-01	1.53E+01	2.15E+00	2.15E-03

SOURCE: VDEQ, 2016. Table 3.8 Groundwater Less than or equal 15 feet Deep http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance.aspx

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site, Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Surface Soil and All Soil

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Resident (Hypothetical)	Former FWENC Facility[18]	Adult (18+ yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Soil	100	mg/day	(9.17)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(2)	BW*AT
					EF	Exposure Frequency	350	days/year	(9.17)	
					ED	Exposure Duration	20	years	(9,17)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(4)	
					BW	Body Weight	80	kg	(9,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 9)	
					AT-N	Averaging Time - Non-Cancer	7,300	days	(3, 9)	
			Child (0 to 6 yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Soil	200	mg/day	(9,17)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(2)	BW*AT
					EF	Exposure Frequency	350	days/year	(9,17)	
					ED	Exposure Duration	6	years	(9)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(4)	
					BW	Body Weight	15	kg	(9,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 9)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3, 9)	
	Commercial/Industrial Worker	Former FWENC Facility[18]	Adult (18+ yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Soil	50	mg/day	(17)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(2)	BW*AT
					EF	Exposure Frequency	250	days/year	(7.17)	
					ED	Exposure Duration	25	years	(7,17)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(4)	
					BW	Body Weight	80	kg	(7,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 7)	
					AT-N	Averaging Time - Non-Cancer	9,125	days	(3, 7)	
	Trespasser	Former FWENC Facility[18]	Adolescent (11-<16 yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Soil	50	mg/day	(11)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(2)	BW*AT
					EF	Exposure Frequency	100	days/year	(12)	
					ED	Exposure Duration	6	years	(12)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(4)	
					BW	Body Weight	56.8	kg	(13)	
					AT-C	Averaging Time - Cancer	25,550	days	(3)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3)	
	Former FWEC Facility User	Former FWENC Facility[18]	Adult (18+ yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Soil	100	mg/day	(7,17)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(2)	BW*AT
					EF	Exposure Frequency	52	days/year	(8)	
					ED	Exposure Duration	25	years	(7,17)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(4)	
					BW	Body Weight	80	kg	(7)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 7)	
					AT-N	Averaging Time - Non-Cancer	9,125	days	(3, 7)	
	Construction Worker /Utility Worker	Former FWENC Facility[18]	Adult (18+ yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Soil	330	mg/day	(1)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(2)	BW*AT
					EF	Exposure Frequency	250	days/year	(1)	
					ED	Exposure Duration	1	year	(1)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(4)	
					BW	Body Weight	80	kg	(1)	
					AT-C	Averaging Time - Cancer	25,550	days	(1,3)	
					AT-N	Averaging Time - Non-Cancer	365	days	(1,3)	
Dermal Absorption	Resident (Hypothetical)	Former FWENC Facility[18]	Adult (18+ yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(4)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	6,032	cm^2	(9,17)	BW*AT
					AF	Soil to Skin Adherence Factor	0.07	mg/cm^2-event	(9.17)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4-5	
					EV	Event Frequency	1	event/day	(5)	
					EF	Exposure Frequency	350	days/year	(9,17)	
					ED	Exposure Duration	20	years	(9,17)	
					BW	Body Weight	80	kg	(9,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 9)	
					AT-N	Averaging Time - Non-Cancer	7,300	days	(3, 9)	
			Child (0 to 6 yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(4)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	2,373	cm^2	(17)	BW*AT
					AF	Soil to Skin Adherence Factor	0.2	mg/cm^2-event	(9,17)	

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4-5	
					EV	Event Frequency	1	event/day	(5)	
					EF	Exposure Frequency	350	days/year	(9,17)	
					ED	Exposure Duration	6	years	(9,17)	
					BW	Body Weight	15	kg	(9,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 9)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3, 9)	
	Commercial/Industrial Worker	Former FWENC Facility[18]	Adult (18+ yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(4)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	3,527	cm^2	(7,17)	BW*AT
					AF	Soil to Skin Adherance Factor	0.12	mg/cm^2-event	(7,17)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4.5	
					EV	Event Frequency	1	event/day	(5)	
					EF	Exposure Frequency	250	days/year	(7,17)	
					ED	Exposure Duration	25	years	(7,17)	
					BW	Body Weight	80	kg	(7,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 7)	
					AT-N	Averaging Time - Non-Cancer	9,125	days	(3, 7)	
	Trespasser	Former FWENC Facility[18]	Adolescent (11-<16 yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(4)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	3,914	cm^2	(14)	BW*AT
					AF	Soil to Skin Adherance Factor	0.07	mg/cm^2-event	(15)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4.5	
					EV	Event Frequency	1	event/day	(5)	
					EF	Exposure Frequency	100	days/year	(12)	
					ED	Exposure Duration	6	years	(12)	
					BW	Body Weight	56.8	kg	(13)	
					AT-C	Averaging Time - Cancer	25,550	days	(3)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3)	
	Former FWEC Facility User	Former FWENC Facility[18]	Adult (18+ yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(4)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	3,527	cm^2	(7,17)	BW*AT
					AF	Soil to Skin Adherance Factor	0.12	mg/cm^2-event	(7,17)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4.5	
					EV	Event Frequency	1	event/day	(5)	
					EF	Exposure Frequency	52	days/year	(8)	
					ED	Exposure Duration	25	years	(7,17)	
					BW	Body Weight	80	kg	(7,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 7)	
					AT-N	Averaging Time - Non-Cancer	9,125	days	(3, 7)	
	Construction Worker /Utility Worker	Former FWENC Facility[18]	Adult (18+ yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(4)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	3,527	cm^2	(1)	BW*AT
					AF	Soil to Skin Adherence Factor	0.3	mg/cm^2-event	(1)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4.5	
					EV	Event Frequency	1	event/day	(5)	
					EF	Exposure Frequency	250	days/year	(1)	
					ED	Exposure Duration	1	year	(1)	
					BW	Body Weight	80	kg	(1)	
					AT-C	Averaging Time - Cancer	25,550	days	(1,3)	
					AT-N	Averaging Time - Non-Cancer	365	days	(1,3)	
Inhalation	Resident (Hypothetical)	Former FWENC Facility[18]	Adult (18+ yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		EC (mg/m^3) =
					PEF	Particulate Emission Factor	1.36E+09	m^3/kg	(9)	(CA)*ET*EF*ED
					VF	Volatilization Factor	Calculated	m^3/kg	See Table 4.5	AT*24
					CA	Chemical Concentration in Air	Calculated	mg/m^3	(6)	CA = CS/VF (for volatiles)
					ET	Exposure Time	24	hours/day	(9,17)	CA = CS/PEF (for particulates)
					EF	Exposure Frequency	350	days/year	(9,17)	
					ED	Exposure Duration	20	years	(9,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 9)	
					AT-N	Averaging Time - Non-Cancer	7,300	days	(3, 9)	
			Child (0 to 6 yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		EC (mg/m^3) =
					PEF	Particulate Emission Factor	1.36E+09	m^3/kg	(9)	(CA)*ET*EF*ED
					VF	Volatilization Factor	Calculated	m^3/kg	See Table 4.5	AT*24
					CA	Chemical Concentration in Air	Calculated	ug/m^3	(6)	CA = EPC/VF (for volatiles)
					ET	Exposure Time	24	hours/day	(9,17)	CA = EPC/PEF (for particulates)
					EF	Exposure Frequency	350	days/year	(9,17)	
					ED	Exposure Duration	6	years	(9,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 9)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3, 9)	
	Commercial/Industrial Worker	Former FWENC Facility[18]	Adult (18+ yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		EC (mg/m^3) =
					PEF	Particulate Emission Factor	1.36E+09	m^3/kg	(7)	(CA)*ET*EF*ED
					VF	Volatilization Factor	Calculated	m^3/kg	See Table 4.5	AT*24
					CA	Chemical Concentration in Air	Calculated	mg/m^3	(6)	CA = CS/VF (for volatiles)
					ET	Exposure Time	8	hours/day	(7,17)	CA = CS/PEF (for particulates)
					EF	Exposure Frequency	250	days/year	(7,17)	
					ED	Exposure Duration	25	years	(7,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 7)	
					AT-N	Averaging Time - Non-Cancer	9,125	days	(3, 7)	

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Trespasser	Former FWENC Facility[18]	Adolescent (11-<16 yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		EC (mg/m^3) =
					PEF	Particulate Emission Factor	1.36E+09	m^3/kg	(16)	(CA)*ET*EF*ED
					VF	Volatilization Factor	Calculated	m^3/kg	See Table 4.5	AT*24
					CA	Chemical Concentration in Air	Calculated	mg/m^3	(6)	CA = CS/VF (for volatiles)
					ET	Exposure Time	2	hours/day	(12)	CA = CS/PEF (for particulates)
					EF	Exposure Frequency	100	days/year	(12)	
					ED	Exposure Duration	6	years	(12)	
					AT-C	Averaging Time - Cancer	25,550	days	(3)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3)	
	Former FWEC Facility User	Former FWENC Facility[18]	Adult (18+ yrs)	Surface Soil (0-1ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		EC (mg/m^3) =
					PEF	Particulate Emission Factor	1.36E+09	m^3/kg	(7)	(CA)*ET*EF*ED
					VF	Volatilization Factor	Calculated	m^3/kg	See Table 4.5	AT*24
					CA	Chemical Concentration in Air	Calculated	mg/m^3	(6)	CA = CS/VF (for volatiles)
					ET	Exposure Time	2	hours/day	(8)	CA = CS/PEF (for particulates)
					EF	Exposure Frequency	52	days/year	(8)	
					ED	Exposure Duration	25	years	(7,17)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 7)	
					AT-N	Averaging Time - Non-Cancer	9,125	days	(3, 7)	
	Construction Worker /Utility Worker	Former FWENC Facility[18]	Adult (18+ yrs)	All Soil (0-15 ft)	CS	Chemical Concentration in Soil	See Tables 3.1-3.5	mg/kg		EC (mg/m^3) =
					PEF	Particulate Emission Factor	1.97E+07	m^3/kg	(1)	(CA)*ET*EF*ED
					VF	Volatilization Factor	Calculated	m^3/kg	See Table 4.5	AT*24
					CA	Chemical Concentration in Air	Calculated	mg/m^3	(6)	CA = CS/VF (for volatiles)
					ET	Exposure Time	8	hours/day	(1)	CA = CS/PEF (for particulates)
					EF	Exposure Frequency	250	days/year	(1)	
					ED	Exposure Duration	1	year	(1)	
					AT-C	Averaging Time - Cancer	25,550	days	(1,3)	
					AT-N	Averaging Time - Non-Cancer	365	days	(1,3)	

Footnotes:

(1) EPA, 2014. Regional Screening Level Calculator Values for the Construction Worker. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
(2) EPA, 1989. Risk Assessment Guidance for Superfund (RAGS): Vol I - Human Health Evaluation Manual (Part A), Section 6.6.2. Conservatively assumes all daily exposure is to contaminated soil.
(3) EPA, 1989. Value for non-carcinogenic effects is the ED converted to days, and the value for carcinogenic effects is based on a 70 year lifetime.
(4) Required for proper units conversion.
(5) Assumes 1 dermal exposure event per day.
(6) EPA, 2009. RAGS Part F Equations 6 and 8 for chronic or subchronic inhalation of volatiles.
(7) EPA, 2014. Regional Screening Level Calculator Values for the Composite Worker. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
(8) Site specific value that assumes a Former FWEC Facility User will be onsite 2 hours per day for 1 day per week to utilize the site for parking trailers.
(9) EPA, 2014. Regional Screening Level Calculator Values for the Child and Adult Resident. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
(10) EPA, 2014. USEPA Regional Screening Table Users' Guide, May. Section 4.6. Soil to skin adherence factor for the recreational child aged 6 to 16 assumed.
(11) EPA, 2011. Exposure Factors Handbook. Table 5-1, Summary of Recommended Values for Daily Soil, Dust and Soil + Dust Ingestion Soil Ingestion. Used general populaton central tendency value for 6 to <21 yea
(12) The site-specific assumption of trespassing for 2 hours per day for 100 days each year (i.e. approximately 3 days per week for 32 weeks (i.e. the 7 non-winter months of April through October)).
(13) EPA, 2011. Table 8-1, Recommended Values for Body Weight. Used mean for ages 11-16 years.
(14) EPA, 2011. Exposure Factors Handbook Table 7-2. Trespassers are assumed to have their face, forearms, hands, and lower legs exposed.
(15) EPA, 2014. USEPA Regional Screening Table Users' Guide, May. Section 4.6. Soil to skin adherence factor for the recreational child aged 6 to 16 assumed.
(16) EPA, 2014. USEPA Regional Screening Table User's Guide, May. Section 4.13.1
(17) EPA, 2014. USEPA Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors
(18) The Former FWENC Facility includes MIP1, MIP2, FSBA and EWA.

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site, Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Tap Water

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Former FWENC Facility	Adult	Tap Water	CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		CDI (mg/kg-day)* =
					IR-W	Ingestion Rate of Groundwater	2.5	L/day	(1)	CW*IR-W*EF*ED / BW*AT
					EF	Exposure Frequency	350	days/year	(1)	
					ED	Exposure Duration	20	years	(1)	* Same for vinyl chloride
		Affected Area			BW	Body Weight	80	kg	(1)	
					AT-C	Averaging Time-Cancer	25,550	days	(1,3)	
		Surrounding Industrial Properties			AT-N	Averaging Time-Noncancer	7,300	days	(1,3)	
			Child (0-6 yrs)	Tap Water	CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		CDI (mg/kg-day) =
					IR-W	Ingestion Rate of Groundwater	0.78	L/day	(1)	CW*IR-W*EF*ED / BW*AT
					EF	Exposure Frequency	350	days/year	(1)	
					ED	Exposure Duration	6	years	(1)	For vinyl chloride (9):
					BW	Body Weight	15	kg	(1)	CDI (mg/kg-day) =
					AT-C	Averaging Time-Cancer	25,550	days	(1,3)	CW*(IR-W/BW)*[((EF*ED)/AT) + 1]
					AT-N	Averaging Time-Noncancer	2,190	days	(1,3)	
	Commercial/ Industrial Worker	Former FWENC Facility	Adult (18+ yrs)	Tap Water	CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		CDI (mg/kg-day)* =
					IR-W	Ingestion Rate of Groundwater	1	L/day	(8)	CW*IR-W*EF*ED / BW*AT
					EF	Exposure Frequency	250	days/year	(8)	
		Affected Area			ED	Exposure Duration	25	years	(5)	* Same for vinyl chloride
					BW	Body Weight	80	kg	(5)	
		Surrounding Industrial Properties			AT-C	Averaging Time-Cancer	25,550	days	(3,5)	
					AT-N	Averaging Time-Noncancer	9,125	days	(3,5)	
	Construction Worker/Utility Worker	Former FWENC Facility	Adult (18+ yrs)	Groundwater in a Trench	CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		CDI (mg/kg-day)* =
					IR-W	Incidental Ingestion Rate of Groundwater	0.005	L/day	(7)	CW*IR-W*EF*ED / BW*AT
					EF	Exposure Frequency	10	days/year	(7)	
		Affected Area			ED	Exposure Duration	1	year	(4)	* Same for vinyl chloride
					BW	Body Weight	80	kg	(4)	
		Surrounding Industrial Properties			AT-C	Averaging Time-Cancer	25,550	days	(3,4)	
					AT-N	Averaging Time-Noncancer	365	days	(3,4)	
Dermal Absorption	Resident	Former FWENC Facility	Adult	Tap Water	DAevent	Absorbed dose per event	Calculated	mg/cm^2-event	See Table 4.6	DAD (mg/kg-day)*=
					CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		DAevent*EV*SA*EF*ED / BW*AT
					Kp	Permeability Constant	Chemical-Specific	cm/hr	See Table 4.5	
					τ−event	Lag time per event	Chemical-Specific	hours/event	See Table 4.5	* Same for vinyl chloride
		Affected Area			FA	Fraction Absorbed Water	Chemical-Specific	unitless	See Table 4.5	
					t-event	Event Duration	0.71	hours/event	(4,8)	where DAevent=
					τ*	Time to Reach Steady-State	Calculated	hour	2.4*τ-event	organic compounds:
		Surrounding Industrial Properties			B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	Calculated	unitless	Kp* √(MW) / 2.6	if tevent ≤ t* : CW*2*FA*Kp*CF2*√(6*τevent*tevent/π)
					MW	Molecular Weight	Chemical-Specific	g/mol	See Table 4.5	
					CF2	Conversion Factor 2	0.001	L/cm^3	(6)	if tevent > t*: CW*FA*Kp*CF2*[tevent/(1+B) + 2*τevent*(1+3B+3B^2)/(1+B)^2]
					EV	Event Frequency	1	events/day	(1)	
					SA	Skin Surface Area Available for Contact	20,900	cm^2	(1)	inorganic compounds:
					EF	Exposure Frequency	350	days/year	(1)	CW*Kp*CF2*tevent
					ED	Exposure Duration	20	years	(1)	
					BW	Body Weight	80	kg	(1)	
					AT-C	Averaging Time (Cancer)	25,550	days	(1,3)	
					AT-N	Averaging Time (Non-cancer)	7,300	days	(1,3)	
			Child (0-6 yrs)	Tap Water	DAevent	Absorbed dose per event	Calculated	mg/cm^2-event	See Table 4.6	DAD (mg/kg-day)=
					CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		DAevent*EV*SA*EF*ED / BW*AT
					Kp	Permeability Constant	Chemical-Specific	cm/hr	See Table 4.5	
					τ−event	Lag time per event	Chemical-Specific	hours/event	See Table 4.5	For vinyl chloride (9):
					FA	Fraction Absorbed Water	Chemical-Specific	unitless	See Table 4.5	DAevent * EV* [(SA*EF*ED)/(BW*AT) + (SA/BW)]
					t-event	Event Duration	0.54	hours/event	(4,8)	
					τ*	Time to Reach Steady-State	Calculated	hour	2.4*τ-event	
					B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	Calculated	unitless	Kp* √(MW) / 2.6	where DAevent=
					MW	Molecular Weight	Chemical-Specific	g/mol	See Table 4.5	organic compounds:
					CF2	Conversion Factor 2	0.001	L/cm^3	(6)	
					EV	Event Frequency	1	events/day	(1)	if tevent ≤ t* : CW*2*FA*Kp*CF2*√(6*τevent*tevent/π)
					SA	Skin Surface Area Available for Contact	6,378	cm^2	(1)	
					EF	Exposure Frequency	350	days/year	(1)	if tevent > t*: CW*FA*Kp*CF2*[tevent/(1+B) + 2*τevent*(1+3B+3B^2)/(1+B)^2]
					ED	Exposure Duration	6	years	(1)	
					BW	Body Weight	15	kg	(1)	inorganic compounds:
					AT-C	Averaging Time (Cancer)	25,550	days	(1,3)	CW*Kp*CF2*tevent
					AT-N	Averaging Time (Non-cancer)	2,190	days	(1,3)	

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption	Commercial/ Industrial Worker	Former FWENC Facility	Adult (18+ yrs)	Tap Water	DAevent	Absorbed dose per event	Calculated	mg/cm^2-event	See Table 4.6	DAD (mg/kg-day)*=
					CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		DAevent*EV*SA*EF*ED / BW*AT
					Kp	Permeability Constant	Chemical-Specific	cm/hr	See Table 4.5	
					τ−event	Lag time per event	Chemical-Specific	hours/event	See Table 4.5	* Same for vinyl chloride
		Affected Area			FA	Fraction Absorbed Water	Chemical-Specific	unitless	See Table 4.5	
					t-event	Event Duration	0.25	hours/event	(5)	where DAevent=
					τ*	Time to Reach Steady-State	Calculated	hour	2.4*τ-event	organic compounds:
		Surrounding Industrial Properties			B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	Calculated	unitless	Kp* √(MW) / 2.6	if tevent ≤ t* : CW*2*FA*Kp*CF2*√(6*τevent*tevent/π)
					MW	Molecular Weight	Chemical-Specific	g/mol	See Table 4.5	
					CF2	Conversion Factor 2	0.001	L/cm^3	(6)	if tevent > t*: CW*FA*Kp*CF2*[tevent/(1+B) + 2*τevent*(1+3B+3B^2)/(1+B)^2]
					EV	Event Frequency	1	events/day	(5)	
					SA	Skin Surface Area Available for Contact	2,220	cm^2	(5)	inorganic compounds:
					EF	Exposure Frequency	250	days/year	(5)	CW*Kp*CF2*tevent
					ED	Exposure Duration	25	years	(2,3)	
					BW	Body Weight	80	kg	(1,3)	
					AT-C	Averaging Time (Cancer)	25,550	days	(1,3)	
					AT-N	Averaging Time (Non-cancer)	9,125	days	(1,3)	
	Construction Worker/Utility Worker	Former FWENC Facility	Adult (18+ yrs)	Groundwater in a Trench	DAevent	Absorbed dose per event	Calculated	mg/cm^2-event	See Table 4.6	DAD (mg/kg-day)*=
					CW	Chemical Concentration in Groundwater	See Table 3.6-3.8	mg/L		DAevent*EV*SA*EF*ED / BW*AT
					Kp	Permeability Constant	Chemical-Specific	cm/hr	See Table 4.5	
					τ−event	Lag time per event	Chemical-Specific	hours/event	See Table 4.5	* Same for vinyl chloride
		Affected Area			FA	Fraction Absorbed Water	Chemical-Specific	unitless	See Table 4.5	
					t-event	Event Duration	4	hours/event	(7)	where DAevent=
					τ*	Time to Reach Steady-State	Calculated	hour	2.4*τ-event	organic compounds:
		Surrounding Industrial Properties			B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	Calculated	unitless	Kp* √(MW) / 2.6	if tevent ≤ t* : CW*2*FA*Kp*CF2*√(6*τevent*tevent/π)
					MW	Molecular Weight	Chemical-Specific	g/mol	See Table 4.5	
					CF2	Conversion Factor 2	0.001	L/cm^3	(6)	if tevent > t*: CW*FA*Kp*CF2*[tevent/(1+B) + 2*τevent*(1+3B+3B^2)/(1+B)^2]
					EV	Event Frequency	1	events/day	(7)	
					SA	Skin Surface Area Available for Contact	3,527	cm^2	(4,8)	inorganic compounds:
					EF	Exposure Frequency	10	days/year	(7)	CW*Kp*CF2*tevent
					ED	Exposure Duration	1	years	(4)	
					BW	Body Weight	80	kg	(1,4)	
					AT-C	Averaging Time (Cancer)	25,550	days	(3,4)	
					AT-N	Averaging Time (Non-cancer)	365	days	(3,4)	
Inhalation	Resident	Former FWENC Facility	Adult	Indoor Air while Showering	CA	Chemical Concentration in Air	Calculated	mg/m^3	Modeled	See Tables 3.12 to 3.14
					EV	Event Frequency	1	events/day	(5)	
					ET	Exposure Time	0.71	hours/event	(1)	EC (mg/m^3) =
		Affected Area			EF	Exposure Frequency	350	days/year	(1)	(CA)*EV*ET*EF*ED / AT*24
					ED	Exposure Duration	20	years	(1)	
		Surrounding Industrial Properties			AT-C	Averaging Time-Cancer	25,550	days	(1,3)	
					AT-N	Averaging Time-Noncancer	7,300	days	(1,3)	
	Construction Worker/Utility Worker	Former FWENC Facility	Adult (18+ yrs)	Groundwater in a Trench	CA	Chemical Concentration in Bathroom Air	Calculated	mg/m^3	Modeled	See Tables 3.15 to 3.17
					EV	Event Frequency	1	events/day	(7)	
					ET	Exposure Time	4	hours/event	(7)	EC (mg/m^3) =
		Affected Area			EF	Exposure Frequency	10	days/year	(7)	(CA)*EV*ET*EF*ED / AT*24
					ED	Exposure Duration	1	years	(4)	
					AT-C	Averaging Time-Cancer	25,550	days	(3,4)	
					AT-N	Averaging Time-Noncancer	365	days	(3,4)	

Footnotes:

(1) EPA, 2014. USEPA Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors

(2) EPA, 2014. Regional Screening Level Calculator Values for the Composite Worker. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

(3) EPA, 1989. Value for non-carcinogenic effects is based on the ED (rounded up to one full year) and the value for carcinogenic effects is based on a 70 year lifetime.

(4) EPA, 2015. Regional Screening Level Calculator Values for the Construction Worker. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

(5) Site-specific scenario for incidental ingestion, dermal absorption and inhalation exposure to contaminants in tap water used in work place. Values for event duration (15 minute per event) based on professional judgement. Surface area of exposed skin equal the average suface area of adult male and adult female forearms and hands from Table 7-2 of EPA 2011. Surface area of exposed skin equal the average surface area of forearms and hands for children ages 0-6 years from Table 7-2 of EPA 2011.

(6) Required for proper units conversion.

(7) Incidental ingestion rate for construction worker / utility worker is assumed to be 0.005 liters/day (approximately 1 teaspoon per day). Site-specific scenario for dermal and inhalation exposure to contaminants in groundwater in a trench during construction.Values for frequency (10 days per year) and duration (4 hours per event) based on professional judgement. See text.

(8) EPA recommends an IR of 1 L/day and an EF of 250 days/year for the Commercial/Industrial Worker. This Reasonable Maximum Exposure (RME) scenario represents a future worker who has access to water (water fountains, bathroom, lunch area, water cooler, irrigation water) within a building or structure during work hours.

(9) The CDI and DAD equations for vinyl chloride are those used in the calculation of the USEPA RSLs and only apply to the cancer endpoint. They include the sum of the prorated and unprorated terms for the child and just the prorated (conventional) term for the adult.

TABLE 4.3
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
FWEC/Church Road TCE Site, Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Sediment

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Resident (Hypothetical)	Former FWENC Facility	Adult	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9 or 3.10	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Sediment	20	mg/day	(5)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(4)	BW*AT
					EF	Exposure Frequency	12	days/year	(14)	
					ED	Exposure Duration	20	years	(1)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(2)	
					BW	Body Weight	80	kg	(1)	
					AT-C	Averaging Time - Cancer	25,550	days	(1, 3)	
					AT-N	Averaging Time - Non-Cancer	7,300	days	(1, 3)	
			Child (0 to 6 yrs)	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9-3.10	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Sediment	50	mg/day	(5)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(4)	BW*AT
					EF	Exposure Frequency	12	days/year	(14)	
					ED	Exposure Duration	6	years	(1)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(2)	
					BW	Body Weight	15	kg	(1)	
					AT-C	Averaging Time - Cancer	25,550	days	(1, 3)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(1, 3)	
	Trespasser/Visitor	Former FWENC Facility Watering Run	Adolescent (11-<16 yrs)	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9-3.10	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Sediment	50	mg/day	(5)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(4)	BW*AT
					EF	Exposure Frequency	12	days/year	(6)	
					ED	Exposure Duration	6	years	(6)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(2)	
					BW	Body Weight	56.8	kg	(7)	
					AT-C	Averaging Time - Cancer	25,550	days	(3)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3)	
	Construction Worker	Former FWENC Facility Watering Run	Adult (18+ yrs)	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9-3.10	mg/kg		CDI (mg/kg-day) =
					IR-S	Ingestion Rate of Sediment	330	mg/day	(10)	CS*IR-S*FI*EF*ED*CF1
					FI	Fraction Ingested	1	unitless	(4)	BW*AT
					EF	Exposure Frequency	250	days/year	(10)	
					ED	Exposure Duration	1	year	(10)	
					CF1	Conversion Factor 1	1.00E-06	kg/mg	(2)	
					BW	Body Weight	80	kg	(10)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 10)	
					AT-N	Averaging Time - Non-Cancer	365	days	(3, 10)	
Dermal Absorption	Resident (Hypothetical)	Former FWENC Facility	Adult	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9-3.10	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(2)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	6,032	cm^2	(15, 16)	BW*AT
					AF	Soil to Skin Adherence Factor	0.07	mg/cm^2-event	(1)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4-4	
					EV	Event Frequency	1	event/day	(8)	
					EF	Exposure Frequency	12	days/year	(14)	
					ED	Exposure Duration	20	years	(1)	
					BW	Body Weight	80	kg	(1)	
					AT-C	Averaging Time - Cancer	25,550	days	(1, 3)	
					AT-N	Averaging Time - Non-Cancer	7,300	days	(1, 3)	
			Child (0 to 6 yrs)	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9-3.10	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(2)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	2,373	cm^2	(16)	BW*AT
					AF	Soil to Skin Adherence Factor	0.2	mg/cm^2-event	(1)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4-4	
					EV	Event Frequency	1	event/day	(8)	
					EF	Exposure Frequency	12	days/year	(14)	
					ED	Exposure Duration	6	years	(1)	
					BW	Body Weight	15	kg	(1)	
					AT-C	Averaging Time - Cancer	25,550	days	(1, 3)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(1, 3)	
	Trespasser/Visitor	Former FWENC Facility Watering Run	Adolescent (11-<16 yrs)	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9-3.10	mg/kg		DAD (mg/kg-day)=
					CF	Conversion Factor	1.00E-06	kg/mg	(2)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	3,914	cm^2	(9)	BW*AT
					AF	Soil to Skin Adherance Factor	0.07	mg/cm^2-event	(11)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4.4	
					EV	Event Frequency	1	event/day	(8)	
					EF	Exposure Frequency	12	days/year	(6)	
					ED	Exposure Duration	6	years	(6)	
					BW	Body Weight	56.8	kg	(7)	
					AT-C	Averaging Time - Cancer	25,550	days	(3)	
					AT-N	Averaging Time - Non-Cancer	2,190	days	(3)	

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption	Construction Worker		Adult	Sediment	CS	Chemical Concentration in Sediment	See Table 3.9-3.10	mg/kg		DAD (mg/kg-day)=
		Former FWENC Facility	(18+ yrs)		CF	Conversion Factor	1.00E-06	kg/mg	(2)	CS*CF*SA*AF*ABS-d*EV*EF*ED
					SA	Skin Surface Area Available for Contact	3,527	cm^2	(15)	BW*AT
		Watering Run			AF	Soil to Skin Adherence Factor	0.3	mg/cm^2-event	(10)	
					ABS-d	Dermal Absorption Factor	Chemical-Specific	unitless	See Table 4.4	
					EV	Event Frequency	1	event/day	(8)	
					EF	Exposure Frequency	250	days/year	(10)	
					ED	Exposure Duration	1	year	(10)	
					BW	Body Weight	80	kg	(10)	
					AT-C	Averaging Time - Cancer	25,550	days	(3, 10)	
					AT-N	Averaging Time - Non-Cancer	365	days	(3, 10)	

Footnotes:

(1) EPA, 2014. Regional Screening Level Calculator Values for the Child and Adult Resident. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

(2) Required for proper units conversion.

(3) EPA, 1989. Value for non-carcinogenic effects is based on the ED (rounded up to one full year) and the value for carcinogenic effects is based on a 70 year lifetime.

(4) EPA, 1989. Risk Assessment Guidance for Superfund (RAGS): Vol I - Human Health Evaluation Manual (Part A), Section 6.6.2. Conservatively assumes all daily exposure is to contaminated sediment.

(5) EPA, 2011. Exposure Factors Handbook. Table 5-1, Summary of Recommended Values for Daily Soil, Dust and Soil + Dust Ingestion Soil Ingestion. Used mean for general population Soil Only for age groups 1 to <6 years, 6 to <21 years, and adults.

(6) The site-specific assumption of trespasser exposure to sediment for 2 hours per day for 12 days each year is based data presented in Table 16-19 of EPA, 2011 or time spent in "Pool, River, or Lake." Average time spent per day for "doers" is 121 minutes per day (i.e., 2 hours) and the average time spent per day for the general population is 4 minutes per day. At 12 events per year and 2 hours per event, the average time spent per day is 4 minutes.

(7) EPA, 2011. Table 8-1, Recommended Values for Body Weight. Used mean for ages 11-16 years.

(8) Assumes 1 dermal exposure event per day

(9) EPA, 2011. Exposure Factors Handbook Table 7-2. Trespassers are assumed to have their face, forearms, hands, and lower legs exposed.

(10) EPA, 2014. Regional Screening Level Calculator Values for the Construction Worker. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

(11) EPA, 2014. USEPA Regional Screening Table Users' Guide, May. Section 4.6. Soil/sediment to skin adherence factor for the recreational child aged 6 to 16 assumed.

(12) EPA, 2014. Section 4.13.1

(14) The site-specific assumption of residential exposure to sediment for 2 hours per day for 12 days each year is based data presented in Table 16-19 of EPA, 2011 or time spent in "Pool, River, or Lake." Average time spent per day for "doers" is 121 minutes per day (i.e., 2 hours) and the average time spent per day for the general population is 4 minutes per day. At 12 events per year and 2 hours per event, the average time spent per day is 4 minutes.

(15) USEPA, 2014. Regional Screening Level Calculator Values for the Child and Adult Recreator. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search.

(16) EPA, 2014. USEPA Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site, Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe	Current/Future
Medium:	Air (Vapor Intrusion)
Exposure Medium:	Indoor Air

Exposure Route	Receptor Population	Exposure Area	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Commercial/ Industrial Worker	Former FWENC Facility	Adult (18+ yrs)	Indoor Air	CA	Chemical Concentration in Indoor Air	Calculated	mg/m^3	See Table 3.11	EC (mg/m^3) =
					ET_{IA}	Exposure Time	8	hours/day	(1)	(CA)*ET*EF*ED
					EF	Exposure Frequency	250	days/year	(1)	AT*24
		Affected Area			ED	Exposure Duration	25	years	(1)	
					AT-C	Averaging Time-Cancer	25,550	days	(1,3)	
					AT-N	Averaging Time-Noncancer	9,125	days	(1,3)	
	Resident	Former FWENC Facility	Adult (18+ yrs)	Indoor Air	CA	Chemical Concentration in Indoor Air	Calculated	mg/m^3	See Table 3.11	EC (mg/m^3) =
					ET_{IA}	Exposure Time	24	hours/day	(2)	(CA)*ET*EF*ED
					EF	Exposure Frequency	350	days/year	(2)	AT*24
		Affected Area			ED	Exposure Duration	20	years	(2)	
					AT-C	Averaging Time-Cancer	25,550	days	(2,3)	
					AT-N	Averaging Time-Noncancer	7,300	days	(2,3)	
			Child (0-6 yrs)	Indoor Air	CA	Chemical Concentration in Indorr Air	Calculated	mg/m^3	See Table 3.11	EC (mg/m^3) =
					ET_{IA}	Exposure Time	24	hours/day	(2)	(CA)*EV*ET*EF*ED
					EF	Exposure Frequency	350	days/year	(2)	AT*24
					ED	Exposure Duration	6	years	(2)	
					AT-C	Averaging Time-Cancer	25,550	days	(2,3)	
					AT-N	Averaging Time (Non-cancer)	2,190	days	(2,3)	

Footnotes:

(1) EPA, 2014. Regional Screening Level Calculator Values for the Composite Worker. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

(2) EPA, 2014. Regional Screening Level Calculator Values for the Child and Adult Resident. Accessed July, 2014. http://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

(3) EPA, 1989. Value for non-carcinogenic effects is based on the ED (rounded up to one full year) and the value for carcinogenic effects is based on a 70 year lifetime.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

Chemical-Specific Properties of COPCs

FWEC/Church Road TCE Site, Mountain Top, Luzerne County, Pennsylvania

COPC	Gastrointestinal Absorption Efficiency (%) [a]	Dermal Permeability Coefficient Kp (cm/hr) [a]	Molecular Weight (g/mol) [a]	Permeabiity through Stratum Corneaum B (unitless) [a]	Time to Reach Steady-State t* (hr) [a]	Lag Time Per Event τevent (hr/event) [a]	Fraction Absorbed FA (unitless) [a]	Fraction of Contaminant Absorbed Dermally from Soil (unitless) [a, b]
1,1,1-Trichloroethane	1	0.0126	133.41	0.056	1.41	0.587	1	0.0005
1,1,2,2-Tetrachloroethane	1	0.00694	167.85	0.035	2.20	0.916	1	0.0005
1,1,2-Trichloroethane	1	0.00504	133.41	0.022	1.4	0.587	1	0.0005
1,1-Dichloroethane	1	0.00675	98.96	0.026	0.9	0.377	1	0.0005
1,1-Dichloroethene	1	0.0117	96.94	0.044	0.88	0.367	1	0.0005
1,2,4-Trichlorobenzene	1	0.0705	181.45	0.365	2.62	1.091	1	0.1
1,2-Dichloroethane	1	0.0042	98.96	0.016	0.90	0.377	1	0.0005
1,4-Dioxane	1	0.000	88.11	0.001	0.79	0.328	1	0.1
Acetone	1	0.000512	58.08	0.002	0.53	0.222	1	0.0005
Acrolein	1	0.000748	56.06	0.002	0.52	0.217	1	0.0005
Aluminum	1	0.001	26.982	0.002	0.36	0.149	1	0.01
Arsenic	1	0.001	74.922	0.003	0.66	0.276	1	0.03
Barium	0.07	0.001	137.33	0.005	1.48	0.618	1	0.01
Benzene	1	0.0149	78.11	0.051	0.69	0.288	1	0.0005
Benzo[a]anthracene	1	0.552	228.3	3.208	8.48	1.997	1	0.13
Benzo[a]pyrene	1	0.713	252.32	4.356	11.82	2.722	1	0.13
Benzo[b]fluoranthene	1	0.417	252.32	2.548	11.34	2.722	1	0.13
Benzo[k]fluoranthene	1	0.691	252.32	4.222	11.80	2.722	0.9	0.13
Bis(2-ethylhexyl)phthalate	1	1.13	390.57	8.589	72.88	16.182	0.8	0.1
Bromodichloromethane	1	0.00402	163.83	0.020	2.09	0.870	1	0.0005
Cadmium	0.025	0.001	112.41	0.004	1.08	0.448	1	0.001
Carbon tetrachloride	1	0.0163	153.82	0.078	1.83	0.764	1	0.0005
Chloroform	1	0.00683	119.38	0.029	1.18	0.490	1	0.0005
Chromium VI	0.025	0.002	52	0.006	0.49	0.206	1	0.001
cis-1,2-Dichloroethene	1	0.011	96.94	0.042	0.88	0.367	1	0.0005
Cobalt	1	0.0004	58.93	0.001	0.54	0.225	1	0.01
Copper	1	0.001	63.55	0.003	0.57	0.239	1	0.01
Cyanide	1	0.001	26.0174	0.002	0.35	0.147	1	0.01
Dibenz(a,h)anthracene	1	0.953	278.36	6.115	16.88	3.808	0.6	0.13
Ethylbenzene	1	0.0493	106.17	0.195	0.99	0.413	1	0.03
Formaldehyde	1	0.00182	30.03	0.004	0.37	0.155	1	0.0005
Indeno[1,2,3-cd]pyrene	1	1.24	276.34	7.928	16.65	3.710	0.6	0.13
Iron	1	0.001	55.85	0.003	0.52	0.216	1	0.01
Lead	1	0.0001	207.2	0.001	3.65	1.521	1	0.01
Manganese	0.04	0.001	54.94	0.003	0.51	0.214	1	0.01
Mercury	1	0.001	200.59	0.005	3.35	1.397	1	0.01
Naphthalene	1	0.0466	128.18	0.203	1.32	0.549	1	0.13
Nickel	0.04	0.0002	58.69	0.001	0.54	0.224	1	0.01
Tetrachloroethene	1	0.0334	165.83	0.165	2.14	0.892	1	0.03
Thallium	1	0.001	204.38	0.005	3.52	1.467	1	0.01
Toluene	1	0.0311	92.14	0.115	0.83	0.345	1	0.03
Trichloroethene	1	0.0116	131.39	0.051	1.37	0.572	1	0.0005
Vinyl chloride	1	0.00838	62.5	0.025	0.57	0.235	1	0.0005
Xylenes, Total	1	0.05	106.17	0.198	0.992	0.413	1	0.03

Notes:

(a) USEPA, 2015. Regional Screening Levels - Generic Tables, Chemical Specific Paramaters. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/ Generic_Tables/docs/params_sl_table_run_JUNE2015.pdf.

(b) USEPA, 1995, Mid-Atlantic Risk Assessment - Technical Guidnace Manual - Assessing Dermal Contact with Soil; Existing Guidance. Although USEPA, 2004 indicates VOCs would tend to be volatilized from the soil on skin and should be accounted for via inhalation routes in the combined exposure pathway analysis, the default values recommended in Region 3 guidance were assumed.

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

Dermally Absorbed Dose from Water Contact

FWEC/Church Road TCE Site, Mountain Top, Luzerne County, Pennsylvania

COPC	Unit Concentration in Water (mg/L)	Time to Reach Steady-State t* (hr)	Commercial Use		Domestic Use - Child		Domestic Use - Adult		Trenching Construction / Utility Worker	
			Event Duration tevent (hr/event)	Absorbed dose per event per ug/L DAevent (mg/cm^2-event)	Event Duration tevent (hr/event)	Absorbed dose per event per ug/L DAevent (mg/cm^2-event)	Event Duration tevent (hr/event)	Absorbed dose per event per ug/L DAevent (mg/cm^2-event)	Event Duration tevent (hr/event)	Absorbed dose per event per ug/L DAevent (mg/cm^2-event)
1,1,1-Trichloroethane	1.0E+00	1.41	0.25	1.33E-02	0.54	1.96E-02	0.71	2.25E-02	4.00	6.34E-02
1,1,2,2-Tetrachloroethane	1.0E+00	2.20	0.25	9.18E-03	0.54	1.35E-02	0.71	1.55E-02	4.00	4.00E-02
1,1,2-Trichloroethane	1.0E+00	1.4	0.25	5.34E-03	0.54	7.85E-03	0.71	9.00E-03	4.00	2.58E-02
1,1-Dichloroethane	1.0E+00	0.9	0.25	5.73E-03	0.54	8.41E-03	0.71	9.65E-03	4.00	3.15E-02
1,1-Dichloroethene	1.0E+00	0.88	0.25	9.80E-03	0.54	1.44E-02	0.71	1.65E-02	4.00	5.38E-02
1,2,4-Trichlorobenzene	1.0E+00	2.62	0.25	1.02E-01	0.54	1.50E-01	0.71	1.72E-01	4.00	4.13E-01
1,2-Dichloroethane	1.0E+00	0.90	0.25	3.56E-03	0.54	5.24E-03	0.71	6.00E-03	4.00	1.97E-02
1,4-Dioxane	1.0E+00	0.8	0.25	2.63E-04	0.54	3.86E-04	0.71	4.43E-04	4.00	1.54E-03
Acetone	1.0E+00	0.53	0.25	3.34E-04	0.54	5.04E-04	0.71	5.91E-04	4.00	2.27E-03
Acrolein	1.0E+00	0.52	0.25	4.81E-04	0.54	7.28E-04	0.71	8.55E-04	4.00	3.31E-03
Aluminum	1.0E+00	0.36	0.25	5.33E-04	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Arsenic	1.0E+00	0.66	0.25	7.26E-04	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Barium	1.0E+00	1.48	0.25	1.09E-03	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Benzene	1.0E+00	0.69	0.25	1.10E-02	0.54	1.62E-02	0.71	1.91E-02	4.00	6.57E-02
Benzo[a]anthracene	1.0E+00	8.48	0.25	1.08E+00	0.54	Not in EPD	0.71	Not in EPD	4.00	Not in EPD
Benzo[a]pyrene	1.0E+00	11.82	0.25	1.63E+00	0.54	Not in EPD	0.71	Not in EPD	4.00	Not in EPD
Benzo[b]fluoranthene	1.0E+00	11.34	0.25	9.51E-01	0.54	Not in EPD	0.71	Not in EPD	4.00	Not in EPD
Benzo[k]fluoranthene	1.0E+00	11.80	0.25	1.42E+00	0.54	Not in EPD	0.71	Not in EPD	4.00	Not in EPD
Bis(2-ethylhexyl)phthalate	1.0E+00	72.88	0.25	5.03E+00	0.54	Not in EPD	0.71	Not in EPD	4.00	Not in EPD
Bromodichloromethane	1.0E+00	2.09	0.25	5.18E-03	0.54	7.61E-03	0.71	8.73E-03	4.00	2.29E-02
Cadmium	1.0E+00	1.08	0.25	9.25E-04	0.54	1.44E-03	0.71	1.61E-03	4.00	4.88E-03
Carbon tetrachloride	1.0E+00	1.83	0.25	1.97E-02	0.54	2.89E-02	0.71	3.32E-02	4.00	8.73E-02
Chloroform	1.0E+00	1.18	0.25	6.61E-03	0.54	9.71E-03	0.71	1.11E-02	4.00	3.34E-02
Chromium VI	1.0E+00	0.49	0.25	1.25E-03	0.54	1.90E-03	0.71	2.24E-03	4.00	8.78E-03
cis-1,2-Dichloroethene	1.0E+00	0.88	0.25	9.21E-03	0.54	1.35E-02	0.71	1.55E-02	4.00	5.07E-02
Cobalt	1.0E+00	0.54	0.25	2.62E-04	0.54	2.16E-04	0.71	2.84E-04	4.00	1.60E-03
Copper	1.0E+00	0.57	0.25	6.75E-04	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Cyanide	1.0E+00	0.35	0.25	5.30E-04	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Dibenz(a,h)anthracene	1.0E+00	16.88	0.25	1.54E+00	0.54	Not in EPD	0.71	Not in EPD	4.00	Not in EPD
Ethylbenzene	1.0E+00	0.99	0.25	4.38E-02	0.54	6.44E-02	0.71	7.38E-02	4.00	2.13E-01
Formaldehyde	1.0E+00	0.37	0.25	9.90E-04	0.54	1.54E-03	0.71	1.85E-03	4.00	7.82E-03
Indeno[1,2,3-cd]pyrene	1.0E+00	16.65	0.25	1.98E+00	0.54	Not in EPD	0.71	Not in EPD	4.00	Not in EPD
Iron	1.0E+00	0.52	0.25	6.42E-04	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Lead	1.0E+00	3.65	0.25	1.70E-04	0.54	5.40E-05	0.71	7.10E-05	4.00	4.00E-04
Manganese	1.0E+00	0.51	0.25	6.39E-04	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Mercury	1.0E+00	3.35	0.25	1.63E-03	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Naphthalene	1.0E+00	1.32	0.25	4.77E-02	0.54	7.01E-02	0.71	8.04E-02	4.00	2.16E-01
Nickel	1.0E+00	0.54	0.25	1.31E-04	0.54	1.08E-04	0.71	1.42E-04	4.00	8.00E-04
Tetrachloroethene	1.0E+00	2.14	0.25	4.36E-02	0.54	6.41E-02	0.71	7.35E-02	4.00	1.84E-01
Thallium	1.0E+00	3.52	0.25	1.67E-03	0.54	5.40E-04	0.71	7.10E-04	4.00	4.00E-03
Toluene	1.0E+00	0.83	0.25	2.52E-02	0.54	3.71E-02	0.71	4.25E-02	4.00	1.35E-01
Trichloroethene	1.0E+00	1.37	0.25	1.21E-02	0.54	1.78E-02	0.71	2.04E-02	4.00	5.81E-02
Vinyl chloride	1.0E+00	0.57	0.25	5.62E-03	0.54	8.26E-03	0.71	9.85E-03	4.00	3.67E-02
Xylenes, Total	1.0E+00	0.99	0.25	4.44E-02	0.54	6.53E-02	0.71	7.49E-02	4.00	2.16E-01

Notes:

DAevent calculated using the following equations:

For organic compounds, if tevent<t*: $DAevent = Cgw*2*FA*Kp*(6*\tau event*tevent/pi)^{1/2}$

if tevent>t*: $DAevent = Cgw*FA*Kp*[tevent/(1+B) + 2*\tau event*(1+3B+3B^2)/(1+B)^2]$

For inorganic compounds: $DAevent = Cgw*Kp*tevent$

For unit concentration shown, DAevent is the dose absorbed cm^2 of exposed skin per mg/L of the COPC.

EPD = effective predictive domain of methodology used to predict dermal absorption.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

Chemical-Specific Volatilization Factor

FWEC/Church Road TCE Site, Mountain Top, Luzerne County, Pennsylvania

COPC	Molecular Weight (g/mol) [a]	Henry's Law Constant H' (dimesionless)	Diffusivity in Air D_{ia} (cm^2/s)	Diffusivity in Water D_w (cm^2/s)	Soil-Water Partition Coefficient K_d (cm^3/g)	Soil Organic Carbon Coefficient (cm^3/g)	Apparent Diffusivity D_A (cm^2/s)	Factor Volatilization from Surface Soil VF (m^3/kg)
1,1,1-Trichloroethane	133.41	7.03E-01	6.48E-02	9.60E-06		43.89	4.89E-03	2.13E+03
1,1,2,2-Tetrachloroethane	167.85	1.50E-02	4.89E-02	9.29E-06		94.94	5.82E-05	1.95E+04
1,1,2-Trichloroethane	133.41	3.37E-02	6.69E-02	1.00E-05		60.7	2.55E-04	9.33E+03
1,1-Dichloroethane	98.96	2.30E-01	8.36E-02	1.06E-05		31.82	3.06E-03	2.69E+03
1,1-Dichloroethene	96.94	1.07E+00	8.63E-02	1.10E-05		31.82	9.96E-03	1.49E+03
1,2,4-Trichlorobenzene	181.45	5.81E-02	3.96E-02	8.40E-06		1356	1.49E-05	3.87E+04
1,2-Dichloroethane	98.96	4.82E-02	8.57E-02	1.10E-05		39.6	6.36E-04	5.91E+03
1,4-Dioxane	88.11	1.96E-04	8.74E-02	1.05E-05		2.633	8.46E-06	5.13E+04
Acetone	58.08	1.43E-03	1.06E-01	1.15E-05		2.364	7.12E-05	1.77E+04
Acrolein	56.06	4.99E-03	1.12E-01	1.22E-05		1	2.78E-04	8.94E+03
Aluminum	26.982				1500		Not Volatile	Not Volatile
Arsenic	74.922				29		Not Volatile	Not Volatile
Barium	137.33				41		Not Volatile	Not Volatile
Benzene	78.11	2.27E-01	8.95E-02	1.03E-05		145.8	1.06E-03	4.57E+03
Benzo[a]anthracene	228.3	4.91E-04	2.61E-02	6.75E-06		176900	Not Volatile	Not Volatile
Benzo[a]pyrene	252.32	1.87E-05	4.76E-02	5.56E-06		587400	Not Volatile	Not Volatile
Benzo[b]fluoranthene	252.32	2.69E-05	4.76E-02	5.56E-06		599400	Not Volatile	Not Volatile
Benzo[k]fluoranthene	252.32	2.39E-05	4.76E-02	5.56E-06		587400	Not Volatile	Not Volatile
Bis(2-ethylhexyl)phthalate	390.57	1.10E-05	1.73E-02	4.18E-06		119600	Not Volatile	Not Volatile
Bromodichloromethane	163.83	8.67E-02	5.63E-02	1.07E-05		31.82	8.46E-04	5.13E+03
Cadmium	112.41				75		Not Volatile	Not Volatile
Carbon tetrachloride	153.82	1.13E+00	5.71E-02	9.78E-06		43.89	5.96E-03	1.93E+03
Chloroform	119.38	1.50E-01	7.69E-02	1.09E-05		31.82	1.93E-03	3.40E+03
Chromium	52				19		Not Volatile	Not Volatile
Chromium VI	52				19		Not Volatile	Not Volatile
cis-1,2-Dichloroethene	96.94	1.67E-01	8.84E-02	1.13E-05		39.6	2.13E-03	3.23E+03
Cobalt	58.93				45		Not Volatile	Not Volatile
Copper	63.55				35		Not Volatile	Not Volatile
Cyanide	26.0174	9.89E-01	2.11E-01	2.46E-05	9.9		1.09E-03	4.51E+03
Dibenz(a,h)anthracene	278.36	5.76E-06	4.46E-02	5.21E-06		1912000	Not Volatile	Not Volatile
Ethylbenzene	106.17	3.22E-01	6.85E-02	8.46E-06		446.1	4.14E-04	7.33E+03
Formaldehyde	30.03	1.38E-05	1.67E-01	1.74E-05		1	Not Volatile	Not Volatile
Indeno[1,2,3-cd]pyrene	276.34	1.42E-05	4.48E-02	5.23E-06		1951000	Not Volatile	Not Volatile
Iron	55.85				25		Not Volatile	Not Volatile
Lead	207.2				900		Not Volatile	Not Volatile
Manganese	54.94				65		Not Volatile	Not Volatile
Mercury	200.59	4.67E-01	3.07E-02	6.30E-06	52		1.46E-05	3.90E+04
Naphthalene	128.18	1.80E-02	6.05E-02	8.38E-06		1544	6.20E-06	5.99E+04
Nickel	58.69				65		Not Volatile	Not Volatile
Tetrachloroethene	165.83	7.24E-01	5.05E-02	9.46E-06		94.94	2.41E-03	3.04E+03
Thallium	204.38				71		Not Volatile	Not Volatile
Toluene	92.14	2.71E-01	7.78E-02	9.20E-06		233.9	7.24E-04	5.54E+03
Trichloroethene	131.39	4.03E-01	6.87E-02	1.02E-05		60.7	2.73E-03	2.86E+03
Vinyl chloride	62.5	1.14E+00	1.07E-01	1.20E-05		21.73	1.46E-02	1.24E+03
Xylenes, Total	106.17	2.12E-01	6.85E-02	8.46E-06		382.9	3.17E-04	8.37E+03

Notes:

(a) USEPA, 2015. Regional Screening Levels - Generic Tables, Chemical Specific Paramaters. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/ Generic_Tables/docs/params_sl_table_run_JUNE2015.pdf. COPCs with a molecular weight greater than 200 or a Henry's Law constant of 4.2E-4 (dimesionless) are considered "Not Volatile" with the exception of 1,4-Dioxane.

Volatilization Factor calcuated as:

$$VF = \frac{Q/C_{vol} * (3.14 * D_A * T)^{1/2} * 10^{-4} (m^2/cm^2)}{(2 * \rho_B * D_A)}$$

where Q/Cvol = 81.9 and T=9.5E8 seconds and:

$$D_A = \frac{\left[\left(\theta_A^{10/3} D_{ia} H' + \theta_W^{10/3} D_W\right)/n^2\right]}{\rho_b K_d + \theta_w + \theta_A H'}$$

$\rho_B = 1.5 \frac{g}{cm^3}$

$f_{oc} = 0.006\ g/g$

$\theta_W = 0.15\ L_{water}/L_{soil}$

$\theta_a = n - \theta_w = 0.284$

$n = 1 - \left(\rho_B/\rho_s\right) = 0.434$

For organics: $K_d = K_{oc} * f_{oc}\ (chemical\ specific)$

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Mountain Top, Luzerne County, Pennsylvania

Chemical of Potential Concern	Oral RfD			Oral Absorption Efficiency for Dermal (1) (3) (4)	Absorbed RfD for Dermal (2)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
	Chronic	Subchronic	Units		Value	Units			Source(s)	Date(s) (MM/YYYY)
Formaldehyde	2.0E-01	3.0E-01	mg/kg-day	1	2.0E-01	mg/kg-day	Urinary, Gastrointestinal	100	IRIS	May-2016
Cyanide	6.0E-04	2.0E-02	mg/kg-day	1	6.0E-04	mg/kg-day	Reproductive	3000	IRIS	Jun-2015
Aluminum	1.0E+00	1.0E+00	mg/kg-day	1	1.0E+00	mg/kg-day	CNS	300	PPRTV	Jun-2015
Arsenic	3.0E-04	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	Skin	3	IRIS	Jun-2015
Barium	2.0E-01	2.0E-01	mg/kg-day	0.07	1.4E-02	mg/kg-day	Kidney	300	IRIS	Jun-2015
Cadmium	1.0E-03	1.0E-03	mg/kg-day	0.025	2.5E-05	mg/kg-day	Urinary	10	IRIS	May-2016
Chromium VI	3.0E-03	5.0E-03	mg/kg-day	0.025	7.5E-05	mg/kg-day	Gastrointestinal	300	IRIS	May-2016
Cobalt	3.0E-04	3.0E-03	mg/kg-day	1	3.0E-04	mg/kg-day	Blood	-	PPRTV	Jun-2015
Copper	4.0E-02	1.0E-02	mg/kg-day	1	4.0E-02	mg/kg-day	No data	-	HEAST	Jun-2015
Iron	7.0E-01	7.0E-01	mg/kg-day	1	7.0E-01	mg/kg-day	Stomach	1.5	PPRTV	Jun-2015
Lead		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Manganese	2.4E-02	2.4E-02	mg/kg-day	0.04	9.6E-04	mg/kg-day	CNS	1	RSL User Guide	Jun-2015
Mercury		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Nickel	2.0E-02	2.0E-02	mg/kg-day	0.04	8.0E-04	mg/kg-day	Growth	300	IRIS	Jun-2015
Thallium	1.0E-05	4.0E-05	mg/kg-day	1	1.0E-05	mg/kg-day	No data	-	Appendix PPRTV	Jun-2015
Benzo[a]anthracene		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Benzo[a]pyrene		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Benzo[b]fluoranthene		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Benzo[k]fluoranthene		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Bis(2-ethylhexyl)phthalate	2.0E-02	1.0E-01	mg/kg-day	1	2.0E-02	mg/kg-day	Liver	1000	IRIS	Jun-2015
Dibenz(a,h)anthracene		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Indeno[1,2,3-cd]pyrene		-	mg/kg-day	1		mg/kg-day	Reviewed; No Value	-	-	-
Naphthalene	2.0E-02	6.0E-01	mg/kg-day	1	2.0E-02	mg/kg-day	Body weight	3000	IRIS	Jun-2015
1,1,1-Trichloroethane	2.0E+00	7.0E+00	mg/kg-day	1	2.0E+00	mg/kg-day	Reduced Body weight	1000	IRIS	Jun-2015
1,1,2,2-Tetrachloroethane	2.0E-02	5.0E-01	mg/kg-day	1	2.0E-02	mg/kg-day	Liver	1000	IRIS	Jun-2015
1,1,2-Trichloroethane	4.0E-03	4.0E-03	mg/kg-day	1	4.0E-03	mg/kg-day	Blood	1000	IRIS	Jun-2015
1,1-Dichloroethane	2.0E-01	2.0E+00	mg/kg-day	1	2.0E-01	mg/kg-day	No data	-	PPRTV	Jun-2015
1,1-Dichloroethene	5.0E-02	9.0E-03	mg/kg-day	1	5.0E-02	mg/kg-day	Liver	100	IRIS	Jun-2015
1,2,4-Trichlorobenzene	1.0E-02	9.0E-02	mg/kg-day	1	1.0E-02	mg/kg-day	Adrenal	1000	IRIS	Jun-2015
1,2-Dichloroethane	6.0E-03	2.0E-02	mg/kg-day	1	6.0E-03	mg/kg-day	No data	-	-	Jun-2015
1,4-Dioxane	3.0E-02	5.0E-01	mg/kg-day	1	3.0E-02	mg/kg-day	Liver, Kidney	300	IRIS	Jun-2015
Acrolein	5.0E-04	4.0E-03	mg/kg-day	1	5.0E-04	mg/kg-day	Decreased survival	100	IRIS	Jun-2015
Acetone	9.0E-01	2.0E+00	mg/kg-day	1	9.0E-01	mg/kg-day	Kidney	1000	IRIS	Jun-2015
Benzene	4.0E-03	1.0E-02	mg/kg-day	1	4.0E-03	mg/kg-day	Lymph	300	IRIS	Jun-2015
Bromodichloromethane	2.0E-02	8.0E-03	mg/kg-day	1	2.0E-02	mg/kg-day	Kidney	1000	IRIS	Jun-2015
Carbon tetrachloride	4.0E-03	7.0E-03	mg/kg-day	1	4.0E-03	mg/kg-day	Liver	1000	IRIS	Jun-2015
Chloroform	1.0E-02	1.0E-01	mg/kg-day	1	1.0E-02	mg/kg-day	Liver	100	IRIS	Jun-2015
cis-1,2-Dichloroethene	2.0E-03	2.0E-02	mg/kg-day	1	2.0E-03	mg/kg-day	Kidney	3000	IRIS	Jun-2015
Ethylbenzene	1.0E-01	5.0E-02	mg/kg-day	1	1.0E-01	mg/kg-day	Liver, Kidney	1000	IRIS	Jun-2015
Tetrachloroethene	6.0E-03	1.0E-01	mg/kg-day	1	6.0E-03	mg/kg-day	CNS	1000	IRIS	Jun-2015
Toluene	8.0E-02	8.0E-01	mg/kg-day	1	8.0E-02	mg/kg-day	Kidney	3000	IRIS	Jun-2015
Trichloroethene	5.0E-04	5.0E-04	mg/kg-day	1	5.0E-04	mg/kg-day	Immunotoxicity, Fetal	100 / 10	IRIS	Jun-2015
Vinyl chloride	3.0E-03	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	Liver	30	IRIS	Jun-2015
Xylenes, Total	2.0E-01	4.0E-01	mg/kg-day	1	2.0E-01	mg/kg-day	Decreased body weight, increased mortality	1000	IRIS	Jun-2015

Footnotes:

(1) EPA, 2004c. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Risk Assessment). Exhibit 4-1.
If constituent not listed, a default value of 100% was used.

(2) Absorbed RfD for Dermal = Oral RfD x Oral Absorption Efficiency for Dermal

(3) Nickel, soluble salts value used.

(4) Vanadium pentoxide value derived from IRIS value by factoring out the molecular weight of the oxide ion.

- = Not Available

Acronyms:

HEAST - Health Effects Assessment Summary Table

IRIS - Integrated Risk Information System

PPRTV - Provisional Peer Reviewed Toxicity Values

RSL - Regional Screening Level

CNS - Central Nervous System

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Mountain Top, Luzerne County, Pennsylvania

Chemical of Potential Concern	Inhalation RfC (1)			Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
	Chronic	Subchronic	Units			Source(s)	Date(s) (MM/DD/YYYY)
Formaldehyde	9.8E-03	3.7E-02	mg/m^3	Nasal	100	ATSDR	May-2016
Cyanide	8.0E-04	8.0E-04	mg/m^3	Thyroid	3000	RSL User Guide	Jun-2015
Aluminum	5.0E-03	5.0E-03	mg/m^3	CNS	300	PPRTV	Jun-2015
Arsenic	1.5E-05	1.5E-05	mg/m^3	CNS, Heart	-	CalEPA	Jun-2015
Barium	5.0E-04	5.0E-03	mg/m^3	No data	-	HEAST	Jun-2015
Cadmium	1.0E-05	1.0E-05	mg/m^3	Urinary		ATSDR	May-2016
Chromium VI	1.0E-04	3.0E-04	mg/m3	Lung (Cr VI particulates)	300	IRIS	May-2016
Cobalt	6.0E-06	2.0E-05	mg/m^3	Respiratory	-	PPRTV	Jun-2015
Copper		-	mg/m^3	Reviewed; No Value	-	-	-
Iron		-	mg/m^3	Reviewed; No Value	-	-	-
Lead		-	mg/m^3	Reviewed; No Value	-	-	-
Manganese	5.0E-05	5.0E-05	mg/m^3	Brain	1000	IRIS	Jun-2015
Mercury	3.0E-04	3.0E-04	mg/m^3	CNS	30	IRIS	Jun-2015
Nickel	9.0E-05	2.0E-04	mg/m^3	Respiratory	30	ATSDR	Jun-2015
Thallium		-	mg/m^3	Reviewed; No Value	-	-	-
Benzo[a]anthracene		-	mg/m^3	Reviewed; No Value	-	-	-
Benzo[a]pyrene		-	mg/m^3	Reviewed; No Value	-	-	-
Benzo[b]fluoranthene		-	mg/m^3	Reviewed; No Value	-	-	-
Benzo[k]fluoranthene		-	mg/m^3	Reviewed; No Value	-	-	-
Bis(2-ethylhexyl)phthalate		-	mg/m^3	Reviewed; No Value	-	-	-
Dibenz(a,h)anthracene		-	mg/m^3	Reviewed; No Value	-	-	-
Indeno[1,2,3-cd]pyrene		-	mg/m^3	Reviewed; No Value	-	-	-
Naphthalene	3.0E-03	3.0E-03	mg/m^3	Respiratory	3000	IRIS	Jun-2015
1,1,1-Trichloroethane	5.0E+00	5.0E+00	mg/m^3	Liver	100	IRIS	Jun-2015
1,1,2,2-Tetrachloroethane		-	mg/m^3	Reviewed; No Value	-	-	-
1,1,2-Trichloroethane	2.0E-04	2.0E-03	mg/m^3	No data	-	Appendix PPRTV	Jun-2015
1,1-Dichloroethane		-	mg/m^3	Reviewed; No Value	no data	-	-
1,1-Dichloroethene	2.0E-01	7.9E-02	mg/m^3	Liver	30	IRIS	Jun-2015
1,2,4-Trichlorobenzene	2.0E-03	2.0E-02	mg/m^3	No data	-	PPRTV	Jun-2015
1,2-Dichloroethane	7.0E-03	7.0E-02	mg/m^3	No data	no data	PPRTV	Jun-2015
1,4-Dioxane	3.0E-02	7.2E-01	mg/m^3	Nasal	1000	IRIS	Jun-2015
Acetone	3.1E+01	3.1E+01	mg/m^3	Blood Forming, CNS	-	ATSDR	Jun-2015
Acrolein	2.0E-05	9.2E-05	mg/m^3	Respiratory	1000	IRIS	May-2016
Benzene	3.0E-02	8.0E-02	mg/m^3	Lymph	300	IRIS	Jun-2015
Bromodichloromethane		2.0E-02	mg/m^3	Reviewed; No Value	-	-	-
Carbon tetrachloride	1.0E-01	1.9E-01	mg/m^3	Liver	100	IRIS	Jun-2015
Chloroform	9.8E-02	2.4E-01	mg/m^3	Cardiovascular, Developmental Effects, Liver, CNS, Kidneys, Reproductive	-	ATSDR	Jun-2015
cis-1,2-Dichloroethene		-	mg/m^3	Reviewed; No Value	-	-	-
Ethylbenzene	1.0E+00	9.0E+00	mg/m^3	Developmental toxicity	300	IRIS	Jun-2015
Tetrachloroethene	4.0E-02	4.0E-02	mg/m^3	Neurotoxicity	1000	IRIS	Jun-2015
Toluene	5.0E+00	5.0E+00	mg/m^3	Neurotoxicity	10	IRIS	Jun-2015
Trichloroethene	2.0E-03	2.0E-03	mg/m^3	Immunotoxicity; Fetal	100 / 10	IRIS	Jun-2015
Vinyl chloride	1.0E-01	7.7E-02	mg/m^3	Liver	30	IRIS	Jun-2015
Xylenes, Total	1.0E-01	4.0E-01	mg/m^3	CNS	300	IRIS	Jun-2015

Footnotes:

- = Not Available

(1) Nickel, soluble salts value used.

Acronyms:

ATSDR - Agency for Toxic Substances and Disease Registry

CalEPA - California Evironmental Protection Agency's On-line Toxicity Criteria Database. http://www.oehha.ca.gov/risk/chemicalDB/

HEAST - Health Effects Assessment Summary Table

IRIS - Integrated Risk Information System

PPRTV - Provisional Peer Reviewed Toxicity Values

RSL - Regional Screening Level

CNS - Central Nervous System

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Mountain Top, Luzerne County, Pennsylvania

Chemical of Potential Concern	Oral CSF (6) (7)		Oral Absorption Efficiency for Dermal	Absorbed CSF for Dermal (2) (6) (7)		Weight of Evidence/ Cancer Guideline Description (3)	Oral CSF	
	Value	Units	(1) (4) (5)	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Formaldehyde		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
Cyanide		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	D	-	-
Aluminum		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
Arsenic	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1	1.50E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	Jun-2015
Barium		$(mg/kg\text{-}day)^{-1}$	0.07		$(mg/kg\text{-}day)^{-1}$	D	-	-
Cadmium		$(mg/kg\text{-}day)^{-1}$	0.025		$(mg/kg\text{-}day)^{-1}$	-	-	-
Chromium VI	5.0E-01	(mg/kg-day)-1	0.025	2.00E+01	$(mg/kg\text{-}day)^{-1}$	D	New Jersey	
Cobalt		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
Copper		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
Iron		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
Lead		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	B2	-	-
Manganese		$(mg/kg\text{-}day)^{-1}$	0.04		$(mg/kg\text{-}day)^{-1}$	-	-	-
Mercury		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	D	-	-
Nickel		$(mg/kg\text{-}day)^{-1}$	0.04		$(mg/kg\text{-}day)^{-1}$	-	-	-
Thallium		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	D	-	-
Benzo[a]anthracene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	-	ECAO	Jun-2015
Benzo[a]pyrene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1	7.30E+00	$(mg/kg\text{-}day)^{-1}$	-	IRIS	Jun-2015
Benzo[b]fluoranthene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	-	ECAO	Jun-2015
Benzo[k]fluoranthene	7.3E-02	$(mg/kg\text{-}day)^{-1}$	1	7.30E-02	$(mg/kg\text{-}day)^{-1}$	-	ECAO	Jun-2015
Bis(2-ethylhexyl)phthalate	1.4E-02	$(mg/kg\text{-}day)^{-1}$	1	1.40E-02	$(mg/kg\text{-}day)^{-1}$	-	IRIS	Jun-2015
Dibenz(a,h)anthracene	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1	7.30E+00	$(mg/kg\text{-}day)^{-1}$	-	ECAO	Jun-2015
Indeno[1,2,3-cd]pyrene	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	-	ECAO	Jun-2015
Naphthalene		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
1,1,1-Trichloroethane		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
1,1,2,2-Tetrachloroethane	2.0E-01	$(mg/kg\text{-}day)^{-1}$	1	2.00E-01	$(mg/kg\text{-}day)^{-1}$	C	IRIS	Jun-2015
1,1,2-Trichloroethane	5.7E-02	$(mg/kg\text{-}day)^{-1}$	1	5.70E-02	$(mg/kg\text{-}day)^{-1}$	C	IRIS	Jun-2015
1,1-Dichloroethane	5.7E-03	$(mg/kg\text{-}day)^{-1}$	1	5.70E-03	$(mg/kg\text{-}day)^{-1}$	-	CalEPA	Jun-2015
1,1-Dichloroethene		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
1,2,4-Trichlorobenzene	2.9E-02	$(mg/kg\text{-}day)^{-1}$	1	2.90E-02	$(mg/kg\text{-}day)^{-1}$	D	PPRTV	Jun-2015
1,2-Dichloroethane	9.1E-02	$(mg/kg\text{-}day)^{-1}$	1	9.10E-02	$(mg/kg\text{-}day)^{-1}$	-	IRIS	Jun-2015
1,4-Dioxane	1.0E-01	$(mg/kg\text{-}day)^{-1}$	1	1.00E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	Jun-2015
Acetone		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	D	-	-
Acrolein		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	IRIS	May-2016
Benzene	1.5E-02 to 5.5E-02	$(mg/kg\text{-}day)^{-1}$	1	1.5E-02 to 5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	Jun-2015
Bromodichloromethane	6.2E-02	$(mg/kg\text{-}day)^{-1}$	1	6.20E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	Jun-2015
Carbon tetrachloride	7.0E-02	$(mg/kg\text{-}day)^{-1}$	1	7.00E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	Jun-2015
Chloroform	3.1E-02	$(mg/kg\text{-}day)^{-1}$	1	3.10E-02	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	Jun-2015
cis-1,2-Dichloroethene		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
Ethylbenzene	1.1E-02	$(mg/kg\text{-}day)^{-1}$	1	1.10E-02	$(mg/kg\text{-}day)^{-1}$	D	CalEPA	Jun-2015
Tetrachloroethene	2.1E-03	$(mg/kg\text{-}day)^{-1}$	1	2.10E-03	$(mg/kg\text{-}day)^{-1}$	-	IRIS	Jun-2015
Toluene		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	-	-	-
Trichloroethene	4.6E-02	$(mg/kg\text{-}day)^{-1}$	1	4.60E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	Jun-2015
Vinyl chloride	1.4E-00 from birth/7.2E-01 adult	$(mg/kg\text{-}day)^{-1}$	1	E-00 from birth/7.2E-01 a	$(mg/kg\text{-}day)^{-1}$	A	IRIS	Jun-2015
Xylenes, Total		$(mg/kg\text{-}day)^{-1}$	1		$(mg/kg\text{-}day)^{-1}$	D	-	-

Footnotes:

- = Not Available

(1) EPA, 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Risk Assessment). Exhibit 4-1. If constituent not listed, a default value of 100% was used.

(2) Absorbed Cancer Slope Factor for Dermal = Oral Cancer Slope Factor / Oral Absorption Efficiency for Dermal.

(3) EPA Weight of Evidence Groups:

A - Human carcinogen

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

(4) The cancer slope factor for TCE is based on three separate target tissue sites - kidney, lymphoid tissue and liver. The ADAF is only applied to the kidney portion of the CSF for trichloroethene (9.3E-03 for oral and dermal exposures).

(5) Nickel, soluble salts value used.

(6) The upper end of the slope factor range for benzene was used in subsequent risk calculations.

(7) IRIS presents "continuous lifetime exposure during adulthood" and "continuous lifetime exposure from birth" slope factors for vinyl chloride. Although vinly chloride is a mutagen, the ADAF approach is not used. Instead, the equations for intake include the sum of the prorated and unprorated terms for the child and just the prorated (conventional) term for the adult. See Table 4.2 for intake equations.

Acronyms:

ATSDR - Agency for Toxic Substances and Disease Registry

CalEPA - California Evironmental Protection Agency's On-line Toxicity Criteria Database. http://www.oehha.ca.gov/risk/chemicalDB/

ECAO - Environmental Criteria Assessment Office

IRIS - Integrated Risk Information System

PPRTV - Provisional Peer Reviewed Toxicity Values

Bolded chemicals operate with a mutagenic mode of action (USEPA 2005).

Per the USEPA (2005), the following default age-dependant adjustment factors (ADAF) were applied to the slope factor for the COPCS with a mutagenic mode of action for the child and adolescent receptors, as appropriate.

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<30	1

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Mountain Top, Luzerne County, Pennsylvania

Chemical of Potential Concern	Unit Risk (3) (4)		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Formaldehyde	1.3E-05	$(ug/m^3)^{-1}$	B1	IRIS	May-2016
Cyanide		$(ug/m^3)^{-1}$	D	-	-
Aluminum		$(ug/m^3)^{-1}$	-	-	-
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	A	IRIS	Jun-2015
Barium		$(ug/m^3)^{-1}$	D	-	-
Cadmium	1.8E-03	$(ug/m^3)^{-1}$	B1	IRIS	May-2016
Chromium VI	8.4E-02	(ug/m3)-1	A	See RSL User Guide	
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	-	PPRTV	Jun-2015
Copper		$(ug/m^3)^{-1}$	-	-	-
Iron		$(ug/m^3)^{-1}$	-	-	-
Lead		$(ug/m^3)^{-1}$	-	-	-
Manganese		$(ug/m^3)^{-1}$	-	-	-
Mercury		$(ug/m^3)^{-1}$	D	-	-
Nickel	2.6E-04	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Thallium		$(ug/m^3)^{-1}$	D	-	-
Benzo[a]anthracene	1.1E-04	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Benzo[a]pyrene	1.1E-03	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Benzo[b]fluoranthene	1.1E-04	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Benzo[k]fluoranthene	1.1E-04	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Bis(2-ethylhexyl)phthalate	2.4E-06	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Dibenz(a,h)anthracene	1.2E-03	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Indeno[1,2,3-cd]pyrene	1.1E-04	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
Naphthalene	3.4E-05	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
1,1,1-Trichloroethane		$(ug/m^3)^{-1}$	-	-	-
1,1,2,2-Tetrachloroethane	5.8E-05	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
1,1,2-Trichloroethane	1.6E-05	$(ug/m^3)^{-1}$	C	IRIS	Jun-2015
1,1-Dichloroethane	1.6E-06	$(ug/m^3)^{-1}$	-	CalEPA	Jun-2015
1,1-Dichloroethene		$(ug/m^3)^{-1}$	-	-	-
1,2,4-Trichlorobenzene		$(ug/m^3)^{-1}$	D	-	-
1,2-Dichloroethane	2.6E-05	$(ug/m^3)^{-1}$	-	IRIS	Jun-2015
1,4-Dioxane	5.0E-06	$(ug/m^3)^{-1}$	B2	IRIS	Jun-2015
Acetone		$(ug/m^3)^{-1}$	D	-	-
Acrolein		$(ug/m^3)^{-1}$	-	IRIS	May-2016
Benzene	2.2E-06 to 7.8E-06	$(ug/m^3)^{-1}$	A	IRIS	Jun-2015
Bromodichloromethane	3.7E-05	$(ug/m^3)^{-1}$	B2	CalEPA	Jun-2015
Carbon tetrachloride	6.0E-06	$(ug/m^3)^{-1}$	B2	IRIS	Jun-2015
Chloroform	2.3E-05	$(ug/m^3)^{-1}$	B2	IRIS	Jun-2015
cis-1,2-Dichloroethene		$(ug/m^3)^{-1}$	-	-	-
Ethylbenzene	2.5E-06	$(ug/m^3)^{-1}$	D	CalEPA	Jun-2015
Tetrachloroethene	2.6E-07	$(ug/m^3)^{-1}$	-	IRIS	Jun-2015
Toluene		$(ug/m^3)^{-1}$	-	-	-
Trichloroethene	4.1E-06	$(ug/m^3)^{-1}$	A	IRIS (2)	Jun-2015
Vinyl chloride	8.8E-06 from birth / 4.4E-06 adult	$(ug/m^3)^{-1}$	A	IRIS	Jun-2015
Xylenes, Total		$(ug/m^3)^{-1}$	D	-	-

Footnotes:

- = Not Available

(1) EPA Weight of Evidence Groups:

A - Human carcinogen

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

(2) The unit risk for TCE is based on three separate target tissue sites - kidney, lymphoid tissue and liver. The ADAF is only applied to the kidney portion of the CSF for trichloroethene. The ADAF is only applied to the kidney portion of the CSF for trichloroethene (1E-03 for inhalation exposure).

(3) The upper end of the slope factor range for benzene was used in subsequent risk calculations.

(4) IRIS presents "continuous lifetime exposure during adulthood" and "continuous lifetime exposure from birth" inhalation unit risks for vinyl chloride. Although vinly chloride is a mutagen, the ADAF approach is not used. Instead, the equations for intake include the sum of the prorated and unprorated terms for the child and just the prorated (conventional) term for the adult. See Table 4.2 for intake equations.

Acronyms:

CalEPA - California Evironmental Protection Agency's On-line Toxicity Criteria Database. http://www.oehha.ca.gov/risk/chemicalDB/

IRIS - Integrated Risk Information System

PPRTV - Provisional Peer Reviewed Toxicity Values

Bolded chemicals operate with a mutagenic mode of action (USEPA 2005).

Per the USEPA (2005), the following default age-dependant adjustment factors (ADAF) were applied to the slope factor for the COPCS with a mutagenic mode of action for the child and adolescent receptors, as appropriate.

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<30	1

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Child / Former FWEC Facility	Ingestion	Formaldehyde	6.24E-03	mg/L	2.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.1E-04	mg/kg-day	2.0E-01	mg/kg-day	1.6E-03
				Cyanide	5.62E-03	mg/L	2.4E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.8E-04	mg/kg-day	6.0E-04	mg/kg-day	4.7E-01
				Aluminum	6.31E-01	mg/L	2.7E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.1E-02	mg/kg-day	1.0E+00	mg/kg-day	3.1E-02
				Barium	1.40E-01	mg/L	6.0E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	7.0E-03	mg/kg-day	2.0E-01	mg/kg-day	3.5E-02
				Cadmium	2.90E-03	mg/L	1.2E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.4E-04	mg/kg-day	1.0E-03	mg/kg-day	1.4E-01
				Chromium	6.92E-03	mg/L	3.0E-05	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	Yes	7.9E-05	3.5E-04	mg/kg-day	3.0E-03	mg/kg-day	1.2E-01
				Cobalt	5.39E-03	mg/L	2.3E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.7E-04	mg/kg-day	3.0E-04	mg/kg-day	9.0E-01
				Iron	3.09E+01	mg/L	1.3E-01	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.5E+00	mg/kg-day	7.0E-01	mg/kg-day	2.2E+00
				Lead	1.65E-02	mg/L	7.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	8.2E-04	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	1.8E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.1E-01	mg/kg-day	2.4E-02	mg/kg-day	8.8E+00
				Mercury	2.30E-04	mg/L	9.8E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.1E-05	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	9.6E-07	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	No	2.8E-08	1.1E-05	mg/kg-day	1.0E-02	mg/kg-day	1.1E-03
				1,1,2-Trichloroethane	3.40E-04	mg/L	1.5E-06	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	No	8.3E-08	1.7E-05	mg/kg-day	4.0E-03	mg/kg-day	4.2E-03
				1,1-Dichloroethane	1.76E-03	mg/L	7.5E-06	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	No	4.3E-08	8.8E-05	mg/kg-day	2.0E-01	mg/kg-day	4.4E-04
				1,1-Dichloroethene	6.18E-03	mg/L	2.6E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.1E-04	mg/kg-day	5.0E-02	mg/kg-day	6.2E-03
				1,2-Dichloroethane	2.10E-04	mg/L	9.0E-07	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	No	8.2E-08	1.0E-05	mg/kg-day	6.0E-03	mg/kg-day	1.7E-03
				1,4-Dioxane	5.43E-03	mg/L	2.3E-05	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	2.3E-06	2.7E-04	mg/kg-day	3.0E-02	mg/kg-day	9.0E-03
				Benzene	1.29E-04	mg/L	5.5E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	3.0E-08	6.4E-06	mg/kg-day	4.0E-03	mg/kg-day	1.6E-03
				Chloroform	9.63E-05	mg/L	4.1E-07	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	1.3E-08	4.8E-06	mg/kg-day	1.0E-02	mg/kg-day	4.8E-04
				cis-1,2-Dichloroethene	1.42E-03	mg/L	6.0E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	7.1E-05	mg/kg-day	2.0E-03	mg/kg-day	3.5E-02
				Tetrachloroethene	1.45E-03	mg/L	6.2E-06	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	No	1.3E-08	7.3E-05	mg/kg-day	6.0E-03	mg/kg-day	1.2E-02
				Trichloroethene	7.46E-01	mg/L	3.2E-03	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	2.8E-04	3.7E-02	mg/kg-day	5.0E-04	mg/kg-day	7.4E+01
				Vinyl chloride	3.30E-04	mg/L	1.9E-05	mg/kg-day	1.4E+00	(mg/kg-day)$^{-1}$	See note	2.6E-05	1.6E-05	mg/kg-day	3.0E-03	mg/kg-day	5.5E-03
			Exp. Route Total									3.8E-04					8.7E+01
			Dermal Absorption (During Bathing)	Formaldehyde	6.24E-03	mg/L	3.4E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.9E-06	mg/kg-day	2.0E-01	mg/kg-day	2.0E-05
				Cyanide	5.62E-03	mg/L	1.1E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.2E-06	mg/kg-day	6.0E-04	mg/kg-day	2.1E-03
				Aluminum	6.31E-01	mg/L	1.2E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.4E-04	mg/kg-day	1.0E+00	mg/kg-day	1.4E-04
				Barium	1.40E-01	mg/L	2.6E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.1E-05	mg/kg-day	1.4E-02	mg/kg-day	2.2E-03
				Cadmium	2.90E-03	mg/L	1.5E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.7E-06	mg/kg-day	2.5E-05	mg/kg-day	6.8E-02
				Chromium	6.92E-03	mg/L	4.6E-07	mg/kg-day	2.0E+01	(mg/kg-day)$^{-1}$	Yes	4.9E-05	5.4E-06	mg/kg-day	7.5E-05	mg/kg-day	7.2E-02
				Cobalt	5.39E-03	mg/L	4.1E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1.6E-03
				Iron	3.09E+01	mg/L	5.8E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	6.8E-03	mg/kg-day	7.0E-01	mg/kg-day	9.7E-03
				Lead	1.65E-02	mg/L	3.1E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.6E-07	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	8.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	9.3E-04	mg/kg-day	9.6E-04	mg/kg-day	9.7E-01
				Mercury	2.30E-04	mg/L	4.3E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	5.1E-08	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	1.2E-06	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	No	3.4E-08	1.4E-05	mg/kg-day	1.0E-02	mg/kg-day	1.4E-03
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	1.2E-06	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	No	3.4E-08	1.4E-05	mg/kg-day	1.0E-02	mg/kg-day	1.4E-03
				1,1-Dichloroethane	1.76E-03	mg/L	5.2E-07	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	No	2.9E-09	6.0E-06	mg/kg-day	2.0E-01	mg/kg-day	3.0E-05
				1,1-Dichloroethene	6.18E-03	mg/L	3.1E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.6E-05	mg/kg-day	5.0E-02	mg/kg-day	7.3E-04
				1,2-Dichloroethane	2.10E-04	mg/L	3.8E-08	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	No	3.5E-09	4.5E-07	mg/kg-day	6.0E-03	mg/kg-day	7.5E-05
				1,4-Dioxane	5.43E-03	mg/L	7.3E-08	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	7.3E-09	8.5E-07	mg/kg-day	3.0E-02	mg/kg-day	2.8E-05
				Benzene	1.29E-04	mg/L	7.3E-08	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	4.0E-09	8.5E-07	mg/kg-day	4.0E-03	mg/kg-day	2.1E-04
				Chloroform	9.63E-05	mg/L	3.3E-08	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	1.0E-09	3.8E-07	mg/kg-day	1.0E-02	mg/kg-day	3.8E-05
				cis-1,2-Dichloroethene	1.42E-03	mg/L	6.7E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	7.8E-06	mg/kg-day	2.0E-03	mg/kg-day	3.9E-03
				Tetrachloroethene	1.45E-03	mg/L	3.3E-06	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	No	6.8E-09	3.8E-05	mg/kg-day	6.0E-03	mg/kg-day	6.3E-03
				Trichloroethene	7.46E-01	mg/L	4.6E-04	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	4.0E-05	5.4E-03	mg/kg-day	5.0E-04	mg/kg-day	1.1E+01
				Vinyl chloride	3.30E-04	mg/L	1.3E-06	mg/kg-day	1.4E+00	(mg/kg-day)$^{-1}$	See note	1.8E-06	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.7E-04
			Exp. Route Total									9.1E-05					1.2E+01
		Exposure Point Total										4.7E-04					9.9E+01
Medium Total												4.7E-04					9.9E+01

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CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs)	MIP1 Child	Incidental Ingestion	Arsenic	7.10E+00	mg/kg	4.7E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	7.0E-06	5.4E-05	mg/kg-day	3.0E-04	mg/kg-day	1.8E-01
				Cobalt	8.50E+00	mg/kg	9.3E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.1E-04	mg/kg-day	3.0E-04	mg/kg-day	3.6E-01
				Iron	2.05E+04	mg/kg	2.2E-02	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.6E-01	mg/kg-day	7.0E-01	mg/kg-day	3.7E-01
				Manganese	4.20E+02	mg/kg	4.6E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	5.4E-03	mg/kg-day	2.4E-02	mg/kg-day	2.2E-01
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	4.7E-06	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	No	9.4E-07	5.5E-05	mg/kg-day	2.0E-02	mg/kg-day	2.8E-03
				1,1,2-Trichloroethane	2.94E+00	mg/kg	3.2E-06	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	No	1.8E-07	3.8E-05	mg/kg-day	4.0E-03	mg/kg-day	9.4E-03
				Trichloroethene	4.10E+02	mg/kg	4.5E-04	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	3.9E-05	5.2E-03	mg/kg-day	5.0E-04	mg/kg-day	1.0E+01
			Exp. Route Total									4.7E-05					1.2E+01
			Dermal Absorption	Arsenic	7.10E+00	mg/kg	5.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	8.3E-07	6.5E-06	mg/kg-day	3.0E-04	mg/kg-day	2.2E-02
				Cobalt	8.50E+00	mg/kg	2.2E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.6E-03
				Iron	2.05E+04	mg/kg	5.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.2E-03	mg/kg-day	7.0E-01	mg/kg-day	8.9E-03
				Manganese	4.20E+02	mg/kg	1.1E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.3E-04	mg/kg-day	9.6E-04	mg/kg-day	1.3E-01
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	5.6E-09	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	No	1.1E-09	6.5E-08	mg/kg-day	2.0E-02	mg/kg-day	3.3E-06
				1,1,2-Trichloroethane	2.94E+00	mg/kg	3.8E-09	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	No	2.2E-10	4.5E-08	mg/kg-day	4.0E-03	mg/kg-day	1.1E-05
				Trichloroethene	4.10E+02	mg/kg	5.3E-07	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	4.6E-08	6.2E-06	mg/kg-day	5.0E-04	mg/kg-day	1.2E-02
			Exp. Route Total									8.8E-07					1.8E-01
		MIP1 - Particulates and Volatilization	Inhalation	Arsenic	5.22E-09	mg/m^3	4.3E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	No	1.8E-09	5.0E-09	mg/m^3	1.5E-05	mg/m^3	3.3E-04
				Cobalt	6.25E-09	mg/m^3	5.1E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	No	4.6E-09	6.0E-09	mg/m^3	6.0E-06	mg/m^3	1.0E-03
				Iron	1.51E-05	mg/m^3	1.2E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	1.4E-05	mg/m^3	-	mg/m^3	-
				Manganese	3.09E-07	mg/m^3	2.5E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	3.0E-07	mg/m^3	5.0E-05	mg/m^3	5.9E-03
				1,1,2,2-Tetrachloroethane	2.21E-04	mg/m^3	1.8E-05	mg/m^3	5.8E-02	$(mg/m^3)^{-1}$	No	1.1E-06	2.1E-04	mg/m^3	-	mg/m^3	-
				1,1,2-Trichloroethane	3.15E-04	mg/m^3	2.6E-05	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	No	4.1E-07	3.0E-04	mg/m^3	2.0E-04	mg/m^3	1.5E+00
				Trichloroethene	1.44E-01	mg/m^3	1.2E-02	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	Yes	9.9E-05	1.4E-01	mg/m^3	2.0E-03	mg/m^3	6.9E+01
			Exp. Route Total									1.0E-04					7.0E+01
		Exposure Point Total										1.5E-04					8.2E+01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs)	MIP2 Child	Incidental Ingestion	Cyanide	2.90E-01	mg/kg	3.2E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.7E-06	mg/kg-day	6.0E-04	mg/kg-day	6.2E-03
				Arsenic	6.26E+00	mg/kg	4.1E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	6.2E-06	4.8E-05	mg/kg-day	3.0E-04	mg/kg-day	1.6E-01
				Cobalt	1.08E+01	mg/kg	1.2E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.4E-04	mg/kg-day	3.0E-04	mg/kg-day	4.6E-01
				Iron	2.13E+04	mg/kg	2.3E-02	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.7E-01	mg/kg-day	7.0E-01	mg/kg-day	3.9E-01
				Manganese	7.04E+02	mg/kg	7.7E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	9.0E-03	mg/kg-day	2.4E-02	mg/kg-day	3.8E-01
				Benzo[a]anthracene	3.40E-01	mg/kg	3.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.5E-06	4.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	9.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	3.6E-06	1.1E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	2.5E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	9.8E-07	2.9E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	3.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.2E-06	3.5E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									1.3E-05					1.4E+00
			Dermal Absorption	Cyanide	2.90E-01	mg/kg	3.8E-10	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.4E-09	mg/kg-day	6.0E-04	mg/kg-day	7.3E-06
				Arsenic	6.26E+00	mg/kg	4.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	7.3E-07	5.7E-06	mg/kg-day	3.0E-04	mg/kg-day	1.9E-02
				Cobalt	1.08E+01	mg/kg	2.8E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Iron	2.13E+04	mg/kg	5.5E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.4E-03	mg/kg-day	7.0E-01	mg/kg-day	9.2E-03
				Manganese	7.04E+02	mg/kg	1.8E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.1E-04	mg/kg-day	9.6E-04	mg/kg-day	2.2E-01
				Benzo[a]anthracene	3.40E-01	mg/kg	1.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	4.5E-07	1.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	2.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.1E-06	3.4E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	7.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	3.0E-07	9.1E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	9.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	3.6E-07	1.1E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									3.0E-06					2.6E-01
		MIP2 - Particulates and Volatilization Child	Inhalation	Cyanide	6.43E-05	mg/m^3	5.3E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	6.2E-05	mg/m^3	8.0E-04	mg/m^3	7.7E-02
				Arsenic	4.60E-09	mg/m^3	3.8E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	No	1.6E-09	4.4E-09	mg/m^3	1.5E-05	mg/m^3	2.9E-04
				Cobalt	7.94E-09	mg/m^3	6.5E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	No	5.9E-09	7.6E-09	mg/m^3	6.0E-06	mg/m^3	1.3E-03
				Iron	1.56E-05	mg/m^3	1.3E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	1.5E-05	mg/m^3	-	mg/m^3	-
				Manganese	5.18E-07	mg/m^3	4.3E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	5.0E-07	mg/m^3	5.0E-05	mg/m^3	9.9E-03
				Benzo[a]anthracene	2.50E-10	mg/m^3	2.1E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.2E-11	2.4E-10	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	6.25E-11	mg/m^3	5.1E-12	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	Yes	3.0E-11	6.0E-11	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	1.69E-10	mg/m^3	1.4E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	8.1E-12	1.6E-10	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.99E-11	mg/m^3	1.6E-12	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	Yes	1.0E-11	1.9E-11	mg/m^3	-	mg/m^3	-
			Exp. Route Total									7.6E-09					8.9E-02
		Exposure Point Total										1.6E-05					1.7E+00

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont)	Former Shot Blast Area (FBSA) Child	Incidental Ingestion	Aluminum	6.20E+03	mg/kg	6.8E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	7.9E-02	mg/kg-day	1.0E+00	mg/kg-day	7.9E-02
				Arsenic	6.66E+00	mg/kg	4.4E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	6.6E-06	5.1E-05	mg/kg-day	3.0E-04	mg/kg-day	1.7E-01
				Chromium VI	9.45E-01	mg/kg	1.0E-06	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.8E-06	1.2E-05	mg/kg-day	3.0E-03	mg/kg-day	4.0E-03
				Cobalt	3.00E+01	mg/kg	3.3E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.8E-04	mg/kg-day	3.0E-04	mg/kg-day	1.3E+00
				Copper	3.11E+02	mg/kg	3.4E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.0E-03	mg/kg-day	4.0E-02	mg/kg-day	9.9E-02
				Iron	2.37E+04	mg/kg	2.6E-02	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.0E-01	mg/kg-day	7.0E-01	mg/kg-day	4.3E-01
				Lead	2.71E+02	mg/kg	3.0E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.5E-03	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	5.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.2E-03	mg/kg-day	2.4E-02	mg/kg-day	2.6E-01
				Nickel	2.06E+02	mg/kg	2.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.6E-03	mg/kg-day	2.0E-02	mg/kg-day	1.3E-01
				Benzo[a]anthracene	7.56E-01	mg/kg	8.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	3.2E-06	9.7E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	1.2E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	4.7E-05	1.4E-05	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	8.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	3.4E-06	1.0E-05	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	1.5E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	5.9E-06	1.8E-06	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	5.5E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.1E-06	6.4E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									7.1E-05					2.5E+00
			Dermal Absorption	Aluminum	6.20E+03	mg/kg	1.6E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.9E-03	mg/kg-day	1.0E+00	mg/kg-day	1.9E-03
				Arsenic	6.66E+00	mg/kg	5.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	7.8E-07	6.1E-06	mg/kg-day	3.0E-04	mg/kg-day	2.0E-02
				Chromium VI	9.45E-01	mg/kg	2.5E-08	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	Yes	2.6E-06	2.9E-07	mg/kg-day	7.5E-05	mg/kg-day	3.8E-03
				Cobalt	3.00E+01	mg/kg	7.8E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	9.1E-06	mg/kg-day	3.0E-04	mg/kg-day	3.0E-02
				Copper	3.11E+02	mg/kg	8.1E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	9.4E-05	mg/kg-day	4.0E-02	mg/kg-day	2.4E-03
				Iron	2.37E+04	mg/kg	6.2E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	7.2E-03	mg/kg-day	7.0E-01	mg/kg-day	1.0E-02
				Lead	2.71E+02	mg/kg	7.1E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	8.2E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	1.3E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.5E-04	mg/kg-day	9.6E-04	mg/kg-day	1.5E-01
				Nickel	2.06E+02	mg/kg	5.4E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.3E-05	mg/kg-day	8.0E-04	mg/kg-day	7.8E-02
				Benzo[a]anthracene	7.56E-01	mg/kg	2.6E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.0E-06	3.0E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	3.7E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.4E-05	4.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	2.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.0E-06	3.1E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	4.7E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.8E-06	5.5E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	1.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	6.6E-07	2.0E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									2.2E-05					3.0E-01
		FSBA - Particulates and Volatilization Child	Inhalation	Aluminum	4.56E-06	mg/m^3	3.7E-07	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	4.4E-06	mg/m^3	5.0E-03	mg/m^3	8.7E-04
				Arsenic	4.90E-09	mg/m^3	4.0E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	No	1.7E-09	4.7E-09	mg/m^3	1.5E-05	mg/m^3	3.1E-04
				Chromium VI	6.95E-10	mg/m^3	5.7E-11	mg/m^3	8.4E+01	$(mg/m^3)^{-1}$	Yes	2.6E-08	6.7E-10	mg/m^3	1.0E-04	mg/m^3	6.7E-06
				Cobalt	2.20E-08	mg/m^3	1.8E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	No	1.6E-08	2.1E-08	mg/m^3	6.0E-06	mg/m^3	3.5E-03
				Copper	2.28E-07	mg/m^3	1.9E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	2.2E-07	mg/m^3	-	mg/m^3	-
				Iron	1.75E-05	mg/m^3	1.4E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	1.7E-05	mg/m^3	-	mg/m^3	-
				Lead	2.00E-07	mg/m^3	1.6E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	1.9E-07	mg/m^3	-	mg/m^3	-
				Manganese	3.58E-07	mg/m^3	2.9E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	3.4E-07	mg/m^3	5.0E-05	mg/m^3	6.9E-03
				Nickel	1.52E-07	mg/m^3	1.2E-08	mg/m^3	2.6E-01	$(mg/m^3)^{-1}$	No	3.2E-09	1.5E-07	mg/m^3	9.0E-05	mg/m^3	1.6E-03
				Benzo[a]pyrene	5.56E-10	mg/m^3	4.6E-11	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	Yes	2.7E-10	5.3E-10	mg/m^3	-	mg/m^3	-
				Benzo[a]anthracene	8.05E-10	mg/m^3	6.6E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	3.9E-11	7.7E-10	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	5.82E-10	mg/m^3	4.8E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	2.8E-11	5.6E-10	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.02E-10	mg/m^3	8.4E-12	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	Yes	5.4E-11	9.8E-11	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	3.66E-10	mg/m^3	3.0E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.8E-11	3.5E-10	mg/m^3	-	mg/m^3	-
			Exp. Route Total									4.7E-08					1.3E-02
		Exposure Point Total										9.3E-05					2.8E+00

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont)	Expended Waste Area (EWA) Child	Incidental Ingestion	Arsenic	8.40E+00	mg/kg	5.5E-06	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	8.3E-06	6.4E-05	mg/kg-day	3.0E-04	mg/kg-day	2.1E-01
				Cobalt	3.40E+01	mg/kg	3.7E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.3E-04	mg/kg-day	3.0E-04	mg/kg-day	1.4E+00
				Copper	3.27E+02	mg/kg	3.6E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.2E-03	mg/kg-day	4.0E-02	mg/kg-day	1.0E-01
				Iron	2.81E+04	mg/kg	3.1E-02	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.6E-01	mg/kg-day	7.0E-01	mg/kg-day	5.1E-01
				Manganese	8.59E+02	mg/kg	9.4E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.1E-02	mg/kg-day	2.4E-02	mg/kg-day	4.6E-01
				Nickel	1.91E+02	mg/kg	2.1E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.4E-03	mg/kg-day	2.0E-02	mg/kg-day	1.2E-01
				Benzo[a]anthracene	2.79E-01	mg/kg	3.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.2E-06	3.6E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	2.8E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.1E-05	3.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	4.4E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.7E-06	5.1E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	5.2E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	2.0E-06	6.1E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	2.0E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	7.9E-07	2.4E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									2.5E-05					2.9E+00
			Dermal Absorption	Arsenic	8.40E+00	mg/kg	6.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	9.8E-07	7.6E-06	mg/kg-day	3.0E-04	mg/kg-day	2.5E-02
				Cobalt	3.40E+01	mg/kg	8.8E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.0E-05	mg/kg-day	3.0E-04	mg/kg-day	3.4E-02
				Copper	3.27E+02	mg/kg	8.5E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	9.9E-05	mg/kg-day	4.0E-02	mg/kg-day	2.5E-03
				Iron	2.81E+04	mg/kg	7.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	8.5E-03	mg/kg-day	7.0E-01	mg/kg-day	1.2E-02
				Manganese	8.59E+02	mg/kg	2.2E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.6E-04	mg/kg-day	9.6E-04	mg/kg-day	2.7E-01
				Nickel	1.91E+02	mg/kg	5.0E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	5.8E-05	mg/kg-day	8.0E-04	mg/kg-day	7.2E-02
				Benzo[a]anthracene	2.79E-01	mg/kg	9.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	3.7E-07	1.1E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	8.7E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	3.4E-06	1.0E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	5.3E-07	1.6E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	1.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	6.3E-07	1.9E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	6.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.4E-07	7.3E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									6.1E-06					4.2E-01
		EWA - Particulates and Volatilization Child	Inhalation	Arsenic	6.18E-09	mg/m^3	5.1E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	No	2.2E-09	5.9E-09	mg/m^3	1.5E-05	mg/m^3	4.0E-04
				Cobalt	2.50E-08	mg/m^3	2.1E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	No	1.8E-08	2.4E-08	mg/m^3	6.0E-06	mg/m^3	4.0E-03
				Copper	2.41E-07	mg/m^3	2.0E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	2.3E-07	mg/m^3	-	mg/m^3	-
				Iron	2.07E-05	mg/m^3	1.7E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	2.0E-05	mg/m^3	-	mg/m^3	-
				Manganese	6.31E-07	mg/m^3	5.2E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	6.1E-07	mg/m^3	5.0E-05	mg/m^3	1.2E-02
				Nickel	1.40E-07	mg/m^3	1.2E-08	mg/m^3	2.6E-01	$(mg/m^3)^{-1}$	No	3.0E-09	1.3E-07	mg/m^3	9.0E-05	mg/m^3	1.5E-03
				Benzo[a]anthracene	2.05E-10	mg/m^3	1.7E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	9.9E-12	2.0E-10	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	1.89E-10	mg/m^3	1.6E-11	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	Yes	9.1E-11	1.8E-10	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	2.96E-10	mg/m^3	2.4E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.4E-11	2.8E-10	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	3.51E-11	mg/m^3	2.9E-12	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	Yes	1.8E-11	3.4E-11	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	1.37E-10	mg/m^3	1.1E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	6.6E-12	1.3E-10	mg/m^3	-	mg/m^3	-
			Exp. Route Total									2.4E-08					1.8E-02
		Exposure Point Total										3.1E-05					3.3E+00
	Exposure Medium Total - Average for All Areas											7.2E-05					2.2E+01
Medium Total												7.2E-05					2.2E+01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Sediment	Sediment	Retention Pond Child	Incidental Ingestion	Arsenic	7.76E+00	mg/kg	4.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	6.6E-08	5.1E-07	mg/kg-day	3.0E-04	mg/kg-day	1.7E-03
				Manganese	2.00E+03	mg/kg	1.9E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.2E-04	mg/kg-day	2.4E-02	mg/kg-day	9.1E-03
				Benzo[a]anthracene	1.15E+02	mg/kg	1.1E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	4.2E-06	1.3E-05	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	8.4E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	3.3E-05	9.9E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	1.0E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	4.0E-06	1.2E-05	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	4.8E-07	mg/kg-day	7.3E-02	$(mg/kg\text{-}day)^{-1}$	Yes	1.9E-07	5.6E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	3.0E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.2E-05	3.5E-06	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	5.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.0E-06	6.0E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									5.5E-05					1.1E-02
			Dermal Absorption	Arsenic	7.76E+00	mg/kg	2.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	3.1E-08	2.4E-07	mg/kg-day	3.0E-04	mg/kg-day	8.1E-04
				Manganese	2.00E+03	mg/kg	1.8E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.1E-05	mg/kg-day	9.6E-04	mg/kg-day	2.2E-02
				Benzo[a]anthracene	1.15E+02	mg/kg	1.3E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	5.2E-06	1.6E-05	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	1.0E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	4.1E-05	1.2E-05	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	1.3E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	5.0E-06	1.5E-05	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	5.9E-07	mg/kg-day	7.3E-02	$(mg/kg\text{-}day)^{-1}$	Yes	2.3E-07	6.9E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	3.7E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.4E-05	4.3E-06	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	6.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.5E-06	7.3E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									6.8E-05					2.2E-02
		Exposure Point Total										1.2E-04					3.3E-02
	Exposure Medium Total											1.2E-04					3.3E-02
Medium Total												1.2E-04					3.3E-02
Groundwater	Vapor Intrusion from Groundwater	Indoor Air Child Former FWEC Facility MIP Area 2	Inhalation	1,1,1-Trichloroethane	4.21E+01	mg/m^3	3.5E+00	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	4.0E+01	mg/m^3	5.0E+00	mg/m^3	8.1E+00
				1,1,2-Trichloroethane	3.93E-02	mg/m^3	3.2E-03	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	No	5.2E-05	3.8E-02	mg/m^3	2.0E-04	mg/m^3	1.9E+02
				1,1-Dichloroethane	2.88E+00	mg/m^3	2.4E-01	mg/m^3	1.6E-03	$(mg/m^3)^{-1}$	No	3.8E-04	2.8E+00	mg/m^3	-	mg/m^3	-
				1,1-Dichloroethene	6.19E+00	mg/m^3	5.1E-01	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	5.9E+00	mg/m^3	2.0E-01	mg/m^3	3.0E+01
				Mercury	9.81E-04	mg/m^3	8.1E-05	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	9.4E-04	mg/m^3	3.0E-04	mg/m^3	3.1E+00
				Naphthalene	2.10E-02	mg/m^3	1.7E-03	mg/m^3	3.4E-02	$(mg/m^3)^{-1}$	No	5.9E-05	2.0E-02	mg/m^3	3.0E-03	mg/m^3	6.7E+00
				Ethylbenzene	4.21E-02	mg/m^3	3.5E-03	mg/m^3	2.5E-03	$(mg/m^3)^{-1}$	No	8.7E-06	4.0E-02	mg/m^3	1.0E+00	mg/m^3	4.0E-02
				Tetrachloroethene	6.41E-02	mg/m^3	5.3E-03	mg/m^3	2.6E-04	$(mg/m^3)^{-1}$	No	1.4E-06	6.1E-02	mg/m^3	4.0E-02	mg/m^3	1.5E+00
				Trichloroethene	6.64E-02	mg/m^3	5.5E-03	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	Yes	4.6E-05	6.4E-02	mg/m^3	2.0E-03	mg/m^3	3.2E+01
				Xylenes, Total	2.97E-01	mg/m^3	2.4E-02	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	2.8E-01	mg/m^3	1.0E-01	mg/m^3	2.8E+00
			Exp. Route Total									5.4E-04					2.7E+02
		Exposure Point Total										5.4E-04					2.7E+02
	Exposure Medium Total											5.4E-04					2.7E+02
Medium Total												5.4E-04					2.7E+02
Total of Receptor Risks Across All Media												1.2E-03	Total of Receptor Hazards Across All Media				3.9E+02

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
				Formaldehyde	6.24E-03	mg/L	5.3E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.9E-04	mg/kg-day	2.0E-01	mg/kg-day	9.4E-04
Groundwater	Groundwater	Adult /	Ingestion	Cyanide	5.62E-03	mg/L	4.8E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.7E-04	mg/kg-day	6.0E-04	mg/kg-day	2.8E-01
	Used as Tap Water	Former FWEC Facility		Aluminum	6.31E-01	mg/L	5.4E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.9E-02	mg/kg-day	1.0E+00	mg/kg-day	1.9E-02
				Barium	1.40E-01	mg/L	1.2E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.2E-03	mg/kg-day	2.0E-01	mg/kg-day	2.1E-02
				Cadmium	2.90E-03	mg/L	2.5E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	8.7E-05	mg/kg-day	1.0E-03	mg/kg-day	8.7E-02
				Chromium	6.92E-03	mg/L	5.9E-05	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	Yes	5.9E-05	2.1E-04	mg/kg-day	3.0E-03	mg/kg-day	6.9E-02
				Cobalt	5.39E-03	mg/L	4.6E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	5.4E-01
				Iron	3.09E+01	mg/L	2.6E-01	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	9.3E-01	mg/kg-day	7.0E-01	mg/kg-day	1.3E+00
				Lead	1.65E-02	mg/L	1.4E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.9E-04	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	3.6E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.3E-01	mg/kg-day	2.4E-02	mg/kg-day	5.3E+00
				Mercury	2.30E-04	mg/L	2.0E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	6.9E-06	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	1.9E-06	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	No	5.6E-08	6.7E-06	mg/kg-day	1.0E-02	mg/kg-day	6.7E-04
				1,1,2-Trichloroethane	3.40E-04	mg/L	2.9E-06	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	No	1.7E-07	1.0E-05	mg/kg-day	4.0E-03	mg/kg-day	2.5E-03
				1,1-Dichloroethane	1.76E-03	mg/L	1.5E-05	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	No	8.6E-08	5.3E-05	mg/kg-day	2.0E-01	mg/kg-day	2.6E-04
				1,1-Dichloroethene	6.18E-03	mg/L	5.3E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.9E-04	mg/kg-day	5.0E-02	mg/kg-day	3.7E-03
				1,2-Dichloroethane	2.10E-04	mg/L	1.8E-06	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	No	1.6E-07	6.3E-06	mg/kg-day	6.0E-03	mg/kg-day	1.0E-03
				1,4-Dioxane	5.43E-03	mg/L	4.6E-05	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	4.6E-06	1.6E-04	mg/kg-day	3.0E-02	mg/kg-day	5.4E-03
				Benzene	1.29E-04	mg/L	1.1E-06	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	6.1E-08	3.9E-06	mg/kg-day	4.0E-03	mg/kg-day	9.7E-04
				Chloroform	9.63E-05	mg/L	8.2E-07	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	2.6E-08	2.9E-06	mg/kg-day	1.0E-02	mg/kg-day	2.9E-04
				cis-1,2-Dichloroethene	1.42E-03	mg/L	1.2E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.2E-05	mg/kg-day	2.0E-03	mg/kg-day	2.1E-02
				Tetrachloroethene	1.45E-03	mg/L	1.2E-05	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	No	2.6E-08	4.4E-05	mg/kg-day	6.0E-03	mg/kg-day	7.3E-03
				Trichloroethene	7.46E-01	mg/L	6.4E-03	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	3.6E-04	2.2E-02	mg/kg-day	5.0E-04	mg/kg-day	4.5E+01
				Vinyl chloride	3.30E-04	mg/L	2.8E-06	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	See note	2.0E-06	9.9E-06	mg/kg-day	3.0E-03	mg/kg-day	3.3E-03
			Exp. Route Total									4.2E-04					5.2E+01
				Formaldehyde	6.24E-03	mg/L	8.3E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.9E-06	mg/kg-day	2.0E-01	mg/kg-day	1.4E-05
			Dermal	Cyanide	5.62E-03	mg/L	2.9E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.0E-06	mg/kg-day	6.0E-04	mg/kg-day	1.7E-03
			Absorption	Aluminum	6.31E-01	mg/L	3.2E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	1.1E-04	mg/kg-day	1.0E+00	mg/kg-day	1.1E-04
			(During	Barium	1.40E-01	mg/L	7.1E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	2.5E-05	mg/kg-day	1.4E-02	mg/kg-day	1.8E-03
			Showering)	Cadmium	2.90E-03	mg/L	3.3E-07	mg/kg-day	-	(mg/kg-day)-1	No	-	1.2E-06	mg/kg-day	2.5E-05	mg/kg-day	4.7E-02
				Chromium	6.92E-03	mg/L	1.1E-06	mg/kg-day	2.0E+01	(mg/kg-day)-1	Yes	4.4E-05	3.9E-06	mg/kg-day	7.5E-05	mg/kg-day	5.2E-02
				Cobalt	5.39E-03	mg/L	1.1E-07	mg/kg-day	-	(mg/kg-day)-1	No	-	3.8E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Iron	3.09E+01	mg/L	1.6E-03	mg/kg-day	-	(mg/kg-day)-1	No	-	5.5E-03	mg/kg-day	7.0E-01	mg/kg-day	7.8E-03
				Lead	1.65E-02	mg/L	8.4E-08	mg/kg-day	-	(mg/kg-day)-1	No	-	2.9E-07	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	2.2E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	7.5E-04	mg/kg-day	9.6E-04	mg/kg-day	7.9E-01
				Mercury	2.30E-04	mg/L	1.2E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.1E-08	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	2.8E-06	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	No	8.0E-08	9.7E-06	mg/kg-day	1.0E-02	mg/kg-day	9.7E-04
				1,1,2-Trichloroethane	3.40E-04	mg/L	2.2E-07	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	No	1.2E-08	7.7E-07	mg/kg-day	4.0E-03	mg/kg-day	1.9E-04
				1,1-Dichloroethane	1.76E-03	mg/L	1.2E-06	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	No	6.9E-09	4.2E-06	mg/kg-day	2.0E-01	mg/kg-day	2.1E-05
				1,1-Dichloroethene	6.18E-03	mg/L	7.3E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.6E-05	mg/kg-day	5.0E-02	mg/kg-day	5.1E-04
				1,2-Dichloroethane	2.10E-04	mg/L	9.0E-08	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	No	8.2E-09	3.2E-07	mg/kg-day	6.0E-03	mg/kg-day	5.3E-05
				1,4-Dioxane	5.43E-03	mg/L	1.7E-07	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	1.7E-08	6.0E-07	mg/kg-day	3.0E-02	mg/kg-day	2.0E-05
				Benzene	1.29E-04	mg/L	1.8E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	9.7E-09	6.2E-07	mg/kg-day	4.0E-03	mg/kg-day	1.5E-04
				Chloroform	9.63E-05	mg/L	7.7E-08	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	2.4E-09	2.7E-07	mg/kg-day	1.0E-02	mg/kg-day	2.7E-05
				cis-1,2-Dichloroethene	1.42E-03	mg/L	1.6E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	5.5E-06	mg/kg-day	2.0E-03	mg/kg-day	2.8E-03
				Tetrachloroethene	1.45E-03	mg/L	7.6E-06	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	No	1.6E-08	2.7E-05	mg/kg-day	6.0E-03	mg/kg-day	4.5E-03
				Trichloroethene	7.46E-01	mg/L	1.1E-03	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	6.1E-05	3.8E-03	mg/kg-day	5.0E-04	mg/kg-day	7.6E+00
				Vinyl chloride	3.30E-04	mg/L	2.3E-07	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	See note	1.7E-07	8.1E-07	mg/kg-day	3.0E-03	mg/kg-day	2.7E-04
			Exp. Route Total									1.1E-04					8.5E+00

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water (cont)	Adult / Former FWEC Facility	Inhalation (During Showering)	Formaldehyde	1.35E-04	mg/m^3	1.1E-06	mg/m^3	1.3E-02	(mg/m^3)$^{-1}$	No	1.4E-08	3.8E-06	mg/m^3	9.8E-03	mg/m^3	3.9E-04
				Cyanide	5.69E-02	mg/m^3	4.6E-04	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	1.6E-03	mg/m^3	8.0E-04	mg/m^3	2.0E+00
				Aluminum	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	5.0E-03	mg/m^3	-
				Barium	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	5.0E-04	mg/m^3	-
				Cadmium	-	mg/m^3	-	mg/m^3	1.8E+00	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	1.0E-05	mg/m^3	-
				Chromium	-	mg/m^3	-	mg/m^3	8.4E+01	(mg/m^3)$^{-1}$	Yes	-	-	mg/m^3	1.0E-04	mg/m^3	-
				Cobalt	-	mg/m^3	-	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	6.0E-06	mg/m^3	-
				Iron	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	-	mg/m^3	-
				Lead	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	-	mg/m^3	-
				Manganese	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	5.0E-05	mg/m^3	-
				Mercury	1.12E-03	mg/m^3	9.1E-06	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	3.2E-05	mg/m^3	3.0E-04	mg/m^3	1.1E-01
				1,2,4-Trichlorobenzene	1.04E-03	mg/m^3	8.5E-06	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	3.0E-05	mg/m^3	2.0E-03	mg/m^3	1.5E-02
				1,1,2-Trichloroethane	1.64E-03	mg/m^3	1.3E-05	mg/m^3	1.6E-02	(mg/m^3)$^{-1}$	No	2.1E-07	4.7E-05	mg/m^3	2.0E-04	mg/m^3	2.3E-01
				1,1-Dichloroethane	1.13E-05	mg/m^3	9.2E-08	mg/m^3	1.6E-03	(mg/m^3)$^{-1}$	No	1.5E-10	3.2E-07	mg/m^3	-	mg/m^3	-
				1,1-Dichloroethene	4.12E-05	mg/m^3	3.3E-07	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	1.2E-06	mg/m^3	2.0E-01	mg/m^3	5.8E-06
				1,2-Dichloroethane	1.21E-03	mg/m^3	9.8E-06	mg/m^3	2.6E-02	(mg/m^3)$^{-1}$	No	2.6E-07	3.4E-05	mg/m^3	7.0E-03	mg/m^3	4.9E-03
				1,4-Dioxane	9.55E-07	mg/m^3	7.7E-09	mg/m^3	5.0E-03	(mg/m^3)$^{-1}$	No	3.9E-11	2.7E-08	mg/m^3	3.0E-02	mg/m^3	9.0E-07
				Benzene	9.07E-07	mg/m^3	7.4E-09	mg/m^3	7.8E-03	(mg/m^3)$^{-1}$	No	5.7E-11	2.6E-08	mg/m^3	3.0E-02	mg/m^3	8.6E-07
				Chloroform	5.70E-07	mg/m^3	4.6E-09	mg/m^3	2.3E-02	(mg/m^3)$^{-1}$	No	1.1E-10	1.6E-08	mg/m^3	9.8E-02	mg/m^3	1.6E-07
				cis-1,2-Dichloroethene	9.10E-06	mg/m^3	7.4E-08	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	2.6E-07	mg/m^3	-	mg/m^3	-
				Tetrachloroethene	7.88E-06	mg/m^3	6.4E-08	mg/m^3	2.6E-04	(mg/m^3)$^{-1}$	No	1.7E-11	2.2E-07	mg/m^3	4.0E-02	mg/m^3	5.6E-06
				Trichloroethene	4.39E-03	mg/m^3	3.6E-05	mg/m^3	4.1E-03	(mg/m^3)$^{-1}$	Yes	1.2E-06	1.2E-04	mg/m^3	2.0E-03	mg/m^3	6.2E-02
				Vinyl chloride	2.57E-03	mg/m^3	2.1E-05	mg/m^3	4.4E-03	(mg/m^3)$^{-1}$	See note	9.2E-08	7.3E-05	mg/m^3	1.0E-01	mg/m^3	7.3E-04
			Exp. Route Total									1.7E-06					2.4E+00
		Exposure Point Total										5.3E-04					6.3E+01
	Exposure Medium Total											5.3E-04					6.3E+01
Medium Total												5.3E-04					6.3E+01
Soil	All Soil (0 -15 ft bgs)	MIP1 Adult	Incidental Ingestion	Arsenic	7.10E+00	mg/kg	1.5E-06	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	No	2.2E-06	5.1E-06	mg/kg-day	3.0E-04	mg/kg-day	1.7E-02
				Cobalt	8.50E+00	mg/kg	2.9E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.0E-05	mg/kg-day	3.0E-04	mg/kg-day	3.4E-02
				Iron	2.05E+04	mg/kg	7.0E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.4E-02	mg/kg-day	7.0E-01	mg/kg-day	3.5E-02
				Manganese	4.20E+02	mg/kg	1.4E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	5.0E-04	mg/kg-day	2.4E-02	mg/kg-day	2.1E-02
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	1.5E-06	mg/kg-day	2.0E-01	(mg/kg-day)$^{-1}$	No	3.0E-07	5.1E-06	mg/kg-day	2.0E-02	mg/kg-day	2.6E-04
				1,1,2-Trichloroethane	2.94E+00	mg/kg	1.0E-06	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	No	5.7E-08	3.5E-06	mg/kg-day	4.0E-03	mg/kg-day	8.8E-04
				Trichloroethene	4.10E+02	mg/kg	1.4E-04	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	7.8E-06	4.9E-04	mg/kg-day	5.0E-04	mg/kg-day	9.8E-01
			Exp. Route Total									1.0E-05					1.1E+00
			Dermal Absorption	Arsenic	7.10E+00	mg/kg	3.1E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	No	4.6E-07	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	3.6E-03
				Cobalt	8.50E+00	mg/kg	1.2E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.4E-03
				Iron	2.05E+04	mg/kg	3.0E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.0E-03	mg/kg-day	7.0E-01	mg/kg-day	1.5E-03
				Manganese	4.20E+02	mg/kg	6.1E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.1E-05	mg/kg-day	9.6E-04	mg/kg-day	2.2E-02
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	3.1E-09	mg/kg-day	2.0E-01	(mg/kg-day)$^{-1}$	No	6.2E-10	1.1E-08	mg/kg-day	2.0E-02	mg/kg-day	5.5E-07
				1,1,2-Trichloroethane	2.94E+00	mg/kg	2.1E-09	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	No	1.2E-10	7.4E-09	mg/kg-day	4.0E-03	mg/kg-day	1.9E-06
				Trichloroethene	4.10E+02	mg/kg	3.0E-07	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	1.6E-08	1.0E-06	mg/kg-day	5.0E-04	mg/kg-day	2.1E-03
			Exp. Route Total									4.8E-07					3.1E-02
		MIP1 - Particulates and Volatilization	Inhalation	Arsenic	5.22E-09	mg/m^3	1.4E-09	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	No	6.2E-09	5.0E-09	mg/m^3	1.5E-05	mg/m^3	3.3E-04
				Cobalt	6.25E-09	mg/m^3	1.7E-09	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	No	1.5E-08	6.0E-09	mg/m^3	6.0E-06	mg/m^3	1.0E-03
				Iron	1.51E-05	mg/m^3	4.1E-06	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	1.4E-05	mg/m^3	-	mg/m^3	-
				Manganese	3.09E-07	mg/m^3	8.5E-08	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	3.0E-07	mg/m^3	5.0E-05	mg/m^3	5.9E-03
				1,1,2,2-Tetrachloroethane	2.21E-04	mg/m^3	6.0E-05	mg/m^3	5.8E-02	(mg/m^3)$^{-1}$	No	3.5E-06	2.1E-04	mg/m^3	-	mg/m^3	-
				1,1,2-Trichloroethane	3.15E-04	mg/m^3	8.6E-05	mg/m^3	1.6E-02	(mg/m^3)$^{-1}$	No	1.4E-06	3.0E-04	mg/m^3	2.0E-04	mg/m^3	1.5E+00
				Trichloroethene	1.44E-01	mg/m^3	3.9E-02	mg/m^3	4.1E-03	(mg/m^3)$^{-1}$	Yes	1.3E-03	1.4E-01	mg/m^3	2.0E-03	mg/m^3	6.9E+01
			Exp. Route Total									1.3E-03					7.0E+01
		Exposure Point Total										1.3E-03					7.1E+01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (Cont.)	MIP2 Adult	Incidental Ingestion	Cyanide	2.90E-01	mg/kg	9.9E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.5E-07	mg/kg-day	6.0E-04	mg/kg-day	5.8E-04
				Arsenic	6.26E+00	mg/kg	1.3E-06	mg/kg-day	1.5E+00	(mg/kg-day)-1	No	1.9E-06	4.5E-06	mg/kg-day	3.0E-04	mg/kg-day	1.5E-02
				Cobalt	1.08E+01	mg/kg	3.7E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	4.3E-02
				Iron	2.13E+04	mg/kg	7.3E-03	mg/kg-day	-	(mg/kg-day)-1	No	-	2.5E-02	mg/kg-day	7.0E-01	mg/kg-day	3.6E-02
				Manganese	7.04E+02	mg/kg	2.4E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	8.4E-04	mg/kg-day	2.4E-02	mg/kg-day	3.5E-02
				Benzo[a]anthracene	3.40E-01	mg/kg	1.2E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.7E-07	4.1E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	2.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	4.3E-07	1.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	7.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.2E-07	2.7E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	9.2E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.4E-07	3.2E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									2.8E-06					1.3E-01
			Dermal Absorption	Cyanide	2.90E-01	mg/kg	2.1E-10	mg/kg-day	-	(mg/kg-day)-1	No	-	7.3E-10	mg/kg-day	6.0E-04	mg/kg-day	1.2E-06
				Arsenic	6.26E+00	mg/kg	2.7E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	No	4.1E-07	9.5E-07	mg/kg-day	3.0E-04	mg/kg-day	3.2E-03
				Cobalt	1.08E+01	mg/kg	1.6E-07	mg/kg-day	-	(mg/kg-day)-1	No	-	5.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.8E-03
				Iron	2.13E+04	mg/kg	3.1E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	1.1E-03	mg/kg-day	7.0E-01	mg/kg-day	1.5E-03
				Manganese	7.04E+02	mg/kg	1.0E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	3.6E-05	mg/kg-day	9.6E-04	mg/kg-day	3.7E-02
				Benzo[a]anthracene	3.40E-01	mg/kg	6.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	9.3E-08	2.2E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	1.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	2.3E-07	5.6E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	4.3E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	6.3E-08	1.5E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	5.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	7.4E-08	1.8E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									8.7E-07					4.4E-02
		MIP2 - Particulates and Volatilization Adult	Inhalation	Cyanide	6.43E-05	mg/m^3	1.8E-05	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	6.2E-05	mg/m^3	8.0E-04	mg/m^3	7.7E-02
				Arsenic	4.60E-09	mg/m^3	1.3E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	No	5.4E-09	4.4E-09	mg/m^3	1.5E-05	mg/m^3	2.9E-04
				Cobalt	7.94E-09	mg/m^3	2.2E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	No	2.0E-08	7.6E-09	mg/m^3	6.0E-06	mg/m^3	1.3E-03
				Iron	1.56E-05	mg/m^3	4.3E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	1.5E-05	mg/m^3	-	mg/m^3	-
				Manganese	5.18E-07	mg/m^3	1.4E-07	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	5.0E-07	mg/m^3	5.0E-05	mg/m^3	9.9E-03
				Benzo[a]anthracene	2.50E-10	mg/m^3	6.8E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.5E-11	2.4E-10	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	6.25E-11	mg/m^3	1.7E-11	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	Yes	3.8E-11	6.0E-11	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	1.69E-10	mg/m^3	4.6E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.0E-11	1.6E-10	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.99E-11	mg/m^3	5.4E-12	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	Yes	1.3E-11	1.9E-11	mg/m^3	-	mg/m^3	-
			Exp. Route Total									2.5E-08					8.9E-02
		Exposure Point Total										3.7E-06					2.6E-01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (Cont.)	Former Shot Blast Area (FBSA) Adult	Incidental Ingestion	Aluminum	6.20E+03	mg/kg	2.1E-03	mg/kg-day	-	(mg/kg-day)-1	No	-	7.4E-03	mg/kg-day	1.0E+00	mg/kg-day	7.4E-03
				Arsenic	6.66E+00	mg/kg	1.4E-06	mg/kg-day	1.5E+00	(mg/kg-day)-1	No	2.1E-06	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Chromium VI	9.45E-01	mg/kg	3.2E-07	mg/kg-day	5.0E-01	(mg/kg-day)-1	Yes	3.2E-07	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.8E-04
				Cobalt	3.00E+01	mg/kg	1.0E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	3.6E-05	mg/kg-day	3.0E-04	mg/kg-day	1.2E-01
				Copper	3.11E+02	mg/kg	1.1E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	3.7E-04	mg/kg-day	4.0E-02	mg/kg-day	9.3E-03
				Iron	2.37E+04	mg/kg	8.1E-03	mg/kg-day	-	(mg/kg-day)-1	No	-	2.8E-02	mg/kg-day	7.0E-01	mg/kg-day	4.0E-02
				Lead	2.71E+02	mg/kg	9.3E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	3.2E-04	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	1.7E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	5.8E-04	mg/kg-day	2.4E-02	mg/kg-day	2.4E-02
				Nickel	2.06E+02	mg/kg	7.1E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	2.5E-04	mg/kg-day	2.0E-02	mg/kg-day	1.2E-02
				Benzo[a]anthracene	7.56E-01	mg/kg	2.6E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	3.8E-07	9.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	3.8E-07	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	5.5E-06	1.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	2.7E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	4.0E-07	9.4E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	4.8E-08	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	7.0E-07	1.7E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	1.7E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	2.5E-07	5.9E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									9.6E-06					2.3E-01
			Dermal Absorption	Aluminum	6.20E+03	mg/kg	9.0E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	3.1E-04	mg/kg-day	1.0E+00	mg/kg-day	3.1E-04
				Arsenic	6.66E+00	mg/kg	2.9E-07	mg/kg-day	1.5E+00	(mg/kg-day)-1	No	4.3E-07	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.4E-03
				Chromium VI	9.45E-01	mg/kg	1.4E-08	mg/kg-day	2.0E+01	(mg/kg-day)-1	Yes	5.5E-07	4.8E-08	mg/kg-day	7.5E-05	mg/kg-day	6.4E-04
				Cobalt	3.00E+01	mg/kg	4.3E-07	mg/kg-day	-	(mg/kg-day)-1	No	-	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	5.1E-03
				Copper	3.11E+02	mg/kg	4.5E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	1.6E-05	mg/kg-day	4.0E-02	mg/kg-day	3.9E-04
				Iron	2.37E+04	mg/kg	3.4E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	1.2E-03	mg/kg-day	7.0E-01	mg/kg-day	1.7E-03
				Lead	2.71E+02	mg/kg	3.9E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	1.4E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	7.0E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	2.5E-05	mg/kg-day	9.6E-04	mg/kg-day	2.6E-02
				Nickel	2.06E+02	mg/kg	3.0E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	1.0E-05	mg/kg-day	8.0E-04	mg/kg-day	1.3E-02
				Benzo[a]anthracene	7.56E-01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.1E-07	5.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	2.1E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	3.0E-06	7.2E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	1.5E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.2E-07	5.2E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	2.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	3.8E-07	9.1E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	9.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.4E-07	3.3E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									4.9E-06					5.0E-02
		FSBA - Particulates and Volatilization Adult	Inhalation	Aluminum	4.56E-06	mg/m^3	1.2E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	4.4E-06	mg/kg-day	5.0E-03	mg/kg-day	8.7E-04
				Arsenic	4.90E-09	mg/m^3	1.3E-09	mg/m^3	4.3E+00	(mg/m3)-1	No	5.8E-09	4.7E-09	mg/kg-day	1.5E-05	mg/kg-day	3.1E-04
				Chromium VI	6.95E-10	mg/m^3	1.9E-10	mg/m^3	8.4E+01	(mg/m3)-1	Yes	3.2E-08	6.7E-10	mg/kg-day	1.0E-04	mg/kg-day	6.7E-06
				Cobalt	2.20E-08	mg/m^3	6.0E-09	mg/m^3	9.0E+00	(mg/m3)-1	No	5.4E-08	2.1E-08	mg/kg-day	6.0E-06	mg/kg-day	3.5E-03
				Copper	2.28E-07	mg/m^3	6.3E-08	mg/m^3	-	(mg/m3)-1	No	-	2.2E-07	mg/kg-day	-	mg/kg-day	-
				Iron	1.75E-05	mg/m^3	4.8E-06	mg/m^3	-	(mg/m3)-1	No	-	1.7E-05	mg/kg-day	-	mg/kg-day	-
				Lead	2.00E-07	mg/m^3	5.5E-08	mg/m^3	-	(mg/m3)-1	No	-	1.9E-07	mg/kg-day	-	mg/kg-day	-
				Manganese	3.58E-07	mg/m^3	9.8E-08	mg/m^3	-	(mg/m3)-1	No	-	3.4E-07	mg/kg-day	5.0E-05	mg/kg-day	6.9E-03
				Nickel	1.52E-07	mg/m^3	4.2E-08	mg/m^3	2.6E-01	(mg/m3)-1	No	1.1E-08	1.5E-07	mg/kg-day	9.0E-05	mg/kg-day	1.6E-03
				Benzo[a]anthracene	5.56E-10	mg/m^3	1.5E-10	mg/m^3	1.1E-01	(mg/m3)-1	Yes	3.4E-11	5.3E-10	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.05E-10	mg/m^3	2.2E-10	mg/m^3	1.1E+00	(mg/m3)-1	Yes	4.9E-10	7.7E-10	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	5.82E-10	mg/m^3	1.6E-10	mg/m^3	1.1E-01	(mg/m3)-1	Yes	3.5E-11	5.6E-10	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.02E-10	mg/m^3	2.8E-11	mg/m^3	1.2E+00	(mg/m3)-1	Yes	6.7E-11	9.8E-11	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	3.66E-10	mg/m^3	1.0E-10	mg/m^3	1.1E-01	(mg/m3)-1	Yes	2.2E-11	3.5E-10	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									1.0E-07					1.3E-02
		Exposure Point Total										1.5E-05					2.9E-01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (Cont.)	Expended Waste Area (EWA) Adult	Incidental Ingestion	Arsenic	8.40E+00	mg/kg	1.7E-06	mg/kg-day	1.5E+00	(mg/kg-day)-1	No	2.6E-06	6.0E-06	mg/kg-day	3.0E-04	mg/kg-day	2.0E-02
				Cobalt	3.40E+01	mg/kg	1.2E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	4.1E-05	mg/kg-day	3.0E-04	mg/kg-day	1.4E-01
				Copper	3.27E+02	mg/kg	1.1E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	3.9E-04	mg/kg-day	4.0E-02	mg/kg-day	9.8E-03
				Iron	2.81E+04	mg/kg	9.6E-03	mg/kg-day	-	(mg/kg-day)-1	No	-	3.4E-02	mg/kg-day	7.0E-01	mg/kg-day	4.8E-02
				Manganese	8.59E+02	mg/kg	2.9E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	1.0E-03	mg/kg-day	2.4E-02	mg/kg-day	4.3E-02
				Nickel	1.91E+02	mg/kg	6.5E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	2.3E-04	mg/kg-day	2.0E-02	mg/kg-day	1.1E-02
				Benzo[a]anthracene	2.79E-01	mg/kg	9.6E-08	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	1.4E-07	3.3E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	8.8E-08	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	1.3E-06	3.1E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	2.0E-07	4.8E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	1.6E-08	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	2.4E-07	5.7E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	6.4E-08	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	9.3E-08	2.2E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									4.5E-06					2.7E-01
		Expended Waste Area (EWA) Adult	Dermal Absorption	Arsenic	8.40E+00	mg/kg	3.6E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	5.5E-07	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.3E-03
				Cobalt	3.40E+01	mg/kg	4.9E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.7E-03
				Copper	3.27E+02	mg/kg	4.7E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.7E-05	mg/kg-day	4.0E-02	mg/kg-day	4.1E-04
				Iron	2.81E+04	mg/kg	4.1E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	1.4E-03	mg/kg-day	7.0E-01	mg/kg-day	2.0E-03
				Manganese	8.59E+02	mg/kg	1.2E-05	mg/kg-day	-	(mg/kg-day)-1	No	-	4.3E-05	mg/kg-day	9.6E-04	mg/kg-day	4.5E-02
				Nickel	1.91E+02	mg/kg	2.8E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	9.7E-06	mg/kg-day	8.0E-04	mg/kg-day	1.2E-02
				Benzo[a]anthracene	2.79E-01	mg/kg	5.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	7.7E-08	1.8E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	4.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	7.1E-07	1.7E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	7.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.1E-07	2.6E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	9.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.3E-07	3.1E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	3.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	5.1E-08	1.2E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									1.6E-06					7.0E-02
		EWA - Particulates and Volatilization Adult	Inhalation	Arsenic	6.18E-09	mg/m^3	1.7E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	No	7.3E-09	5.9E-09	mg/kg-day	1.5E-05	mg/kg-day	4.0E-04
				Cobalt	2.50E-08	mg/m^3	6.9E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	No	6.2E-08	2.4E-08	mg/kg-day	6.0E-06	mg/kg-day	4.0E-03
				Copper	2.41E-07	mg/m^3	6.6E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	2.3E-07	mg/kg-day	-	mg/kg-day	-
				Iron	2.07E-05	mg/m^3	5.7E-06	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	2.0E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	6.31E-07	mg/m^3	1.7E-07	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	6.1E-07	mg/kg-day	5.0E-05	mg/kg-day	1.2E-02
				Nickel	1.40E-07	mg/m^3	3.8E-08	mg/m^3	2.6E-01	$(mg/m^3)^{-1}$	No	1.0E-08	1.3E-07	mg/kg-day	9.0E-05	mg/kg-day	1.5E-03
				Benzo[a]anthracene	2.05E-10	mg/m^3	5.6E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.2E-11	2.0E-10	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.89E-10	mg/m^3	5.2E-11	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	Yes	1.1E-10	1.8E-10	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.96E-10	mg/m^3	8.1E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.8E-11	2.8E-10	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.51E-11	mg/m^3	9.6E-12	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	Yes	2.3E-11	3.4E-11	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.37E-10	mg/m^3	3.7E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	8.2E-12	1.3E-10	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									7.9E-08					1.8E-02
		Exposure Point Total										6.2E-06					3.5E-01
	Exposure Medium Total - Average for All Areas											3.3E-04					1.8E+01
Medium Total												3.3E-04					1.8E+01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Sediment	Sediment	Retention Pond Adult	Incidental Ingestion	Arsenic	7.76E+00	mg/kg	1.1E-08	mg/kg-day	1.5E+00	(mg/kg-day)-1	No	1.6E-08	3.8E-08	mg/kg-day	3.0E-04	mg/kg-day	1.3E-04
				Manganese	2.00E+03	mg/kg	4.7E-06	mg/kg-day	-	(mg/kg-day)-1	No	-	1.6E-05	mg/kg-day	2.4E-02	mg/kg-day	6.8E-04
				Benzo[a]anthracene	1.15E+02	mg/kg	2.7E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	3.9E-07	9.4E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	2.1E-07	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	3.1E-06	7.4E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	2.6E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	3.8E-07	9.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	1.2E-07	mg/kg-day	7.3E-02	(mg/kg-day)-1	Yes	1.7E-08	4.2E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	7.5E-08	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	1.1E-06	2.6E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	1.3E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	1.9E-07	4.5E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									5.2E-06					8.1E-04
			Dermal Absorption	Arsenic	7.76E+00	mg/kg	1.2E-08	mg/kg-day	1.5E+00	(mg/kg-day)-1	No	1.7E-08	4.0E-08	mg/kg-day	3.0E-04	mg/kg-day	1.3E-04
				Manganese	2.00E+03	mg/kg	9.9E-07	mg/kg-day	-	(mg/kg-day)-1	No	-	3.5E-06	mg/kg-day	9.6E-04	mg/kg-day	3.6E-03
				Benzo[a]anthracene	1.15E+02	mg/kg	7.4E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	1.1E-06	2.6E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	5.8E-07	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	8.5E-06	2.0E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	7.1E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	1.0E-06	2.5E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	3.3E-07	mg/kg-day	7.3E-02	(mg/kg-day)-1	Yes	4.8E-08	1.2E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	2.1E-07	mg/kg-day	7.3E+00	(mg/kg-day)-1	Yes	3.0E-06	7.2E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	3.5E-07	mg/kg-day	7.3E-01	(mg/kg-day)-1	Yes	5.1E-07	1.2E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									1.4E-05					3.7E-03
		Exposure Point Total										1.9E-05					4.6E-03
	Exposure Medium Total											1.9E-05					4.6E-03
Medium Total												1.9E-05					4.6E-03
Groundwater	Vapor Intrusion from Groundwater	Indoor Air Adult Former FWEC Facility MIP Area 2	Inhalation	1,1,1-Trichloroethane	4.21E+01	mg/m^3	1.2E+01	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	4.0E+01	mg/m^3	5.0E+00	mg/m^3	8.1E+00
				1,1,2-Trichloroethane	3.93E-02	mg/m^3	1.1E-02	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	No	1.7E-04	3.8E-02	mg/m^3	2.0E-04	mg/m^3	1.9E+02
				1,1-Dichloroethane	2.88E+00	mg/m^3	7.9E-01	mg/m^3	1.6E-03	$(mg/m^3)^{-1}$	No	1.3E-03	2.8E+00	mg/m^3	-	mg/m^3	-
				1,1-Dichloroethene	6.19E+00	mg/m^3	1.7E+00	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	5.9E+00	mg/m^3	2.0E-01	mg/m^3	3.0E+01
				Mercury	9.81E-04	mg/m^3	2.7E-04	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	9.4E-04	mg/m^3	3.0E-04	mg/m^3	3.1E+00
				Naphthalene	2.10E-02	mg/m^3	5.8E-03	mg/m^3	3.4E-02	$(mg/m^3)^{-1}$	No	2.0E-04	2.0E-02	mg/m^3	3.0E-03	mg/m^3	6.7E+00
				Ethylbenzene	4.21E-02	mg/m^3	1.2E-02	mg/m^3	2.5E-03	$(mg/m^3)^{-1}$	No	2.9E-05	4.0E-02	mg/m^3	1.0E+00	mg/m^3	4.0E-02
				Tetrachloroethene	6.41E-02	mg/m^3	1.8E-02	mg/m^3	2.6E-04	$(mg/m^3)^{-1}$	No	4.6E-06	6.1E-02	mg/m^3	4.0E-02	mg/m^3	1.5E+00
				Trichloroethene	6.64E-02	mg/m^3	1.8E-02	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	Yes	6.0E-04	6.4E-02	mg/m^3	2.0E-03	mg/m^3	3.2E+01
				Xylenes, Total	2.97E-01	mg/m^3	8.1E-02	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	2.8E-01	mg/m^3	1.0E-01	mg/m^3	2.8E+00
			Exp. Route Total									2.3E-03					2.7E+02
		Exposure Point Total										2.3E-03					2.7E+02
	Exposure Medium Total											2.3E-03					2.7E+02
Medium Total												2.3E-03					2.7E+02
Total of Receptor Risks Across All Media												3.1E-03	Total of Receptor Hazards Across All Media				3.5E+02
Lifetime Total for Groundwater												1.0E-03					NA
Lifetime Total for Soil												4.1E-04					NA
Lifetime Total for Sediment												1.4E-04					NA
Lifetime Total for Indoor Air												2.8E-03					NA
Lifetime Total Across All Media												4.4E-03					NA

Notes: (a) Per the USEPA (2005), the following default age-dependant adjustment factors (ADAF) were applied to the slope factor for the COPCS with a mutagenic mode of action:

AGE	ADAF
0-<2	10
2-<16	3
16-<30	1

For the purposes of application of the ADAF, the child receptor is aged 0 to 6 and the adult receptor is aged 6 to 26. Therefore, an ADAF of 5.3 was calculated for Child 0-6 years of age as the age-weighted ADAF for children 0<2 (ADAF=10) and children 2<6 (ADAF=3), [(2 yrs x 10) + (3 yrs x 4)] / 6 yrs = 5.3]. Similarly, an ADAF of 2 was calculated for the Adult 6 to 26 years of ages [((10 yrs x 3) + (10 yrs x 1)) / 20 yrs = 2]. The ADAF is only applied to the kidney portion of the CSF / Unit Risk for trichloroethene (9.3E-03 for oral and dermal exposures; 1E-03 for inhalation exposure). The ADAF is not applied to the lymphoid tissue or liver portions of the CSF / Unit Risk (3.7E-02 for oral and dermal exposure; 3.1E-03 for inhalaition exposure). Although vinly chloride is a mutagen, the ADAF approach is not used. Instead, the equations for intake include the sum of the prorated and unprorated terms for the child and just the prorated (conventional) term for the adult. See Table 4.2 for intake equations.

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Chromium (total) in groundwater is assumed to be Chromium VI due to the absence of valid groundwater chromium speciation data.

Arsenic ingestion intakes from soil and sediment reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Former FWEC Facility	Ingestion	Formaldehyde	6.24E-03	mg/L	1.9E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				Cyanide	5.62E-03	mg/L	1.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.9E-05	mg/kg-day	6.0E-04	mg/kg-day	3.2E-02
				Aluminum	6.31E-01	mg/L	1.9E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.2E-03	mg/kg-day	1.0E+00	mg/kg-day	2.2E-03
				Barium	1.40E-01	mg/L	4.3E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	4.8E-04	mg/kg-day	2.0E-01	mg/kg-day	2.4E-03
				Cadmium	2.90E-03	mg/L	8.9E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.9E-06	mg/kg-day	1.0E-03	mg/kg-day	9.9E-03
				Chromium	6.92E-03	mg/L	2.1E-05	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	1.1E-05	2.4E-05	mg/kg-day	3.0E-03	mg/kg-day	7.9E-03
				Cobalt	5.39E-03	mg/L	1.6E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.8E-05	mg/kg-day	3.0E-04	mg/kg-day	6.2E-02
				Iron	3.09E+01	mg/L	9.4E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-01	mg/kg-day	7.0E-01	mg/kg-day	1.5E-01
				Lead	1.65E-02	mg/L	5.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.7E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	1.3E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.5E-02	mg/kg-day	2.4E-02	mg/kg-day	6.1E-01
				Mercury	2.30E-04	mg/L	7.0E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.9E-07	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	6.9E-07	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	2.0E-08	7.7E-07	mg/kg-day	1.0E-02	mg/kg-day	7.7E-05
				1,1,2-Trichloroethane	3.40E-04	mg/L	1.0E-06	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	5.9E-08	1.2E-06	mg/kg-day	4.0E-03	mg/kg-day	2.9E-04
				1,1-Dichloroethane	1.76E-03	mg/L	5.4E-06	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	3.1E-08	6.0E-06	mg/kg-day	2.0E-01	mg/kg-day	3.0E-05
				1,1-Dichloroethene	6.18E-03	mg/L	1.9E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.1E-05	mg/kg-day	5.0E-02	mg/kg-day	4.2E-04
				1,2-Dichloroethane	2.10E-04	mg/L	6.4E-07	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	5.8E-08	7.2E-07	mg/kg-day	6.0E-03	mg/kg-day	1.2E-04
				1,4-Dioxane	5.43E-03	mg/L	1.7E-05	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	1.7E-06	1.9E-05	mg/kg-day	3.0E-02	mg/kg-day	6.2E-04
				Benzene	1.29E-04	mg/L	3.9E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.2E-08	4.4E-07	mg/kg-day	4.0E-03	mg/kg-day	1.1E-04
				Chloroform	9.63E-05	mg/L	2.9E-07	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	9.1E-09	3.3E-07	mg/kg-day	1.0E-02	mg/kg-day	3.3E-05
				cis-1,2-Dichloroethene	1.42E-03	mg/L	4.3E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	4.8E-06	mg/kg-day	2.0E-03	mg/kg-day	2.4E-03
				Tetrachloroethene	1.45E-03	mg/L	4.4E-06	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	9.3E-09	5.0E-06	mg/kg-day	6.0E-03	mg/kg-day	8.3E-04
				Trichloroethene	7.46E-01	mg/L	2.3E-03	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	1.0E-04	2.6E-03	mg/kg-day	5.0E-04	mg/kg-day	5.1E+00
				Vinyl chloride	3.30E-04	mg/L	1.0E-06	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	7.3E-07	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.8E-04
			Exp. Route Total								1.2E-04					6.0E+00
			Dermal Absorption (During Use of Tap Water in the Workplace)	Formaldehyde	6.24E-03	mg/L	4.2E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.2E-07	mg/kg-day	2.0E-01	mg/kg-day	5.9E-07
				Cyanide	5.62E-03	mg/L	9.5E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.7E-08	mg/kg-day	6.0E-04	mg/kg-day	4.5E-05
				Aluminum	6.31E-01	mg/L	1.1E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.0E-06	mg/kg-day	1.0E+00	mg/kg-day	3.0E-06
				Barium	1.40E-01	mg/L	2.4E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	6.7E-07	mg/kg-day	1.4E-02	mg/kg-day	4.8E-05
				Cadmium	2.90E-03	mg/L	1.8E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.1E-08	mg/kg-day	2.5E-05	mg/kg-day	2.0E-03
				Chromium	6.92E-03	mg/L	5.9E-08	mg/kg-day	2.0E+01	(mg/kg-day)$^{-1}$	1.2E-06	1.6E-07	mg/kg-day	7.5E-05	mg/kg-day	2.2E-03
				Cobalt	5.39E-03	mg/L	3.7E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.0E-08	mg/kg-day	3.0E-04	mg/kg-day	3.4E-05
				Iron	3.09E+01	mg/L	5.2E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.5E-04	mg/kg-day	7.0E-01	mg/kg-day	2.1E-04
				Lead	1.65E-02	mg/L	2.8E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.8E-09	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	7.2E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.0E-05	mg/kg-day	9.6E-04	mg/kg-day	2.1E-02
				Mercury	2.30E-04	mg/L	3.9E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-09	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	1.6E-07	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	4.5E-09	4.4E-07	mg/kg-day	1.0E-02	mg/kg-day	4.4E-05
				1,1,2-Trichloroethane	3.40E-04	mg/L	1.2E-08	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	7.0E-10	3.4E-08	mg/kg-day	4.0E-03	mg/kg-day	8.6E-06
				1,1-Dichloroethane	1.76E-03	mg/L	6.8E-08	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	3.9E-10	1.9E-07	mg/kg-day	2.0E-01	mg/kg-day	9.6E-07
				1,1-Dichloroethene	6.18E-03	mg/L	4.1E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.2E-06	mg/kg-day	5.0E-02	mg/kg-day	2.3E-05
				1,2-Dichloroethane	2.10E-04	mg/L	5.1E-09	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	4.6E-10	1.4E-08	mg/kg-day	6.0E-03	mg/kg-day	2.4E-06
				1,4-Dioxane	5.43E-03	mg/L	9.7E-09	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	9.7E-10	2.7E-08	mg/kg-day	3.0E-02	mg/kg-day	9.0E-07
				Benzene	1.29E-04	mg/L	9.7E-09	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	5.3E-10	2.7E-08	mg/kg-day	4.0E-03	mg/kg-day	6.8E-06
				Chloroform	9.63E-05	mg/L	4.3E-09	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	1.3E-10	1.2E-08	mg/kg-day	1.0E-02	mg/kg-day	1.2E-06
				cis-1,2-Dichloroethene	1.42E-03	mg/L	8.8E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.5E-07	mg/kg-day	2.0E-03	mg/kg-day	1.2E-04
				Tetrachloroethene	1.45E-03	mg/L	4.3E-07	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	9.0E-10	1.2E-06	mg/kg-day	6.0E-03	mg/kg-day	2.0E-04
				Trichloroethene	7.46E-01	mg/L	6.1E-05	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	2.8E-06	1.7E-04	mg/kg-day	5.0E-04	mg/kg-day	3.4E-01
				Vinyl chloride	3.30E-04	mg/L	1.3E-08	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	9.1E-09	3.5E-08	mg/kg-day	3.0E-03	mg/kg-day	1.2E-05
			Exp. Route Total								4.0E-06					3.7E-01
		Exposure Point Total									1.2E-04					6.4E+00
	Exposure Medium Total										1.2E-04					6.4E+00
Medium Total											1.2E-04					6.4E+00

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs)	MIP1	Incidental Ingestion	Formaldehyde	6.24E-03	mg/L	1.9E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				Arsenic	7.10E+00	mg/kg	6.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	9.8E-07	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	6.1E-03
				Cobalt	8.50E+00	mg/kg	1.3E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.6E-06	mg/kg-day	3.0E-04	mg/kg-day	1.2E-02
				Iron	2.05E+04	mg/kg	3.1E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	8.8E-03	mg/kg-day	7.0E-01	mg/kg-day	1.3E-02
				Manganese	4.20E+02	mg/kg	6.4E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.8E-04	mg/kg-day	2.4E-02	mg/kg-day	7.5E-03
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	6.6E-07	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-07	1.8E-06	mg/kg-day	2.0E-02	mg/kg-day	9.2E-05
				1,1,2-Trichloroethane	2.94E+00	mg/kg	4.5E-07	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	2.6E-08	1.3E-06	mg/kg-day	4.0E-03	mg/kg-day	3.1E-04
				Trichloroethene	4.10E+02	mg/kg	6.3E-05	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	2.9E-06	1.8E-04	mg/kg-day	5.0E-04	mg/kg-day	3.5E-01
			Exp. Route Total								4.0E-06					3.9E-01
			Dermal Absorption	Arsenic	7.10E+00	mg/kg	2.8E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-07	7.7E-07	mg/kg-day	3.0E-04	mg/kg-day	2.6E-03
				Cobalt	8.50E+00	mg/kg	1.1E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.1E-07	mg/kg-day	3.0E-04	mg/kg-day	1.0E-03
				Iron	2.05E+04	mg/kg	2.7E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	7.4E-04	mg/kg-day	7.0E-01	mg/kg-day	1.1E-03
				Manganese	4.20E+02	mg/kg	5.4E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.5E-05	mg/kg-day	9.6E-04	mg/kg-day	1.6E-02
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	2.8E-09	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-10	7.8E-09	mg/kg-day	2.0E-02	mg/kg-day	3.9E-07
				1,1,2-Trichloroethane	2.94E+00	mg/kg	1.9E-09	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	1.1E-10	5.3E-09	mg/kg-day	4.0E-03	mg/kg-day	1.3E-06
				Trichloroethene	4.10E+02	mg/kg	2.7E-07	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-08	7.4E-07	mg/kg-day	5.0E-04	mg/kg-day	1.5E-03
			Exp. Route Total								4.3E-07					2.2E-02
		MIP1 - Particulates and Volatilization	Inhalation	Arsenic	5.22E-09	mg/m^3	4.3E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.8E-09	1.2E-09	mg/m^3	1.5E-05	mg/m^3	7.9E-05
				Cobalt	6.25E-09	mg/m^3	5.1E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	4.6E-09	1.4E-09	mg/m^3	6.0E-06	mg/m^3	2.4E-04
				Iron	1.51E-05	mg/m^3	1.2E-06	mg/m^3	-	$(mg/m^3)^{-1}$	-	3.4E-06	mg/m^3	-	mg/m^3	-
				Manganese	3.09E-07	mg/m^3	2.5E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	7.1E-08	mg/m^3	5.0E-05	mg/m^3	1.4E-03
				1,1,2,2-Tetrachloroethane	2.21E-04	mg/m^3	1.8E-05	mg/m^3	5.8E-02	$(mg/m^3)^{-1}$	1.0E-06	5.0E-05	mg/m^3	-	mg/m^3	-
				1,1,2-Trichloroethane	3.15E-04	mg/m^3	2.6E-05	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	4.1E-07	7.2E-05	mg/m^3	2.0E-04	mg/m^3	3.6E-01
				Trichloroethene	1.44E-01	mg/m^3	1.2E-02	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	4.8E-05	3.3E-02	mg/m^3	2.0E-03	mg/m^3	1.6E+01
			Exp. Route Total								4.9E-05					1.7E+01
		Exposure Point Total									5.4E-05					1.7E+01

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont)	MIP2	Incidental Ingestion	Formaldehyde	6.24E-03	mg/L	1.9E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				Cyanide	2.90E-01	mg/kg	4.4E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.2E-07	mg/kg-day	6.0E-04	mg/kg-day	2.1E-04
				Arsenic	6.26E+00	mg/kg	5.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.6E-07	1.6E-06	mg/kg-day	3.0E-04	mg/kg-day	5.4E-03
				Cobalt	1.08E+01	mg/kg	1.7E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	4.6E-06	mg/kg-day	3.0E-04	mg/kg-day	1.5E-02
				Iron	2.13E+04	mg/kg	3.2E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	9.1E-03	mg/kg-day	7.0E-01	mg/kg-day	1.3E-02
				Manganese	7.04E+02	mg/kg	1.1E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.0E-04	mg/kg-day	2.4E-02	mg/kg-day	1.3E-02
				Benzo[a]anthracene	3.40E-01	mg/kg	5.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.8E-08	1.5E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	1.3E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.5E-08	3.6E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	3.5E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.6E-08	9.8E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	4.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.0E-08	1.2E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								1.0E-06					4.7E-02
			Dermal Absorption	Cyanide	2.90E-01	mg/kg	1.9E-10	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.3E-10	mg/kg-day	6.0E-04	mg/kg-day	8.8E-07
				Arsenic	6.26E+00	mg/kg	2.4E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-07	6.8E-07	mg/kg-day	3.0E-04	mg/kg-day	2.3E-03
				Cobalt	1.08E+01	mg/kg	1.4E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Iron	2.13E+04	mg/kg	2.8E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	7.7E-04	mg/kg-day	7.0E-01	mg/kg-day	1.1E-03
				Manganese	7.04E+02	mg/kg	9.1E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.6E-05	mg/kg-day	9.6E-04	mg/kg-day	2.7E-02
				Benzo[a]anthracene	3.40E-01	mg/kg	5.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.2E-08	1.6E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	1.4E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07	4.0E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	3.9E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-08	1.1E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	4.5E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-08	1.3E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								5.7E-07					3.1E-02
		MIP2 - Particulates and Volatilization	Inhalation	Cyanide	6.43E-05	mg/m^3	5.2E-06	mg/m^3	-	$(mg/m^3)^{-1}$	-	1.5E-05	mg/m^3	8.0E-04	mg/m^3	1.8E-02
				Arsenic	4.60E-09	mg/m^3	3.8E-10	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.6E-09	1.1E-09	mg/m^3	1.5E-05	mg/m^3	7.0E-05
				Cobalt	7.94E-09	mg/m^3	6.5E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	5.8E-09	1.8E-09	mg/m^3	6.0E-06	mg/m^3	3.0E-04
				Iron	1.56E-05	mg/m^3	1.3E-06	mg/m^3	-	$(mg/m^3)^{-1}$	-	3.6E-06	mg/m^3	-	mg/m^3	-
				Manganese	5.18E-07	mg/m^3	4.2E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	1.2E-07	mg/m^3	5.0E-05	mg/m^3	2.4E-03
				Benzo[a]anthracene	2.50E-10	mg/m^3	2.0E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	2.2E-12	5.7E-11	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	6.25E-11	mg/m^3	5.1E-12	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	5.6E-12	1.4E-11	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	1.69E-10	mg/m^3	1.4E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	1.5E-12	3.9E-11	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.99E-11	mg/m^3	1.6E-12	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	1.9E-12	4.5E-12	mg/m^3	-	mg/m^3	-
			Exp. Route Total								7.5E-09					2.1E-02
		Exposure Point Total									1.6E-06					9.9E-02

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont)	Former Shot Blast Area (FBSA)	Incidental Ingestion	Formaldehyde	6.24E-03	mg/L	1.9E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				Aluminum	6.20E+03	mg/kg	9.5E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.7E-03	mg/kg-day	1.0E+00	mg/kg-day	2.7E-03
				Arsenic	6.66E+00	mg/kg	6.1E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	9.2E-07	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.7E-03
				Chromium VI	9.45E-01	mg/kg	1.4E-07	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	7.2E-08	4.0E-07	mg/kg-day	3.0E-03	mg/kg-day	1.3E-04
				Cobalt	3.00E+01	mg/kg	4.6E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	4.3E-02
				Copper	3.11E+02	mg/kg	4.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.3E-04	mg/kg-day	4.0E-02	mg/kg-day	3.3E-03
				Iron	2.37E+04	mg/kg	3.6E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.0E-02	mg/kg-day	7.0E-01	mg/kg-day	1.5E-02
				Lead	2.71E+02	mg/kg	4.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.2E-04	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	7.4E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.1E-04	mg/kg-day	2.4E-02	mg/kg-day	8.7E-03
				Nickel	2.06E+02	mg/kg	3.2E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.8E-05	mg/kg-day	2.0E-02	mg/kg-day	4.4E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	1.2E-07	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	8.4E-08	3.2E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	1.7E-07	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.2E-06	4.7E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	1.2E-07	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	8.8E-08	3.4E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	2.1E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.6E-07	6.0E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	7.6E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	5.6E-08	2.1E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								2.6E-06					8.2E-02
			Dermal Absorption	Aluminum	6.20E+03	mg/kg	8.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.2E-04	mg/kg-day	1.0E+00	mg/kg-day	2.2E-04
				Arsenic	6.66E+00	mg/kg	2.6E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	3.9E-07	7.2E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Chromium VI	9.45E-01	mg/kg	1.2E-08	mg/kg-day	2.0E+01	(mg/kg-day)$^{-1}$	2.4E-07	3.4E-08	mg/kg-day	7.5E-05	mg/kg-day	4.6E-04
				Cobalt	3.00E+01	mg/kg	3.9E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	3.6E-03
				Copper	3.11E+02	mg/kg	4.0E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-05	mg/kg-day	4.0E-02	mg/kg-day	2.8E-04
				Iron	2.37E+04	mg/kg	3.1E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.6E-04	mg/kg-day	7.0E-01	mg/kg-day	1.2E-03
				Lead	2.71E+02	mg/kg	3.5E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.8E-06	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	6.3E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.8E-05	mg/kg-day	9.6E-04	mg/kg-day	1.8E-02
				Nickel	2.06E+02	mg/kg	2.7E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.5E-06	mg/kg-day	8.0E-04	mg/kg-day	9.3E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	1.3E-07	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	9.3E-08	3.6E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	1.8E-07	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.3E-06	5.2E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	1.3E-07	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	9.7E-08	3.7E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	2.3E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.7E-07	6.5E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	8.4E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	6.1E-08	2.3E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								2.4E-06					3.6E-02
		FSBA - Particulates and Volatilization	Inhalation	Aluminum	4.56E-06	mg/m^3	3.7E-07	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.0E-06	mg/m^3	5.0E-03	mg/m^3	2.1E-04
				Arsenic	4.90E-09	mg/m^3	4.0E-10	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	1.7E-09	1.1E-09	mg/m^3	1.5E-05	mg/m^3	7.5E-05
				Chromium VI	6.95E-10	mg/m^3	5.7E-11	mg/m^3	8.4E+01	(mg/m^3)$^{-1}$	4.8E-09	1.6E-10	mg/m^3	1.0E-04	mg/m^3	1.6E-06
				Cobalt	2.20E-08	mg/m^3	1.8E-09	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	1.6E-08	5.0E-09	mg/m^3	6.0E-06	mg/m^3	8.4E-04
				Copper	2.28E-07	mg/m^3	1.9E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	5.2E-08	mg/m^3	-	mg/m^3	-
				Iron	1.75E-05	mg/m^3	1.4E-06	mg/m^3	-	(mg/m^3)$^{-1}$	-	4.0E-06	mg/m^3	-	mg/m^3	-
				Lead	2.00E-07	mg/m^3	1.6E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	4.6E-08	mg/m^3	-	mg/m^3	-
				Manganese	3.58E-07	mg/m^3	2.9E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	8.2E-08	mg/m^3	5.0E-05	mg/m^3	1.6E-03
				Nickel	1.52E-07	mg/m^3	1.2E-08	mg/m^3	2.6E-01	(mg/m^3)$^{-1}$	3.2E-09	3.5E-08	mg/m^3	9.0E-05	mg/m^3	3.8E-04
				Benzo[a]pyrene	5.56E-10	mg/m^3	4.5E-11	mg/m^3	1.1E+00	(mg/m^3)$^{-1}$	5.0E-11	1.3E-10	mg/m^3	-	mg/m^3	-
				Benzo[a]anthracene	8.05E-10	mg/m^3	6.6E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	7.2E-12	1.8E-10	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	5.82E-10	mg/m^3	4.7E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	5.2E-12	1.3E-10	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.02E-10	mg/m^3	8.3E-12	mg/m^3	1.2E+00	(mg/m^3)$^{-1}$	1.0E-11	2.3E-11	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	3.66E-10	mg/m^3	3.0E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	3.3E-12	8.4E-11	mg/m^3	-	mg/m^3	-
			Exp. Route Total								2.6E-08					3.1E-03
		Exposure Point Total									5.0E-06					1.2E-01

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont)	Expended Waste Area (EWA)	Incidental Ingestion	Formaldehyde	6.24E-03	mg/L	1.9E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				Arsenic	8.40E+00	mg/kg	7.7E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	1.2E-06	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.2E-03
				Cobalt	3.40E+01	mg/kg	5.2E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	4.9E-02
				Copper	3.27E+02	mg/kg	5.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.4E-04	mg/kg-day	4.0E-02	mg/kg-day	3.5E-03
				Iron	2.81E+04	mg/kg	4.3E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.2E-02	mg/kg-day	7.0E-01	mg/kg-day	1.7E-02
				Manganese	8.59E+02	mg/kg	1.3E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.7E-04	mg/kg-day	2.4E-02	mg/kg-day	1.5E-02
				Nickel	1.91E+02	mg/kg	2.9E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.2E-05	mg/kg-day	2.0E-02	mg/kg-day	4.1E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	4.3E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	3.1E-08	1.2E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	3.9E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	2.9E-07	1.1E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	6.1E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	4.5E-08	1.7E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	7.3E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	5.3E-08	2.0E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	2.8E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.1E-08	8.0E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								1.6E-06					9.6E-02
			Dermal Absorption	Arsenic	8.40E+00	mg/kg	3.3E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	4.9E-07	9.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.0E-03
				Cobalt	3.40E+01	mg/kg	4.4E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	4.1E-03
				Copper	3.27E+02	mg/kg	4.2E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.2E-05	mg/kg-day	4.0E-02	mg/kg-day	3.0E-04
				Iron	2.81E+04	mg/kg	3.6E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.0E-03	mg/kg-day	7.0E-01	mg/kg-day	1.5E-03
				Manganese	8.59E+02	mg/kg	1.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.1E-05	mg/kg-day	9.6E-04	mg/kg-day	3.2E-02
				Nickel	1.91E+02	mg/kg	2.5E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	6.9E-06	mg/kg-day	8.0E-04	mg/kg-day	8.6E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	4.7E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	3.4E-08	1.3E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	4.3E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	3.2E-07	1.2E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	6.8E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	4.9E-08	1.9E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	8.0E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	5.9E-08	2.3E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	3.1E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.3E-08	8.8E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								9.7E-07					5.0E-02
		EWA - Particulates and Volatilization	Inhalation	Arsenic	6.18E-09	mg/m^3	5.0E-10	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	2.2E-09	1.4E-09	mg/m^3	1.5E-05	mg/m^3	9.4E-05
				Cobalt	2.50E-08	mg/m^3	2.0E-09	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	1.8E-08	5.7E-09	mg/m^3	6.0E-06	mg/m^3	9.5E-04
				Copper	2.41E-07	mg/m^3	2.0E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	5.5E-08	mg/m^3	-	mg/m^3	-
				Iron	2.07E-05	mg/m^3	1.7E-06	mg/m^3	-	(mg/m^3)$^{-1}$	-	4.7E-06	mg/m^3	-	mg/m^3	-
				Manganese	6.31E-07	mg/m^3	5.1E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.4E-07	mg/m^3	5.0E-05	mg/m^3	2.9E-03
				Nickel	1.40E-07	mg/m^3	1.1E-08	mg/m^3	2.6E-01	(mg/m^3)$^{-1}$	3.0E-09	3.2E-08	mg/m^3	9.0E-05	mg/m^3	3.6E-04
				Benzo[a]anthracene	2.05E-10	mg/m^3	1.7E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	1.8E-12	4.7E-11	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	1.89E-10	mg/m^3	1.5E-11	mg/m^3	1.1E+00	(mg/m^3)$^{-1}$	1.7E-11	4.3E-11	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	2.96E-10	mg/m^3	2.4E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	2.7E-12	6.7E-11	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	3.51E-11	mg/m^3	2.9E-12	mg/m^3	1.2E+00	(mg/m^3)$^{-1}$	3.4E-12	8.0E-12	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	1.37E-10	mg/m^3	1.1E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	1.2E-12	3.1E-11	mg/m^3	-	mg/m^3	-
			Exp. Route Total								2.4E-08					4.3E-03
		Exposure Point Total									2.6E-06					1.5E-01
	Exposure Medium Total - Average for All Areas										1.6E-05					4.4E+00
Medium Total											1.6E-05					4.4E+00

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Vapor Intrusion from Groundwater	Indoor Air Former FWEC Facility MIP Area 2	Inhalation	Formaldehyde	6.24E-03	mg/L	1.9E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				1,1,1-Trichloroethane	4.21E+01	mg/m^3	3.4E+00	mg/m^3	-	$(mg/m^3)^{-1}$	-	9.6E+00	mg/m^3	5.0E+00	mg/m^3	1.9E+00
				1,1,2-Trichloroethane	3.93E-02	mg/m^3	3.2E-03	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	5.1E-05	9.0E-03	mg/m^3	2.0E-04	mg/m^3	4.5E+01
				1,1-Dichloroethane	2.88E+00	mg/m^3	2.3E-01	mg/m^3	1.6E-03	$(mg/m^3)^{-1}$	3.8E-04	6.6E-01	mg/m^3	-	mg/m^3	-
				1,1-Dichloroethene	6.19E+00	mg/m^3	5.0E-01	mg/m^3	-	$(mg/m^3)^{-1}$	-	1.4E+00	mg/m^3	2.0E-01	mg/m^3	7.1E+00
				Mercury	9.81E-04	mg/m^3	8.0E-05	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.2E-04	mg/m^3	3.0E-04	mg/m^3	7.5E-01
				Naphthalene	2.10E-02	mg/m^3	1.7E-03	mg/m^3	3.4E-02	$(mg/m^3)^{-1}$	5.8E-05	4.8E-03	mg/m^3	3.0E-03	mg/m^3	1.6E+00
				Ethylbenzene	4.21E-02	mg/m^3	3.4E-03	mg/m^3	2.5E-03	$(mg/m^3)^{-1}$	8.6E-06	9.6E-03	mg/m^3	1.0E+00	mg/m^3	9.6E-03
				Tetrachloroethene	6.41E-02	mg/m^3	5.2E-03	mg/m^3	2.6E-04	$(mg/m^3)^{-1}$	1.4E-06	1.5E-02	mg/m^3	4.0E-02	mg/m^3	3.7E-01
				Trichloroethene	6.64E-02	mg/m^3	5.4E-03	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	2.2E-05	1.5E-02	mg/m^3	2.0E-03	mg/m^3	7.6E+00
				Xylenes, Total	2.97E-01	mg/m^3	2.4E-02	mg/m^3	-	$(mg/m^3)^{-1}$	-	6.8E-02	mg/m^3	1.0E-01	mg/m^3	6.8E-01
			Exp. Route Total								5.2E-04					6.5E+01
		Exposure Point Total									5.2E-04					6.5E+01
	Exposure Medium Total										5.2E-04					6.5E+01
Medium Total											5.2E-04					6.5E+01
										Total of Receptor Risks Across All Media	6.5E-04				Total of Receptor Hazards Across All Media	7.6E+01

Notes:

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Chromium (total) in groundwater is assumed to be Chromium VI due to the absence of valid groundwater chromium speciation data.

Arsenic ingestion intakes from soil reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	FFF - Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	Surface Soil (0 -1 ft bgs)	MIP1	Incidental Ingestion	1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	8.9E-08	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	No	1.8E-08	1.0E-06	mg/kg-day	2.0E-02	mg/kg-day	5.2E-05
				1,1,2-Trichloroethane	2.94E+00	mg/kg	6.1E-08	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	No	3.5E-09	7.1E-07	mg/kg-day	4.0E-03	mg/kg-day	1.8E-04
				Trichloroethene	4.10E+02	mg/kg	8.5E-06	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	5.5E-07	9.9E-05	mg/kg-day	5.0E-04	mg/kg-day	2.0E-01
			Exp. Route Total									5.7E-07					2.0E-01
			Dermal Absorption	1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	2.4E-10	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	No	4.9E-11	2.8E-09	mg/kg-day	2.0E-02	mg/kg-day	1.4E-07
				1,1,2-Trichloroethane	2.94E+00	mg/kg	1.7E-10	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	No	9.5E-12	1.9E-09	mg/kg-day	4.0E-03	mg/kg-day	4.9E-07
				Trichloroethene	4.10E+02	mg/kg	2.3E-08	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	1.5E-09	2.7E-07	mg/kg-day	5.0E-04	mg/kg-day	5.4E-04
			Exp. Route Total									1.6E-09					5.4E-04
		MIP1 - Particulates and Volatilization	Inhalation	1,1,2,2-Tetrachloroethane	2.21E-04	mg/m^3	4.3E-07	mg/m^3	5.8E-02	$(mg/m^3)^{-1}$	No	2.5E-08	5.0E-06	mg/m^3	-	mg/m^3	-
				1,1,2-Trichloroethane	3.15E-04	mg/m^3	6.2E-07	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	No	9.9E-09	7.2E-06	mg/m^3	2.0E-04	mg/m^3	3.6E-02
				Trichloroethene	1.44E-01	mg/m^3	2.8E-04	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	Yes	1.7E-06	3.3E-03	mg/m^3	2.0E-03	mg/m^3	1.6E+00
			Exp. Route Total									1.7E-06					1.7E+00
		Exposure Point Total										2.3E-06					1.9E+00

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	FFF - Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	Surface Soil (0 -1 ft bgs) (cont.)	Former Shot Blast Area (FBSA)	Incidental Ingestion	Aluminum	6.20E+03	mg/kg	1.3E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.5E-03	mg/kg-day	1.0E+00	mg/kg-day	1.5E-03
				Arsenic	6.66E+00	mg/kg	8.3E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	No	1.2E-07	9.6E-07	mg/kg-day	3.0E-04	mg/kg-day	3.2E-03
				Chromium VI	9.45E-01	mg/kg	2.0E-08	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	Yes	2.9E-08	2.3E-07	mg/kg-day	3.0E-03	mg/kg-day	7.6E-05
				Cobalt	3.00E+01	mg/kg	6.2E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	7.2E-06	mg/kg-day	3.0E-04	mg/kg-day	2.4E-02
				Copper	3.11E+02	mg/kg	6.4E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	7.5E-05	mg/kg-day	4.0E-02	mg/kg-day	1.9E-03
				Iron	2.37E+04	mg/kg	4.9E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	5.7E-03	mg/kg-day	7.0E-01	mg/kg-day	8.2E-03
				Lead	2.71E+02	mg/kg	5.6E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	6.5E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	1.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.2E-04	mg/kg-day	2.4E-02	mg/kg-day	4.9E-03
				Nickel	2.06E+02	mg/kg	4.3E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	5.0E-05	mg/kg-day	2.0E-02	mg/kg-day	2.5E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	1.6E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	Yes	3.4E-08	1.8E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	2.3E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	Yes	5.0E-07	2.6E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	1.6E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	Yes	3.6E-08	1.9E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	2.9E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	Yes	6.3E-08	3.4E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	1.0E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	Yes	2.3E-08	1.2E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									8.0E-07					4.6E-02
			Dermal Absorption	Aluminum	6.20E+03	mg/kg	7.0E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	8.2E-05	mg/kg-day	1.0E+00	mg/kg-day	8.2E-05
				Arsenic	6.66E+00	mg/kg	2.3E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	No	3.4E-08	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	8.8E-04
				Chromium VI	9.45E-01	mg/kg	1.1E-09	mg/kg-day	2.0E+01	(mg/kg-day)$^{-1}$	Yes	6.4E-08	1.2E-08	mg/kg-day	7.5E-05	mg/kg-day	1.7E-04
				Cobalt	3.00E+01	mg/kg	3.4E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.0E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Copper	3.11E+02	mg/kg	3.5E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.1E-06	mg/kg-day	4.0E-02	mg/kg-day	1.0E-04
				Iron	2.37E+04	mg/kg	2.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.1E-04	mg/kg-day	7.0E-01	mg/kg-day	4.5E-04
				Lead	2.71E+02	mg/kg	3.1E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.6E-06	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	5.5E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	6.4E-06	mg/kg-day	9.6E-04	mg/kg-day	6.7E-03
				Nickel	2.06E+02	mg/kg	2.3E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.7E-06	mg/kg-day	8.0E-04	mg/kg-day	3.4E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	1.1E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	Yes	2.4E-08	1.3E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	1.6E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	Yes	3.5E-07	1.9E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	Yes	2.6E-08	1.4E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	2.0E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	Yes	4.5E-08	2.4E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	7.3E-09	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	Yes	1.6E-08	8.6E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									5.6E-07					1.3E-02
		FSBA - Particulates and Volatilization	Inhalation	Aluminum	4.56E-06	mg/m^3	8.9E-09	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	1.0E-07	mg/m^3	5.0E-03	mg/m^3	2.1E-05
				Arsenic	4.90E-09	mg/m^3	9.6E-12	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	No	4.1E-11	1.1E-10	mg/m^3	1.5E-05	mg/m^3	7.5E-06
				Chromium VI	6.95E-10	mg/m^3	1.4E-12	mg/m^3	8.4E+01	(mg/m^3)$^{-1}$	Yes	3.4E-10	1.6E-11	mg/m^3	1.0E-04	mg/m^3	1.6E-07
				Cobalt	2.20E-08	mg/m^3	4.3E-11	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	No	3.9E-10	5.0E-10	mg/m^3	6.0E-06	mg/m^3	8.4E-05
				Copper	2.28E-07	mg/m^3	4.5E-10	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	5.2E-09	mg/m^3	-	mg/m^3	-
				Iron	1.75E-05	mg/m^3	3.4E-08	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	4.0E-07	mg/m^3	-	mg/m^3	-
				Lead	2.00E-07	mg/m^3	3.9E-10	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	4.6E-09	mg/m^3	-	mg/m^3	-
				Manganese	3.58E-07	mg/m^3	7.0E-10	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	8.2E-09	mg/m^3	5.0E-05	mg/m^3	1.6E-04
				Nickel	1.52E-07	mg/m^3	3.0E-10	mg/m^3	2.6E-01	(mg/m^3)$^{-1}$	No	7.7E-11	3.5E-09	mg/m^3	9.0E-05	mg/m^3	3.8E-05
				Benzo[a]pyrene	5.56E-10	mg/m^3	1.1E-12	mg/m^3	1.1E+00	(mg/m^3)$^{-1}$	Yes	3.6E-12	1.3E-11	mg/m^3	-	mg/m^3	-
				Benzo[a]anthracene	8.05E-10	mg/m^3	1.6E-12	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	Yes	5.2E-13	1.8E-11	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	5.82E-10	mg/m^3	1.1E-12	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	Yes	3.8E-13	1.3E-11	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.02E-10	mg/m^3	2.0E-13	mg/m^3	1.2E+00	(mg/m^3)$^{-1}$	Yes	7.2E-13	2.3E-12	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	3.66E-10	mg/m^3	7.2E-13	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	Yes	2.4E-13	8.4E-12	mg/m^3	-	mg/m^3	-
			Exp. Route Total									8.5E-10					3.1E-04
		Exposure Point Total										1.4E-06					6.0E-02

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	FFF - Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Soil	Surface Soil (0 -1 ft bgs) (cont.)	Expended Waste Area (EWA)	Incidental Ingestion	Arsenic	8.40E+00	mg/kg	1.0E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	1.6E-07	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	4.1E-03
				Cobalt	3.40E+01	mg/kg	7.0E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	8.2E-06	mg/kg-day	3.0E-04	mg/kg-day	2.7E-02
				Copper	3.27E+02	mg/kg	6.8E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	7.9E-05	mg/kg-day	4.0E-02	mg/kg-day	2.0E-03
				Iron	2.81E+04	mg/kg	5.8E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.8E-03	mg/kg-day	7.0E-01	mg/kg-day	9.7E-03
				Manganese	8.59E+02	mg/kg	1.8E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.1E-04	mg/kg-day	2.4E-02	mg/kg-day	8.6E-03
				Nickel	1.91E+02	mg/kg	3.9E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.6E-05	mg/kg-day	2.0E-02	mg/kg-day	2.3E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	5.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.3E-08	6.7E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	5.3E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.2E-07	6.2E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	8.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.8E-08	9.7E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	9.9E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	2.2E-08	1.2E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	3.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	8.4E-09	4.5E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									3.3E-07					5.4E-02
			Dermal Absorption	Arsenic	8.40E+00	mg/kg	2.9E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	4.3E-08	3.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Cobalt	3.40E+01	mg/kg	3.9E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.5E-03
				Copper	3.27E+02	mg/kg	3.7E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.3E-06	mg/kg-day	4.0E-02	mg/kg-day	1.1E-04
				Iron	2.81E+04	mg/kg	3.2E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.7E-04	mg/kg-day	7.0E-01	mg/kg-day	5.3E-04
				Manganese	8.59E+02	mg/kg	9.7E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.1E-05	mg/kg-day	9.6E-04	mg/kg-day	1.2E-02
				Nickel	1.91E+02	mg/kg	2.2E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.5E-06	mg/kg-day	8.0E-04	mg/kg-day	3.2E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	4.1E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	9.0E-09	4.8E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	3.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	8.3E-08	4.4E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	5.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	1.3E-08	6.9E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	7.0E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.5E-08	8.2E-09	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	2.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	6.0E-09	3.2E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									1.7E-07					1.8E-02
		EWA - Particulates and Volatilization	Inhalation	Arsenic	6.18E-09	mg/m^3	1.2E-11	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	No	5.2E-11	1.4E-10	mg/m^3	1.5E-05	mg/m^3	9.4E-06
				Cobalt	2.50E-08	mg/m^3	4.9E-11	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	No	4.4E-10	5.7E-10	mg/m^3	6.0E-06	mg/m^3	9.5E-05
				Copper	2.41E-07	mg/m^3	4.7E-10	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	5.5E-09	mg/m^3	-	mg/m^3	-
				Iron	2.07E-05	mg/m^3	4.0E-08	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	4.7E-07	mg/m^3	-	mg/m^3	-
				Manganese	6.31E-07	mg/m^3	1.2E-09	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	1.4E-08	mg/m^3	5.0E-05	mg/m^3	2.9E-04
				Nickel	1.40E-07	mg/m^3	2.7E-10	mg/m^3	2.6E-01	$(mg/m^3)^{-1}$	No	7.1E-11	3.2E-09	mg/m^3	9.0E-05	mg/m^3	3.6E-05
				Benzo[a]anthracene	2.05E-10	mg/m^3	4.0E-13	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.3E-13	4.7E-12	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	1.89E-10	mg/m^3	3.7E-13	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	Yes	1.2E-12	4.3E-12	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	2.96E-10	mg/m^3	5.8E-13	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	1.9E-13	6.7E-12	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	3.51E-11	mg/m^3	6.9E-14	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	Yes	2.5E-13	8.0E-13	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	1.37E-10	mg/m^3	2.7E-13	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	Yes	8.8E-14	3.1E-12	mg/m^3	-	mg/m^3	-
			Exp. Route Total									5.7E-10					4.3E-04
		Exposure Point Total										5.0E-07					7.3E-02
	Exposure Medium Total - Average for All Areas											1.4E-06					6.6E-01
Medium Total												1.4E-06					6.6E-01

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	FFF - Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Sediment	Sediment	Retention Pond	Incidental Ingestion	Arsenic	7.76E+00	mg/kg	1.2E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	1.7E-08	1.3E-07	mg/kg-day	3.0E-04	mg/kg-day	4.5E-04
				Manganese	2.00E+03	mg/kg	5.0E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	5.8E-05	mg/kg-day	2.4E-02	mg/kg-day	2.4E-03
				Benzo[a]anthracene	1.15E+02	mg/kg	2.8E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	6.2E-07	3.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	2.2E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	4.9E-06	2.6E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	2.7E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	6.0E-07	3.2E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	1.3E-07	mg/kg-day	7.3E-02	$(mg/kg\text{-}day)^{-1}$	Yes	2.8E-08	1.5E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	7.9E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.7E-06	9.3E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	1.3E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	3.0E-07	1.6E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									8.2E-06					2.9E-03
			Dermal Absorption	Arsenic	7.76E+00	mg/kg	3.2E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	4.7E-09	3.7E-08	mg/kg-day	3.0E-04	mg/kg-day	1.2E-04
				Manganese	2.00E+03	mg/kg	2.7E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.2E-06	mg/kg-day	9.6E-04	mg/kg-day	3.3E-03
				Benzo[a]anthracene	1.15E+02	mg/kg	2.0E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	4.4E-07	2.4E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	1.6E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	3.5E-06	1.9E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	1.9E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	4.3E-07	2.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	9.0E-08	mg/kg-day	7.3E-02	$(mg/kg\text{-}day)^{-1}$	Yes	2.0E-08	1.1E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	5.7E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	Yes	1.2E-06	6.6E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	9.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	Yes	2.1E-07	1.1E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total									5.8E-06					3.4E-03
		Exposure Point Total										1.4E-05					6.3E-03
	Exposure Medium Total											1.4E-05					6.3E-03
Medium Total												1.4E-05					6.3E-03
											Total of Receptor Risks Across All Media	1.5E-05				Total of Receptor Hazards Across All Media	6.7E-01

Notes: (a) Per the USEPA (2005), the following default age-dependant adjustment factors (ADAF) were applied to the slope factor for the COPCS with a mutagenic mode of action:

AGE	ADAF
0-<2	10
2-<16	3
16-<30	1

For the purposes of application of the ADAF, the trespasser is aged 11 to 16. Therefore, an ADAF of 3 was applied. The ADAF is only applied to the kidney portion of the CSF / Unit Risk for trichloroethene (9.3E-03 for oral and dermal exposures; 1E-03 for inhalation exposure). The ADAF is not applied to the lymphoid tissue or liver portions of the CSF / Unit Risk (3.7E-02 for oral and dermal exposure; 3.1E-02 for inhalaition exposure).

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Chromium (total) in groundwater is assumed to be Chromium VI due to the absence of valid groundwater chromium speciation data.

Arsenic ingestion intakes from soil and sediment reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.4A.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
FWEC/Church Road TCE Site
Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil (0 -1 ft bgs)	MIP1	Incidental Ingestion	1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	2.7E-07	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	5.5E-08	7.7E-07	mg/kg-day	2.0E-02	mg/kg-day	3.8E-05
				1,1,2-Trichloroethane	2.94E+00	mg/kg	1.9E-07	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	1.1E-08	5.2E-07	mg/kg-day	4.0E-03	mg/kg-day	1.3E-04
				Trichloroethene	4.10E+02	mg/kg	2.6E-05	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-06	7.3E-05	mg/kg-day	5.0E-04	mg/kg-day	1.5E-01
			Exp. Route Total								1.3E-06					1.5E-01
			Dermal Absorption	1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	5.8E-10	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-10	1.6E-09	mg/kg-day	2.0E-02	mg/kg-day	8.1E-08
				1,1,2-Trichloroethane	2.94E+00	mg/kg	4.0E-10	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	2.3E-11	1.1E-09	mg/kg-day	4.0E-03	mg/kg-day	2.8E-07
				Trichloroethene	4.10E+02	mg/kg	5.5E-08	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	2.5E-09	1.5E-07	mg/kg-day	5.0E-04	mg/kg-day	3.1E-04
			Exp. Route Total								2.7E-09					3.1E-04
		MIP1 - Particulates and Volatilization	Inhalation	1,1,2,2-Tetrachloroethane	2.21E-04	mg/m^3	9.4E-07	mg/m^3	5.8E-02	$(mg/m^3)^{-1}$	5.4E-08	2.6E-06	mg/m^3	-	mg/m^3	-
				1,1,2-Trichloroethane	3.15E-04	mg/m^3	1.3E-06	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	2.1E-08	3.7E-06	mg/m^3	2.0E-04	mg/m^3	1.9E-02
				Trichloroethene	1.44E-01	mg/m^3	6.1E-04	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	2.5E-06	1.7E-03	mg/m^3	2.0E-03	mg/m^3	8.5E-01
			Exp. Route Total								2.6E-06					8.7E-01
		Exposure Point Total									3.8E-06					1.0E+00

TABLE 7.4A.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
FWEC/Church Road TCE Site
Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil (0 -1 ft bgs)	Former Shot Blast Area (FBSA)	Incidental Ingestion	Aluminum	6.20E+03	mg/kg	3.9E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.1E-03	mg/kg-day	1.0E+00	mg/kg-day	1.1E-03
				Arsenic	6.66E+00	mg/kg	2.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-07	7.1E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Chromium VI	9.45E-01	mg/kg	6.0E-08	mg/kg-day	5.0E-01	$(mg/kg\text{-}day)^{-1}$	3.0E-08	1.7E-07	mg/kg-day	3.0E-03	mg/kg-day	5.6E-05
				Cobalt	3.00E+01	mg/kg	1.9E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.8E-02
				Copper	3.11E+02	mg/kg	2.0E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.5E-05	mg/kg-day	4.0E-02	mg/kg-day	1.4E-03
				Iron	2.37E+04	mg/kg	1.5E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	4.2E-03	mg/kg-day	7.0E-01	mg/kg-day	6.0E-03
				Lead	2.71E+02	mg/kg	1.7E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	4.8E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	3.1E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	8.7E-05	mg/kg-day	2.4E-02	mg/kg-day	3.6E-03
				Nickel	2.06E+02	mg/kg	1.3E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.8E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	4.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.5E-08	1.3E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	7.0E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	5.1E-07	2.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	5.0E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.7E-08	1.4E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	8.8E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.5E-08	2.5E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	3.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.3E-08	8.9E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								1.1E-06					3.4E-02
			Dermal Absorption	Aluminum	6.20E+03	mg/kg	1.7E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	4.7E-05	mg/kg-day	1.0E+00	mg/kg-day	4.7E-05
				Arsenic	6.66E+00	mg/kg	5.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.1E-08	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	5.0E-04
				Chromium VI	9.45E-01	mg/kg	2.5E-09	mg/kg-day	2.0E+01	$(mg/kg\text{-}day)^{-1}$	5.1E-08	7.1E-09	mg/kg-day	7.5E-05	mg/kg-day	9.5E-05
				Cobalt	3.00E+01	mg/kg	8.1E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.3E-07	mg/kg-day	3.0E-04	mg/kg-day	7.5E-04
				Copper	3.11E+02	mg/kg	8.4E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.3E-06	mg/kg-day	4.0E-02	mg/kg-day	5.9E-05
				Iron	2.37E+04	mg/kg	6.4E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.8E-04	mg/kg-day	7.0E-01	mg/kg-day	2.6E-04
				Lead	2.71E+02	mg/kg	7.3E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.0E-06	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	1.3E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.7E-06	mg/kg-day	9.6E-04	mg/kg-day	3.8E-03
				Nickel	2.06E+02	mg/kg	5.6E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.6E-06	mg/kg-day	8.0E-04	mg/kg-day	1.9E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	2.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-08	7.4E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	3.8E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-07	1.1E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	2.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.0E-08	7.8E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	4.9E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-08	1.4E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	1.7E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-08	4.9E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								5.0E-07					7.5E-03
		FSBA - Particulates and Volatilization	Inhalation	Aluminum	4.56E-06	mg/m^3	1.9E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	5.4E-08	mg/m^3	5.0E-03	mg/m^3	1.1E-05
				Arsenic	4.90E-09	mg/m^3	2.1E-11	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	8.9E-11	5.8E-11	mg/m^3	1.5E-05	mg/m^3	3.9E-06
				Chromium VI	6.95E-10	mg/m^3	2.9E-12	mg/m^3	8.4E+01	$(mg/m^3)^{-1}$	2.5E-10	8.2E-12	mg/m^3	1.0E-04	mg/m^3	8.2E-08
				Cobalt	2.20E-08	mg/m^3	9.3E-11	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	8.4E-10	2.6E-10	mg/m^3	6.0E-06	mg/m^3	4.4E-05
				Copper	2.28E-07	mg/m^3	9.7E-10	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.7E-09	mg/m^3	-	mg/m^3	-
				Iron	1.75E-05	mg/m^3	7.4E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.1E-07	mg/m^3	-	mg/m^3	-
				Lead	2.00E-07	mg/m^3	8.5E-10	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.4E-09	mg/m^3	-	mg/m^3	-
				Manganese	3.58E-07	mg/m^3	1.5E-09	mg/m^3	-	$(mg/m^3)^{-1}$	-	4.3E-09	mg/m^3	5.0E-05	mg/m^3	8.5E-05
				Nickel	1.52E-07	mg/m^3	6.4E-10	mg/m^3	2.6E-01	$(mg/m^3)^{-1}$	1.7E-10	1.8E-09	mg/m^3	9.0E-05	mg/m^3	2.0E-05
				Benzo[a]pyrene	5.56E-10	mg/m^3	2.4E-12	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	2.6E-12	6.6E-12	mg/m^3	-	mg/m^3	-
				Benzo[a]anthracene	8.05E-10	mg/m^3	3.4E-12	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	3.8E-13	9.6E-12	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	5.82E-10	mg/m^3	2.5E-12	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	2.7E-13	6.9E-12	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.02E-10	mg/m^3	4.3E-13	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	5.2E-13	1.2E-12	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	3.66E-10	mg/m^3	1.6E-12	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	1.7E-13	4.3E-12	mg/m^3	-	mg/m^3	-
			Exp. Route Total								1.3E-09					1.6E-04
		Exposure Point Total									1.6E-06					4.2E-02

TABLE 7.4A.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
FWEC/Church Road TCE Site
Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil (0 -1 ft bgs)	Expended Waste Area (EWA)	Incidental Ingestion	Arsenic	8.40E+00	mg/kg	3.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.8E-07	9.0E-07	mg/kg-day	3.0E-04	mg/kg-day	3.0E-03
				Cobalt	3.40E+01	mg/kg	2.2E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	6.1E-06	mg/kg-day	3.0E-04	mg/kg-day	2.0E-02
				Copper	3.27E+02	mg/kg	2.1E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.8E-05	mg/kg-day	4.0E-02	mg/kg-day	1.5E-03
				Iron	2.81E+04	mg/kg	1.8E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.0E-03	mg/kg-day	7.0E-01	mg/kg-day	7.1E-03
				Manganese	8.59E+02	mg/kg	5.5E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.5E-04	mg/kg-day	2.4E-02	mg/kg-day	6.4E-03
				Nickel	1.91E+02	mg/kg	1.2E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.4E-05	mg/kg-day	2.0E-02	mg/kg-day	1.7E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	1.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-08	5.0E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	1.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07	4.6E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	2.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-08	7.2E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	3.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-08	8.5E-09	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.6E-09	3.3E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								6.6E-07					4.0E-02
			Dermal Absorption	Arsenic	8.40E+00	mg/kg	6.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07	1.9E-07	mg/kg-day	3.0E-04	mg/kg-day	6.3E-04
				Cobalt	3.40E+01	mg/kg	9.2E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	8.5E-04
				Copper	3.27E+02	mg/kg	8.8E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.5E-06	mg/kg-day	4.0E-02	mg/kg-day	6.2E-05
				Iron	2.81E+04	mg/kg	7.6E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.1E-04	mg/kg-day	7.0E-01	mg/kg-day	3.0E-04
				Manganese	8.59E+02	mg/kg	2.3E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	6.5E-06	mg/kg-day	9.6E-04	mg/kg-day	6.7E-03
				Nickel	1.91E+02	mg/kg	5.1E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.4E-06	mg/kg-day	8.0E-04	mg/kg-day	1.8E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	9.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.1E-09	2.7E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	9.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.6E-08	2.5E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	1.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08	3.9E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	1.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-08	4.7E-09	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	6.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.8E-09	1.8E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								2.0E-07					1.0E-02
		EWA - Particulates and Volatilization	Inhalation	Arsenic	6.18E-09	mg/m^3	2.6E-11	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.1E-10	7.3E-11	mg/m^3	1.5E-05	mg/m^3	4.9E-06
				Cobalt	2.50E-08	mg/m^3	1.1E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	9.5E-10	3.0E-10	mg/m^3	6.0E-06	mg/m^3	4.9E-05
				Copper	2.41E-07	mg/m^3	1.0E-09	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.9E-09	mg/m^3	-	mg/m^3	-
				Iron	2.07E-05	mg/m^3	8.8E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.5E-07	mg/m^3	-	mg/m^3	-
				Manganese	6.31E-07	mg/m^3	2.7E-09	mg/m^3	-	$(mg/m^3)^{-1}$	-	7.5E-09	mg/m^3	5.0E-05	mg/m^3	1.5E-04
				Nickel	1.40E-07	mg/m^3	5.9E-10	mg/m^3	2.6E-01	$(mg/m^3)^{-1}$	1.5E-10	1.7E-09	mg/m^3	9.0E-05	mg/m^3	1.8E-05
				Benzo[a]anthracene	2.05E-10	mg/m^3	8.7E-13	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	9.6E-14	2.4E-12	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	1.89E-10	mg/m^3	8.0E-13	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	8.8E-13	2.2E-12	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	2.96E-10	mg/m^3	1.3E-12	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	1.4E-13	3.5E-12	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	3.51E-11	mg/m^3	1.5E-13	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	1.8E-13	4.2E-13	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	1.37E-10	mg/m^3	5.8E-13	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	6.4E-14	1.6E-12	mg/m^3	-	mg/m^3	-
			Exp. Route Total								1.2E-09					2.2E-04
		Exposure Point Total									8.7E-07					5.0E-02
	Exposure Medium Total - Average for All Areas										2.1E-06					3.7E-01
Medium Total											2.1E-06					3.7E-01
										Total of Receptor Risks Across All Media	2.1E-06				Total of Receptor Hazards Across All Media	3.7E-01

Notes:

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Arsenic ingestion intakes from soil reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.4B.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs)	MIP1	Incidental Ingestion	Arsenic	7.10E+00	mg/kg	2.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-07	7.6E-07	mg/kg-day	3.0E-04	mg/kg-day	2.5E-03
				Cobalt	8.50E+00	mg/kg	5.4E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	5.0E-03
				Iron	2.05E+04	mg/kg	1.3E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.7E-03	mg/kg-day	7.0E-01	mg/kg-day	5.2E-03
				Manganese	4.20E+02	mg/kg	2.7E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	7.5E-05	mg/kg-day	2.4E-02	mg/kg-day	3.1E-03
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	2.7E-07	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	5.5E-08	7.7E-07	mg/kg-day	2.0E-02	mg/kg-day	3.8E-05
				1,1,2-Trichloroethane	2.94E+00	mg/kg	1.9E-07	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	1.1E-08	5.2E-07	mg/kg-day	4.0E-03	mg/kg-day	1.3E-04
				Trichloroethene	4.10E+02	mg/kg	2.6E-05	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-06	7.3E-05	mg/kg-day	5.0E-04	mg/kg-day	1.5E-01
			Exp. Route Total								1.7E-06					1.6E-01
			Dermal Absorption	Arsenic	7.10E+00	mg/kg	5.7E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.6E-08	1.6E-07	mg/kg-day	3.0E-04	mg/kg-day	5.4E-04
				Cobalt	8.50E+00	mg/kg	2.3E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	6.4E-08	mg/kg-day	3.0E-04	mg/kg-day	2.1E-04
				Iron	2.05E+04	mg/kg	5.5E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.5E-04	mg/kg-day	7.0E-01	mg/kg-day	2.2E-04
				Manganese	4.20E+02	mg/kg	1.1E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.2E-06	mg/kg-day	9.6E-04	mg/kg-day	3.3E-03
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	5.8E-10	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	1.2E-10	1.6E-09	mg/kg-day	2.0E-02	mg/kg-day	8.1E-08
				1,1,2-Trichloroethane	2.94E+00	mg/kg	4.0E-10	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	2.3E-11	1.1E-09	mg/kg-day	4.0E-03	mg/kg-day	2.8E-07
				Trichloroethene	4.10E+02	mg/kg	5.5E-08	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	2.5E-09	1.5E-07	mg/kg-day	5.0E-04	mg/kg-day	3.1E-04
			Exp. Route Total								8.9E-08					4.6E-03
		MIP1 - Particulates and Volatilization	Inhalation	Arsenic	5.22E-09	mg/m^3	2.2E-11	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	9.5E-11	6.2E-11	mg/m^3	1.5E-05	mg/m^3	4.1E-06
				Cobalt	6.25E-09	mg/m^3	2.7E-11	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	2.4E-10	7.4E-11	mg/m^3	6.0E-06	mg/m^3	1.2E-05
				Iron	1.51E-05	mg/m^3	6.4E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	1.8E-07	mg/m^3	-	mg/m^3	-
				Manganese	3.09E-07	mg/m^3	1.3E-09	mg/m^3	-	$(mg/m^3)^{-1}$	-	3.7E-09	mg/m^3	5.0E-05	mg/m^3	7.3E-05
				1,1,2,2-Tetrachloroethane	2.21E-04	mg/m^3	9.4E-07	mg/m^3	5.8E-02	$(mg/m^3)^{-1}$	5.4E-08	2.6E-06	mg/m^3	-	mg/m^3	-
				1,1,2-Trichloroethane	3.15E-04	mg/m^3	1.3E-06	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	2.1E-08	3.7E-06	mg/m^3	2.0E-04	mg/m^3	1.9E-02
				Trichloroethene	1.44E-01	mg/m^3	6.1E-04	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	2.5E-06	1.7E-03	mg/m^3	2.0E-03	mg/m^3	8.5E-01
			Exp. Route Total								2.6E-06					8.7E-01
		Exposure Point Total									4.3E-06					1.0E+00

TABLE 7.4B.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
		MIP2	Incidental Ingestion	Cyanide	2.90E-01	mg/kg	1.8E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.2E-08	mg/kg-day	6.0E-04	mg/kg-day	8.6E-05
				Arsenic	6.26E+00	mg/kg	2.4E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	3.6E-07	6.7E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Cobalt	1.08E+01	mg/kg	6.9E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	6.4E-03
				Iron	2.13E+04	mg/kg	1.4E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.8E-03	mg/kg-day	7.0E-01	mg/kg-day	5.4E-03
				Manganese	7.04E+02	mg/kg	4.5E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.3E-04	mg/kg-day	2.4E-02	mg/kg-day	5.2E-03
				Benzo[a]anthracene	3.40E-01	mg/kg	2.2E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.6E-08	6.1E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	5.4E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	3.9E-08	1.5E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	1.5E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.1E-08	4.1E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	1.7E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.3E-08	4.8E-09	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								4.4E-07					1.9E-02
			Dermal Absorption	Cyanide	2.90E-01	mg/kg	3.9E-11	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-10	mg/kg-day	6.0E-04	mg/kg-day	1.8E-07
				Arsenic	6.26E+00	mg/kg	5.1E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	7.6E-08	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	4.7E-04
				Cobalt	1.08E+01	mg/kg	2.9E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.1E-08	mg/kg-day	3.0E-04	mg/kg-day	2.7E-04
				Iron	2.13E+04	mg/kg	5.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.6E-04	mg/kg-day	7.0E-01	mg/kg-day	2.3E-04
				Manganese	7.04E+02	mg/kg	1.9E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.3E-06	mg/kg-day	9.6E-04	mg/kg-day	5.5E-03
				Benzo[a]anthracene	3.40E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	8.7E-09	3.3E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	3.0E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	2.2E-08	8.3E-09	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	8.0E-09	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	5.9E-09	2.3E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	9.4E-10	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	6.9E-09	2.6E-09	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								1.2E-07					6.5E-03
		MIP2 - Particulates and Volatilization	Inhalation	Cyanide	6.43E-05	mg/m^3	2.7E-07	mg/m^3	-	(mg/m^3)$^{-1}$	-	7.6E-07	mg/kg-day	8.0E-04	mg/kg-day	9.5E-04
				Arsenic	4.60E-09	mg/m^3	2.0E-11	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	8.4E-11	5.5E-11	mg/kg-day	1.5E-05	mg/kg-day	3.6E-06
				Cobalt	7.94E-09	mg/m^3	3.4E-11	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	3.0E-10	9.4E-11	mg/kg-day	6.0E-06	mg/kg-day	1.6E-05
				Iron	1.56E-05	mg/m^3	6.6E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.9E-07	mg/kg-day	-	mg/kg-day	-
				Manganese	5.18E-07	mg/m^3	2.2E-09	mg/m^3	-	(mg/m^3)$^{-1}$	-	6.1E-09	mg/kg-day	5.0E-05	mg/kg-day	1.2E-04
				Benzo[a]anthracene	2.50E-10	mg/m^3	1.1E-12	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	1.2E-13	3.0E-12	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	6.25E-11	mg/m^3	2.7E-13	mg/m^3	1.1E+00	(mg/m^3)$^{-1}$	2.9E-13	7.4E-13	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.69E-10	mg/m^3	7.2E-13	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	7.9E-14	2.0E-12	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.99E-11	mg/m^3	8.4E-14	mg/m^3	1.2E+00	(mg/m^3)$^{-1}$	1.0E-13	2.4E-13	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								3.9E-10					1.1E-03
		Exposure Point Total									5.6E-07					2.7E-02

TABLE 7.4B.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
		Former Shot Blast Area (FBSA)	Incidental Ingestion	Aluminum	6.20E+03	mg/kg	3.9E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-03	mg/kg-day	1.0E+00	mg/kg-day	1.1E-03
				Arsenic	6.66E+00	mg/kg	2.5E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	3.8E-07	7.1E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Chromium VI	9.45E-01	mg/kg	6.0E-08	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	3.0E-08	1.7E-07	mg/kg-day	3.0E-03	mg/kg-day	5.6E-05
				Cobalt	3.00E+01	mg/kg	1.9E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.8E-02
				Copper	3.11E+02	mg/kg	2.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.5E-05	mg/kg-day	4.0E-02	mg/kg-day	1.4E-03
				Iron	2.37E+04	mg/kg	1.5E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	4.2E-03	mg/kg-day	7.0E-01	mg/kg-day	6.0E-03
				Lead	2.71E+02	mg/kg	1.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	4.8E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	3.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.7E-05	mg/kg-day	2.4E-02	mg/kg-day	3.6E-03
				Nickel	2.06E+02	mg/kg	1.3E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.8E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	4.8E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	3.5E-08	1.3E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	7.0E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	5.1E-07	2.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	5.0E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	3.7E-08	1.4E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	8.8E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	6.5E-08	2.5E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	3.2E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.3E-08	8.9E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								1.1E-06					3.4E-02
			Dermal Absorption	Aluminum	6.20E+03	mg/kg	1.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	4.7E-05	mg/kg-day	1.0E+00	mg/kg-day	4.7E-05
				Arsenic	6.66E+00	mg/kg	5.4E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	8.1E-08	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	5.0E-04
				Chromium VI	9.45E-01	mg/kg	2.5E-09	mg/kg-day	2.0E+01	(mg/kg-day)$^{-1}$	5.1E-08	7.1E-09	mg/kg-day	7.5E-05	mg/kg-day	9.5E-05
				Cobalt	3.00E+01	mg/kg	8.1E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.3E-07	mg/kg-day	3.0E-04	mg/kg-day	7.5E-04
				Copper	3.11E+02	mg/kg	8.4E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.3E-06	mg/kg-day	4.0E-02	mg/kg-day	5.9E-05
				Iron	2.37E+04	mg/kg	6.4E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.8E-04	mg/kg-day	7.0E-01	mg/kg-day	2.6E-04
				Lead	2.71E+02	mg/kg	7.3E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.0E-06	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	1.3E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.7E-06	mg/kg-day	9.6E-04	mg/kg-day	3.8E-03
				Nickel	2.06E+02	mg/kg	5.6E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.6E-06	mg/kg-day	8.0E-04	mg/kg-day	1.9E-03
				Benzo[a]anthracene	7.56E-01	mg/kg	2.6E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.9E-08	7.4E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	3.8E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	2.8E-07	1.1E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	2.8E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.0E-08	7.8E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	4.9E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	3.6E-08	1.4E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	1.7E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.3E-08	4.9E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								5.0E-07					7.5E-03
		FSBA - Particulates and Volatilization	Inhalation	Aluminum	4.56E-06	mg/m^3	1.9E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	5.4E-08	mg/m^3	5.0E-03	mg/m^3	1.1E-05
				Arsenic	4.90E-09	mg/m^3	2.1E-11	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	8.9E-11	5.8E-11	mg/m^3	1.5E-05	mg/m^3	3.9E-06
				Chromium VI	6.95E-10	mg/m^3	2.9E-12	mg/m^3	8.4E+01	(mg/m^3)$^{-1}$	2.5E-10	8.2E-12	mg/m^3	1.0E-04	mg/m^3	8.2E-08
				Cobalt	2.20E-08	mg/m^3	9.3E-11	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	8.4E-10	2.6E-10	mg/m^3	6.0E-06	mg/m^3	4.4E-05
				Copper	2.28E-07	mg/m^3	9.7E-10	mg/m^3	-	(mg/m^3)$^{-1}$	-	2.7E-09	mg/m^3	-	mg/m^3	-
				Iron	1.75E-05	mg/m^3	7.4E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	2.1E-07	mg/m^3	-	mg/m^3	-
				Lead	2.00E-07	mg/m^3	8.5E-10	mg/m^3	-	(mg/m^3)$^{-1}$	-	2.4E-09	mg/m^3	-	mg/m^3	-
				Manganese	3.58E-07	mg/m^3	1.5E-09	mg/m^3	-	(mg/m^3)$^{-1}$	-	4.3E-09	mg/m^3	5.0E-05	mg/m^3	8.5E-05
				Nickel	1.52E-07	mg/m^3	6.4E-10	mg/m^3	2.6E-01	(mg/m^3)$^{-1}$	1.7E-10	1.8E-09	mg/m^3	9.0E-05	mg/m^3	2.0E-05
				Benzo[a]anthracene	5.56E-10	mg/m^3	2.4E-12	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	2.6E-13	6.6E-12	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	8.05E-10	mg/m^3	3.4E-12	mg/m^3	1.1E+00	(mg/m^3)$^{-1}$	3.8E-12	9.6E-12	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	5.82E-10	mg/m^3	2.5E-12	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	2.7E-13	6.9E-12	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.02E-10	mg/m^3	4.3E-13	mg/m^3	1.2E+00	(mg/m^3)$^{-1}$	5.2E-13	1.2E-12	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	3.66E-10	mg/m^3	1.6E-12	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	1.7E-13	4.3E-12	mg/m^3	-	mg/m^3	-
			Exp. Route Total								1.4E-09					1.6E-04
		Exposure Point Total									1.6E-06					4.2E-02

TABLE 7.4B.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
		Expended Waste Area (EWA)	Incidental Ingestion	Arsenic	8.40E+00	mg/kg	3.2E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.8E-07	9.0E-07	mg/kg-day	3.0E-04	mg/kg-day	3.0E-03
				Cobalt	3.40E+01	mg/kg	2.2E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	6.1E-06	mg/kg-day	3.0E-04	mg/kg-day	2.0E-02
				Copper	3.27E+02	mg/kg	2.1E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.8E-05	mg/kg-day	4.0E-02	mg/kg-day	1.5E-03
				Iron	2.81E+04	mg/kg	1.8E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.0E-03	mg/kg-day	7.0E-01	mg/kg-day	7.1E-03
				Manganese	8.59E+02	mg/kg	5.5E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.5E-04	mg/kg-day	2.4E-02	mg/kg-day	6.4E-03
				Nickel	1.91E+02	mg/kg	1.2E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.4E-05	mg/kg-day	2.0E-02	mg/kg-day	1.7E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	1.8E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.3E-08	5.0E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	1.6E-08	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07	4.6E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	2.6E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.9E-08	7.2E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	3.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.2E-08	8.5E-09	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	8.6E-09	3.3E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								6.6E-07					4.0E-02
			Dermal Absorption	Arsenic	8.40E+00	mg/kg	6.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-07	1.9E-07	mg/kg-day	3.0E-04	mg/kg-day	6.3E-04
				Cobalt	3.40E+01	mg/kg	9.2E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	8.5E-04
				Copper	3.27E+02	mg/kg	8.8E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.5E-06	mg/kg-day	4.0E-02	mg/kg-day	6.2E-05
				Iron	2.81E+04	mg/kg	7.6E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.1E-04	mg/kg-day	7.0E-01	mg/kg-day	3.0E-04
				Manganese	8.59E+02	mg/kg	2.3E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	6.5E-06	mg/kg-day	9.6E-04	mg/kg-day	6.7E-03
				Nickel	1.91E+02	mg/kg	5.1E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.4E-06	mg/kg-day	8.0E-04	mg/kg-day	1.8E-03
				Benzo[a]anthracene	2.79E-01	mg/kg	9.8E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	7.1E-09	2.7E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	9.0E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	6.6E-08	2.5E-08	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	1.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08	3.9E-08	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	1.7E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-08	4.7E-09	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	6.5E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.8E-09	1.8E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								2.0E-07					1.0E-02
		EWA - Particulates and Volatilization	Inhalation	Arsenic	6.18E-09	mg/m^3	2.6E-11	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	1.1E-10	7.3E-11	mg/m^3	1.5E-05	mg/m^3	4.9E-06
				Cobalt	2.50E-08	mg/m^3	1.1E-10	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	9.5E-10	3.0E-10	mg/m^3	6.0E-06	mg/m^3	4.9E-05
				Copper	2.41E-07	mg/m^3	1.0E-09	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.9E-09	mg/m^3	-	mg/m^3	-
				Iron	2.07E-05	mg/m^3	8.8E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.5E-07	mg/m^3	-	mg/m^3	-
				Manganese	6.31E-07	mg/m^3	2.7E-09	mg/m^3	-	$(mg/m^3)^{-1}$	-	7.5E-09	mg/m^3	5.0E-05	mg/m^3	1.5E-04
				Nickel	1.40E-07	mg/m^3	5.9E-10	mg/m^3	2.6E-01	$(mg/m^3)^{-1}$	1.5E-10	1.7E-09	mg/m^3	9.0E-05	mg/m^3	1.8E-05
				Benzo[a]anthracene	2.05E-10	mg/m^3	8.7E-13	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	9.6E-14	2.4E-12	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	1.89E-10	mg/m^3	8.0E-13	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	8.8E-13	2.2E-12	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	2.96E-10	mg/m^3	1.3E-12	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	1.4E-13	3.5E-12	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	3.51E-11	mg/m^3	1.5E-13	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	1.8E-13	4.2E-13	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	1.37E-10	mg/m^3	5.8E-13	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	6.4E-14	1.6E-12	mg/m^3	-	mg/m^3	-
			Exp. Route Total								1.2E-09					2.2E-04
		Exposure Point Total									8.7E-07					5.0E-02
	Exposure Medium Total - Average for All Areas										1.8E-06					2.9E-01
Medium Total											1.8E-06					2.9E-01
										Total of Receptor Risks Across All Media	1.8E-06				Total of Receptor Hazards Across All Media	2.9E-01

Notes:

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Arsenic ingestion intakes from soil reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Direct Contact During Trenching Former FWEC Facility	Incidental Ingestion	Formaldehyde	6.24E-03	mg/L	1.5E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-08	mg/kg-day	3.0E-01	mg/kg-day	3.6E-08
				Cyanide	5.62E-03	mg/L	1.4E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.6E-09	mg/kg-day	2.0E-02	mg/kg-day	4.8E-07
				Aluminum	6.31E-01	mg/L	1.5E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-06	mg/kg-day	1.0E+00	mg/kg-day	1.1E-06
				Barium	1.40E-01	mg/L	3.4E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.4E-07	mg/kg-day	2.0E-01	mg/kg-day	1.2E-06
				Cadmium	2.90E-03	mg/L	7.1E-11	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.0E-09	mg/kg-day	1.0E-03	mg/kg-day	5.0E-06
				Chromium	6.92E-03	mg/L	1.7E-10	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	8.5E-11	1.2E-08	mg/kg-day	5.0E-03	mg/kg-day	2.4E-06
				Cobalt	5.39E-03	mg/L	1.3E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.2E-09	mg/kg-day	3.0E-03	mg/kg-day	3.1E-06
				Iron	3.09E+01	mg/L	7.6E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.3E-05	mg/kg-day	7.0E-01	mg/kg-day	7.6E-05
				Lead	1.65E-02	mg/L	4.0E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.8E-08	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	1.0E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.3E-06	mg/kg-day	2.4E-02	mg/kg-day	3.0E-04
				Mercury	2.30E-04	mg/L	5.6E-12	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.9E-10	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	5.5E-12	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	1.6E-13	3.9E-10	mg/kg-day	9.0E-02	mg/kg-day	4.3E-09
				1,1,2-Trichloroethane	3.40E-04	mg/L	8.3E-12	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	4.7E-13	5.8E-10	mg/kg-day	4.0E-03	mg/kg-day	1.5E-07
				1,1-Dichloroethane	1.76E-03	mg/L	4.3E-11	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	2.4E-13	3.0E-09	mg/kg-day	2.0E+00	mg/kg-day	1.5E-09
				1,1-Dichloroethene	6.18E-03	mg/L	1.5E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-08	mg/kg-day	9.0E-03	mg/kg-day	1.2E-06
				1,2-Dichloroethane	2.10E-04	mg/L	5.1E-12	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	4.7E-13	3.6E-10	mg/kg-day	2.0E-02	mg/kg-day	1.8E-08
				1,4-Dioxane	5.43E-03	mg/L	1.3E-10	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	1.3E-11	9.3E-09	mg/kg-day	5.0E-01	mg/kg-day	1.9E-08
				Benzene	1.29E-04	mg/L	3.2E-12	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	1.7E-13	2.2E-10	mg/kg-day	1.0E-02	mg/kg-day	2.2E-08
				Chloroform	9.63E-05	mg/L	2.4E-12	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	7.3E-14	1.6E-10	mg/kg-day	1.0E-01	mg/kg-day	1.6E-09
				cis-1,2-Dichloroethene	1.42E-03	mg/L	3.5E-11	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.4E-09	mg/kg-day	2.0E-02	mg/kg-day	1.2E-07
				Tetrachloroethene	1.45E-03	mg/L	3.6E-11	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	7.5E-14	2.5E-09	mg/kg-day	1.0E-01	mg/kg-day	2.5E-08
				Trichloroethene	7.46E-01	mg/L	1.8E-08	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	8.4E-10	1.3E-06	mg/kg-day	5.0E-04	mg/kg-day	2.6E-03
				Vinyl chloride	3.30E-04	mg/L	8.1E-12	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	5.8E-12	5.7E-10	mg/kg-day	3.0E-03	mg/kg-day	1.9E-07
			Exp. Route Total								9.5E-10					2.9E-03
			Dermal Absorption	Formaldehyde	6.24E-03	mg/L	8.4E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.9E-08	mg/kg-day	3.0E-01	mg/kg-day	2.0E-07
				Cyanide	5.62E-03	mg/L	3.9E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.7E-08	mg/kg-day	2.0E-02	mg/kg-day	1.4E-06
				Aluminum	6.31E-01	mg/L	4.4E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.0E-06	mg/kg-day	1.0E+00	mg/kg-day	3.0E-06
				Barium	1.40E-01	mg/L	9.7E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	6.8E-07	mg/kg-day	1.4E-02	mg/kg-day	4.8E-05
				Cadmium	2.90E-03	mg/L	2.4E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.7E-08	mg/kg-day	2.5E-05	mg/kg-day	6.8E-04
				Chromium	6.92E-03	mg/L	1.0E-09	mg/kg-day	2.0E+01	(mg/kg-day)$^{-1}$	2.1E-08	7.3E-08	mg/kg-day	1.3E-04	mg/kg-day	5.9E-04
				Cobalt	5.39E-03	mg/L	1.5E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.0E-08	mg/kg-day	3.0E-03	mg/kg-day	3.5E-06
				Iron	3.09E+01	mg/L	2.1E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.5E-04	mg/kg-day	7.0E-01	mg/kg-day	2.1E-04
				Lead	1.65E-02	mg/L	1.1E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.0E-09	mg/kg-day	-	mg/kg-day	-
				Manganese	4.24E+00	mg/L	2.9E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.0E-05	mg/kg-day	9.6E-04	mg/kg-day	2.1E-02
				Mercury	2.30E-04	mg/L	1.6E-11	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-09	mg/kg-day	-	mg/kg-day	-
				1,2,4-Trichlorobenzene	2.25E-04	mg/L	1.6E-09	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	4.6E-11	1.1E-07	mg/kg-day	9.0E-02	mg/kg-day	1.2E-06
				1,1,2-Trichloroethane	3.40E-04	mg/L	1.5E-10	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	8.6E-12	1.1E-08	mg/kg-day	4.0E-03	mg/kg-day	2.6E-06
				1,1-Dichloroethane	1.76E-03	mg/L	9.6E-10	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	5.4E-12	6.7E-08	mg/kg-day	2.0E+00	mg/kg-day	3.3E-08
				1,1-Dichloroethene	6.18E-03	mg/L	5.7E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	4.0E-07	mg/kg-day	9.0E-03	mg/kg-day	4.5E-05
				1,2-Dichloroethane	2.10E-04	mg/L	7.2E-11	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	6.5E-12	5.0E-09	mg/kg-day	2.0E-02	mg/kg-day	2.5E-07
				1,4-Dioxane	5.43E-03	mg/L	1.4E-10	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	1.4E-11	1.0E-08	mg/kg-day	5.0E-01	mg/kg-day	2.0E-08
				Benzene	1.29E-04	mg/L	1.5E-10	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	8.0E-12	1.0E-08	mg/kg-day	1.0E-02	mg/kg-day	1.0E-06
				Chloroform	9.63E-05	mg/L	5.6E-11	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	1.7E-12	3.9E-09	mg/kg-day	1.0E-01	mg/kg-day	3.9E-08
				cis-1,2-Dichloroethene	1.42E-03	mg/L	1.2E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.7E-08	mg/kg-day	2.0E-02	mg/kg-day	4.3E-06
				Tetrachloroethene	1.45E-03	mg/L	4.6E-09	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	9.7E-12	3.2E-07	mg/kg-day	1.0E-01	mg/kg-day	3.2E-06
				Trichloroethene	7.46E-01	mg/L	7.5E-07	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	3.4E-08	5.2E-05	mg/kg-day	5.0E-04	mg/kg-day	1.0E-01
				Vinyl chloride	3.30E-04	mg/L	2.1E-10	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	1.5E-10	1.5E-08	mg/kg-day	3.0E-03	mg/kg-day	4.9E-06
			Exp. Route Total								5.6E-08					1.3E-01

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Air	Inhalation	Formaldehyde	-	mg/m^3	-	mg/m^3	1.3E-02	(mg/m^3)$^{-1}$	-	-	mg/m^3	3.7E-02	mg/m^3	-
		In Trench		Cyanide	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	8.0E-04	mg/m^3	-
		Former FWEC		Aluminum	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	5.0E-03	mg/m^3	-
		Facility		Barium	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	5.0E-03	mg/m^3	-
				Cadmium	-	mg/m^3	-	mg/m^3	1.8E+00	(mg/m^3)$^{-1}$	-	-	mg/m^3	1.0E-05	mg/m^3	-
				Chromium	-	mg/m^3	-	mg/m^3	8.4E+01	(mg/m^3)$^{-1}$	-	-	mg/m^3	3.0E-04	mg/m^3	-
				Cobalt	-	mg/m^3	-	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	-	-	mg/m^3	2.0E-05	mg/m^3	-
				Iron	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	-	mg/m^3	-
				Lead	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	-	mg/m^3	-
				Manganese	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	5.0E-05	mg/m^3	-
				Mercury	3.09E-03	mg/m^3	2.0E-07	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.4E-05	mg/m^3	3.0E-04	mg/m^3	4.7E-02
				1,2,4-Trichlorobenzene	3.07E-03	mg/m^3	2.0E-07	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.4E-05	mg/m^3	2.0E-02	mg/m^3	7.0E-04
				1,1,2-Trichloroethane	5.29E-03	mg/m^3	3.5E-07	mg/m^3	1.6E-02	(mg/m^3)$^{-1}$	5.5E-09	2.4E-05	mg/m^3	2.0E-03	mg/m^3	1.2E-02
				1,1-Dichloroethane	3.34E-02	mg/m^3	2.2E-06	mg/m^3	1.6E-03	(mg/m^3)$^{-1}$	3.5E-09	1.5E-04	mg/m^3	-	mg/m^3	-
				1,1-Dichloroethene	1.20E-01	mg/m^3	7.8E-06	mg/m^3	-	(mg/m^3)$^{-1}$	-	5.5E-04	mg/m^3	7.9E-02	mg/m^3	6.9E-03
				1,2-Dichloroethane	3.80E-03	mg/m^3	2.5E-07	mg/m^3	2.6E-02	(mg/m^3)$^{-1}$	6.4E-09	1.7E-05	mg/m^3	7.0E-02	mg/m^3	2.5E-04
				1,4-Dioxane	8.15E-03	mg/m^3	5.3E-07	mg/m^3	5.0E-03	(mg/m^3)$^{-1}$	2.7E-09	3.7E-05	mg/m^3	7.2E-01	mg/m^3	5.2E-05
				Benzene	2.76E-03	mg/m^3	1.8E-07	mg/m^3	7.8E-03	(mg/m^3)$^{-1}$	1.4E-09	1.3E-05	mg/m^3	8.0E-02	mg/m^3	1.6E-04
				Chloroform	1.66E-03	mg/m^3	1.1E-07	mg/m^3	2.3E-02	(mg/m^3)$^{-1}$	2.5E-09	7.6E-06	mg/m^3	2.4E-01	mg/m^3	3.1E-05
				cis-1,2-Dichloroethene	2.70E-02	mg/m^3	1.8E-06	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.2E-04	mg/m^3	-	mg/m^3	-
				Tetrachloroethene	2.15E-02	mg/m^3	1.4E-06	mg/m^3	2.6E-04	(mg/m^3)$^{-1}$	3.6E-10	9.8E-05	mg/m^3	4.0E-02	mg/m^3	2.5E-03
				Trichloroethene	1.24E+01	mg/m^3	8.1E-04	mg/m^3	4.1E-03	(mg/m^3)$^{-1}$	3.3E-06	5.6E-02	mg/m^3	2.0E-03	mg/m^3	2.8E+01
				Vinyl chloride	7.95E-03	mg/m^3	5.2E-07	mg/m^3	4.4E-03	(mg/m^3)$^{-1}$	2.3E-09	3.6E-05	mg/m^3	7.7E-02	mg/m^3	4.7E-04
			Exp. Route Total								3.3E-06					2.8E+01
		Exposure Point Total									3.4E-06					2.8E+01
	Exposure Medium Total										3.4E-06					2.8E+01
Medium Total											3.4E-06					2.8E+01

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs)	MIP1	Incidental Ingestion	Arsenic	7.10E+00	mg/kg	1.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.6E-07	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	4.0E-02
				Cobalt	8.50E+00	mg/kg	3.4E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.4E-05	mg/kg-day	3.0E-03	mg/kg-day	8.0E-03
				Iron	2.05E+04	mg/kg	8.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.8E-02	mg/kg-day	7.0E-01	mg/kg-day	8.3E-02
				Manganese	4.20E+02	mg/kg	1.7E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.2E-03	mg/kg-day	2.4E-02	mg/kg-day	4.9E-02
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	1.7E-07	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	3.5E-08	1.2E-05	mg/kg-day	5.0E-01	mg/kg-day	2.4E-05
				1,1,2-Trichloroethane	2.94E+00	mg/kg	1.2E-07	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	6.8E-09	8.3E-06	mg/kg-day	4.0E-03	mg/kg-day	2.1E-03
				Trichloroethene	4.10E+02	mg/kg	1.7E-05	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	7.6E-07	1.2E-03	mg/kg-day	5.0E-04	mg/kg-day	2.3E+00
			Exp. Route Total								1.1E-06					2.5E+00
			Dermal Absorption	Arsenic	7.10E+00	mg/kg	2.8E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.1E-08	1.9E-06	mg/kg-day	3.0E-04	mg/kg-day	6.4E-03
				Cobalt	8.50E+00	mg/kg	1.1E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	7.7E-07	mg/kg-day	3.0E-03	mg/kg-day	2.6E-04
				Iron	2.05E+04	mg/kg	2.7E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.9E-03	mg/kg-day	7.0E-01	mg/kg-day	2.7E-03
				Manganese	4.20E+02	mg/kg	5.4E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.8E-05	mg/kg-day	9.6E-04	mg/kg-day	4.0E-02
				1,1,2,2-Tetrachloroethane	4.31E+00	mg/kg	2.8E-10	mg/kg-day	2.0E-01	$(mg/kg\text{-}day)^{-1}$	5.6E-11	2.0E-08	mg/kg-day	5.0E-01	mg/kg-day	3.9E-08
				1,1,2-Trichloroethane	2.94E+00	mg/kg	1.9E-10	mg/kg-day	5.7E-02	$(mg/kg\text{-}day)^{-1}$	1.1E-11	1.3E-08	mg/kg-day	4.0E-03	mg/kg-day	3.3E-06
				Trichloroethene	4.10E+02	mg/kg	2.7E-08	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	1.2E-09	1.9E-06	mg/kg-day	5.0E-04	mg/kg-day	3.7E-03
			Exp. Route Total								4.3E-08					5.3E-02
		MIP1 - Particulates and Volatilization	Inhalation	Arsenic	3.60E-07	mg/m^3	1.2E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	5.1E-09	8.2E-08	mg/m^3	1.5E-05	mg/m^3	5.5E-03
				Cobalt	4.31E-07	mg/m^3	1.4E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	1.3E-08	9.9E-08	mg/m^3	2.0E-05	mg/m^3	4.9E-03
				Iron	1.04E-03	mg/m^3	3.4E-06	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.4E-04	mg/m^3	-	mg/m^3	-
				Manganese	2.13E-05	mg/m^3	7.0E-08	mg/m^3	-	$(mg/m^3)^{-1}$	-	4.9E-06	mg/m^3	5.0E-05	mg/m^3	9.7E-02
				1,1,2,2-Tetrachloroethane	2.21E-04	mg/m^3	7.2E-07	mg/m^3	5.8E-02	$(mg/m^3)^{-1}$	4.2E-08	5.0E-05	mg/m^3	-	mg/m^3	-
				1,1,2-Trichloroethane	3.15E-04	mg/m^3	1.0E-06	mg/m^3	1.6E-02	$(mg/m^3)^{-1}$	1.6E-08	7.2E-05	mg/m^3	2.0E-03	mg/m^3	3.6E-02
				Trichloroethene	1.44E-01	mg/m^3	4.7E-04	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	1.9E-06	3.3E-02	mg/m^3	2.0E-03	mg/m^3	1.6E+01
			Exp. Route Total								2.0E-06					1.7E+01
		Exposure Point Total									3.1E-06					1.9E+01

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont.)	MIP2	Incidental Ingestion	Cyanide	2.90E-01	mg/kg	1.2E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	8.2E-07	mg/kg-day	2.0E-02	mg/kg-day	4.1E-05
				Arsenic	6.26E+00	mg/kg	1.5E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.3E-07	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	3.5E-02
				Cobalt	1.08E+01	mg/kg	4.4E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.1E-05	mg/kg-day	3.0E-03	mg/kg-day	1.0E-02
				Iron	2.13E+04	mg/kg	8.6E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	6.0E-02	mg/kg-day	7.0E-01	mg/kg-day	8.6E-02
				Manganese	7.04E+02	mg/kg	2.8E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	2.0E-03	mg/kg-day	2.4E-02	mg/kg-day	8.3E-02
				Benzo[a]anthracene	3.40E-01	mg/kg	1.4E-08	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.0E-08	9.6E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	3.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.5E-08	2.4E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	9.3E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.8E-09	6.5E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	1.1E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	8.0E-09	7.6E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								2.8E-07					2.1E-01
			Dermal Absorption	Cyanide	2.90E-01	mg/kg	1.9E-11	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.3E-09	mg/kg-day	2.0E-02	mg/kg-day	6.6E-08
				Arsenic	6.26E+00	mg/kg	2.4E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	3.6E-08	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.7E-03
				Cobalt	1.08E+01	mg/kg	1.4E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	9.8E-07	mg/kg-day	3.0E-03	mg/kg-day	3.3E-04
				Iron	2.13E+04	mg/kg	2.8E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.9E-03	mg/kg-day	7.0E-01	mg/kg-day	2.8E-03
				Manganese	7.04E+02	mg/kg	9.1E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	6.4E-05	mg/kg-day	9.6E-04	mg/kg-day	6.6E-02
				Benzo[a]anthracene	3.40E-01	mg/kg	5.7E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	4.2E-09	4.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.50E-02	mg/kg	1.4E-09	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.0E-08	1.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	2.30E-01	mg/kg	3.9E-09	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	2.8E-09	2.7E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	2.70E-02	mg/kg	4.5E-10	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.3E-09	3.2E-08	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								5.7E-08					7.5E-02
		MIP2 - Particulates and Volatilization	Inhalation	Cyanide	6.43E-05	mg/m^3	2.1E-07	mg/m^3	-	$(mg/m^3)^{-1}$	-	1.5E-05	mg/m^3	8.0E-04	mg/m^3	1.8E-02
				Arsenic	3.18E-07	mg/m^3	1.0E-09	mg/m^3	4.3E+00	$(mg/m^3)^{-1}$	4.5E-09	7.3E-08	mg/m^3	1.5E-05	mg/m^3	4.8E-03
				Cobalt	5.48E-07	mg/m^3	1.8E-09	mg/m^3	9.0E+00	$(mg/m^3)^{-1}$	1.6E-08	1.3E-07	mg/m^3	2.0E-05	mg/m^3	6.3E-03
				Iron	1.08E-03	mg/m^3	3.5E-06	mg/m^3	-	$(mg/m^3)^{-1}$	-	2.5E-04	mg/m^3	-	mg/m^3	-
				Manganese	3.57E-05	mg/m^3	1.2E-07	mg/m^3	-	$(mg/m^3)^{-1}$	-	8.2E-06	mg/m^3	5.0E-05	mg/m^3	1.6E-01
				Benzo[a]anthracene	1.73E-08	mg/m^3	5.6E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	6.2E-12	3.9E-09	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	4.31E-09	mg/m^3	1.4E-11	mg/m^3	1.1E+00	$(mg/m^3)^{-1}$	1.5E-11	9.9E-10	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	1.17E-08	mg/m^3	3.8E-11	mg/m^3	1.1E-01	$(mg/m^3)^{-1}$	4.2E-12	2.7E-09	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	1.37E-09	mg/m^3	4.5E-12	mg/m^3	1.2E+00	$(mg/m^3)^{-1}$	5.4E-12	3.1E-10	mg/m^3	-	mg/m^3	-
			Exp. Route Total								2.1E-08					1.9E-01
		Exposure Point Total									3.5E-07					4.8E-01

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont.)	Former Shot Blast Area (FBSA)	Incidental Ingestion	Aluminum	6.20E+03	mg/kg	2.5E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.8E-02	mg/kg-day	1.0E+00	mg/kg-day	1.8E-02
				Arsenic	6.66E+00	mg/kg	1.6E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	2.4E-07	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	3.8E-02
				Chromium VI	9.45E-01	mg/kg	3.8E-08	mg/kg-day	5.0E-01	(mg/kg-day)$^{-1}$	1.9E-08	2.7E-06	mg/kg-day	5.0E-03	mg/kg-day	5.3E-04
				Cobalt	3.00E+01	mg/kg	1.2E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.5E-05	mg/kg-day	3.0E-03	mg/kg-day	2.8E-02
				Copper	3.11E+02	mg/kg	1.3E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.8E-04	mg/kg-day	1.0E-02	mg/kg-day	8.8E-02
				Iron	2.37E+04	mg/kg	9.6E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	6.7E-02	mg/kg-day	7.0E-01	mg/kg-day	9.6E-02
				Lead	2.71E+02	mg/kg	1.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.7E-04	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	2.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.4E-03	mg/kg-day	2.4E-02	mg/kg-day	5.7E-02
				Nickel	2.06E+02	mg/kg	8.3E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.8E-04	mg/kg-day	2.0E-02	mg/kg-day	2.9E-02
				Benzo[a]anthracene	7.56E-01	mg/kg	3.1E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.2E-08	2.1E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	4.4E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	3.2E-07	3.1E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	3.2E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.3E-08	2.2E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	5.6E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	4.1E-08	3.9E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	2.0E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.5E-08	1.4E-06	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								6.8E-07					3.5E-01
			Dermal Absorption	Aluminum	6.20E+03	mg/kg	8.0E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.6E-04	mg/kg-day	1.0E+00	mg/kg-day	5.6E-04
				Arsenic	6.66E+00	mg/kg	2.6E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	3.9E-08	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	6.0E-03
				Chromium VI	9.45E-01	mg/kg	1.2E-09	mg/kg-day	2.0E+01	(mg/kg-day)$^{-1}$	2.4E-08	8.6E-08	mg/kg-day	1.3E-04	mg/kg-day	6.8E-04
				Cobalt	3.00E+01	mg/kg	3.9E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.7E-06	mg/kg-day	3.0E-03	mg/kg-day	9.1E-04
				Copper	3.11E+02	mg/kg	4.0E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.8E-05	mg/kg-day	1.0E-02	mg/kg-day	2.8E-03
				Iron	2.37E+04	mg/kg	3.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.2E-03	mg/kg-day	7.0E-01	mg/kg-day	3.1E-03
				Lead	2.71E+02	mg/kg	3.5E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.5E-05	mg/kg-day	-	mg/kg-day	-
				Manganese	4.87E+02	mg/kg	6.3E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	4.4E-05	mg/kg-day	9.6E-04	mg/kg-day	4.6E-02
				Nickel	2.06E+02	mg/kg	2.7E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.9E-05	mg/kg-day	8.0E-04	mg/kg-day	2.3E-02
				Benzo[a]anthracene	7.56E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	9.3E-09	8.9E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	1.10E+00	mg/kg	1.8E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.3E-07	1.3E-06	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	7.91E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	9.7E-09	9.3E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	1.39E-01	mg/kg	2.3E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.7E-08	1.6E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	4.98E-01	mg/kg	8.4E-09	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	6.1E-09	5.9E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								2.4E-07					8.3E-02
		FSBA - Particulates and Volatilization	Inhalation	Aluminum	3.15E-04	mg/m^3	1.0E-06	mg/m^3	-	(mg/m^3)$^{-1}$	-	7.2E-05	mg/m^3	5.0E-03	mg/m^3	1.4E-02
				Arsenic	3.38E-07	mg/m^3	1.1E-09	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	4.7E-09	7.7E-08	mg/m^3	1.5E-05	mg/m^3	5.1E-03
				Chromium VI	4.80E-08	mg/m^3	1.6E-10	mg/m^3	8.4E+01	(mg/m^3)$^{-1}$	1.3E-08	1.1E-08	mg/m^3	3.0E-04	mg/m^3	3.7E-05
				Cobalt	1.52E-06	mg/m^3	5.0E-09	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	4.5E-08	3.5E-07	mg/m^3	2.0E-05	mg/m^3	1.7E-02
				Copper	1.58E-05	mg/m^3	5.1E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	3.6E-06	mg/m^3	-	mg/m^3	-
				Iron	1.21E-03	mg/m^3	3.9E-06	mg/m^3	-	(mg/m^3)$^{-1}$	-	2.8E-04	mg/m^3	-	mg/m^3	-
				Lead	1.38E-05	mg/m^3	4.5E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	3.1E-06	mg/m^3	-	mg/m^3	-
				Manganese	2.47E-05	mg/m^3	8.1E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	5.6E-06	mg/m^3	5.0E-05	mg/m^3	1.1E-01
				Nickel	1.05E-05	mg/m^3	3.4E-08	mg/m^3	2.6E-01	(mg/m^3)$^{-1}$	8.9E-09	2.4E-06	mg/m^3	2.0E-04	mg/m^3	1.2E-02
				Benzo[a]anthracene	3.84E-08	mg/m^3	1.3E-10	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	1.4E-11	8.8E-09	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	5.56E-08	mg/m^3	1.8E-10	mg/m^3	1.1E+00	(mg/m^3)$^{-1}$	2.0E-10	1.3E-08	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	4.02E-08	mg/m^3	1.3E-10	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	1.4E-11	9.2E-09	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	7.06E-09	mg/m^3	2.3E-11	mg/m^3	1.2E+00	(mg/m^3)$^{-1}$	2.8E-11	1.6E-09	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	2.53E-08	mg/m^3	8.2E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	9.1E-12	5.8E-09	mg/m^3	-	mg/m^3	-
			Exp. Route Total								7.2E-08					1.6E-01
		Exposure Point Total									1.0E-06					6.0E-01

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	All Soil (0 -15 ft bgs) (cont.)	Expended Waste Area (EWA)	Incidental Ingestion	Arsenic	8.40E+00	mg/kg	2.0E-07	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	3.1E-07	1.4E-05	mg/kg-day	3.0E-04	mg/kg-day	4.7E-02
				Cobalt	3.40E+01	mg/kg	1.4E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.6E-05	mg/kg-day	3.0E-03	mg/kg-day	3.2E-02
				Copper	3.27E+02	mg/kg	1.3E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.2E-04	mg/kg-day	1.0E-02	mg/kg-day	9.2E-02
				Iron	2.81E+04	mg/kg	1.1E-03	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.9E-02	mg/kg-day	7.0E-01	mg/kg-day	1.1E-01
				Manganese	8.59E+02	mg/kg	3.5E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.4E-03	mg/kg-day	2.4E-02	mg/kg-day	1.0E-01
				Nickel	1.91E+02	mg/kg	7.7E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.4E-04	mg/kg-day	2.0E-02	mg/kg-day	2.7E-02
				Benzo[a]anthracene	2.79E-01	mg/kg	1.1E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	8.2E-09	7.9E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	1.0E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	7.6E-08	7.3E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	1.6E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.2E-08	1.1E-06	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	1.9E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.4E-08	1.4E-07	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	7.5E-09	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	5.5E-09	5.3E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								4.2E-07					4.1E-01
			Dermal Absorption	Arsenic	8.40E+00	mg/kg	3.3E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	4.9E-08	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	7.6E-03
				Cobalt	3.40E+01	mg/kg	4.4E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.1E-06	mg/kg-day	3.0E-03	mg/kg-day	1.0E-03
				Copper	3.27E+02	mg/kg	4.2E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.0E-05	mg/kg-day	1.0E-02	mg/kg-day	3.0E-03
				Iron	2.81E+04	mg/kg	3.6E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.5E-03	mg/kg-day	7.0E-01	mg/kg-day	3.6E-03
				Manganese	8.59E+02	mg/kg	1.1E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.8E-05	mg/kg-day	9.6E-04	mg/kg-day	8.1E-02
				Nickel	1.91E+02	mg/kg	2.5E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.7E-05	mg/kg-day	8.0E-04	mg/kg-day	2.2E-02
				Benzo[a]anthracene	2.79E-01	mg/kg	4.7E-09	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	3.4E-09	3.3E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	2.57E-01	mg/kg	4.3E-09	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	3.2E-08	3.0E-07	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	4.02E-01	mg/kg	6.8E-09	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	4.9E-09	4.7E-07	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	4.78E-02	mg/kg	8.0E-10	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	5.9E-09	5.6E-08	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	1.86E-01	mg/kg	3.1E-09	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.3E-09	2.2E-07	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								9.7E-08					1.2E-01
		EWA - Particulates and Volatilization	Inhalation	Arsenic	4.27E-07	mg/m^3	1.4E-09	mg/m^3	4.3E+00	(mg/m^3)$^{-1}$	6.0E-09	9.7E-08	mg/m^3	1.5E-05	mg/m^3	6.5E-03
				Cobalt	1.73E-06	mg/m^3	5.6E-09	mg/m^3	9.0E+00	(mg/m^3)$^{-1}$	5.1E-08	3.9E-07	mg/m^3	2.0E-05	mg/m^3	2.0E-02
				Copper	1.66E-05	mg/m^3	5.4E-08	mg/m^3	-	(mg/m^3)$^{-1}$	-	3.8E-06	mg/m^3	-	mg/m^3	-
				Iron	1.43E-03	mg/m^3	4.7E-06	mg/m^3	-	(mg/m^3)$^{-1}$	-	3.3E-04	mg/m^3	-	mg/m^3	-
				Manganese	4.36E-05	mg/m^3	1.4E-07	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.0E-05	mg/m^3	5.0E-05	mg/m^3	2.0E-01
				Nickel	9.68E-06	mg/m^3	3.2E-08	mg/m^3	2.6E-01	(mg/m^3)$^{-1}$	8.2E-09	2.2E-06	mg/m^3	2.0E-04	mg/m^3	1.1E-02
				Benzo[a]anthracene	1.42E-08	mg/m^3	4.6E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	5.1E-12	3.2E-09	mg/m^3	-	mg/m^3	-
				Benzo[a]pyrene	1.30E-08	mg/m^3	4.3E-11	mg/m^3	1.1E+00	(mg/m^3)$^{-1}$	4.7E-11	3.0E-09	mg/m^3	-	mg/m^3	-
				Benzo[b]fluoranthene	2.04E-08	mg/m^3	6.7E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	7.3E-12	4.7E-09	mg/m^3	-	mg/m^3	-
				Dibenz(a,h)anthracene	2.43E-09	mg/m^3	7.9E-12	mg/m^3	1.2E+00	(mg/m^3)$^{-1}$	9.5E-12	5.5E-10	mg/m^3	-	mg/m^3	-
				Indeno[1,2,3-cd]pyrene	9.44E-09	mg/m^3	3.1E-11	mg/m^3	1.1E-01	(mg/m^3)$^{-1}$	3.4E-12	2.2E-09	mg/m^3	-	mg/m^3	-
			Exp. Route Total								6.5E-08					2.4E-01
		Exposure Point Total									5.8E-07					7.7E-01
	Exposure Medium Total - Average for All Areas										1.3E-06					5.2E+00
Medium Total											1.3E-06					5.2E+00

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Retention Pond	Incidental Ingestion	Arsenic	7.76E+00	mg/kg	1.9E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	2.8E-07	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	4.4E-02
				Manganese	2.00E+03	mg/kg	8.1E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.7E-03	mg/kg-day	2.4E-02	mg/kg-day	2.4E-01
				Benzo[a]anthracene	1.15E+02	mg/kg	4.6E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.4E-06	3.2E-04	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	3.6E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2.7E-05	2.5E-04	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	4.4E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	3.2E-06	3.1E-04	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	2.1E-06	mg/kg-day	7.3E-02	$(mg/kg\text{-}day)^{-1}$	1.5E-07	1.4E-04	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	1.3E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	9.4E-06	9.0E-05	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	2.2E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.6E-06	1.5E-04	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								4.5E-05					2.8E-01
			Dermal Absorption	Arsenic	7.76E+00	mg/kg	3.0E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	4.5E-08	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.0E-03
				Manganese	2.00E+03	mg/kg	2.6E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.8E-04	mg/kg-day	9.6E-04	mg/kg-day	1.9E-01
				Benzo[a]anthracene	1.15E+02	mg/kg	1.9E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-06	1.4E-04	mg/kg-day	-	mg/kg-day	-
				Benzo[a]pyrene	8.99E+01	mg/kg	1.5E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05	1.1E-04	mg/kg-day	-	mg/kg-day	-
				Benzo[b]fluoranthene	1.10E+02	mg/kg	1.9E-06	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	1.4E-06	1.3E-04	mg/kg-day	-	mg/kg-day	-
				Benzo[k]fluoranthene	5.10E+01	mg/kg	8.6E-07	mg/kg-day	7.3E-02	$(mg/kg\text{-}day)^{-1}$	6.3E-08	6.0E-05	mg/kg-day	-	mg/kg-day	-
				Dibenz(a,h)anthracene	3.20E+01	mg/kg	5.4E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.9E-06	3.8E-05	mg/kg-day	-	mg/kg-day	-
				Indeno[1,2,3-cd]pyrene	5.43E+01	mg/kg	9.1E-07	mg/kg-day	7.3E-01	$(mg/kg\text{-}day)^{-1}$	6.7E-07	6.4E-05	mg/kg-day	-	mg/kg-day	-
			Exp. Route Total								1.9E-05					2.0E-01
		Exposure Point Total									6.3E-05					4.8E-01
	Exposure Medium Total										6.3E-05					4.8E-01
Medium Total											6.3E-05					4.8E-01
										Total of Receptor Risks Across All Media	6.8E-05				Total of Receptor Hazards Across All Media	3.4E+01

Notes:

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Chromium (total) in groundwater is assumed to be Chromium VI due to the absence of valid groundwater chromium speciation data.

Arsenic ingestion intakes from soil and sediment reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	AA - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Child / Affected Area Groundwater	Ingestion	Iron	1.99E+01	mg/L	8.5E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	9.9E-01	mg/kg-day	7.0E-01	mg/kg-day	1.4E+00
				1,4-Dioxane	2.59E-04	mg/L	1.1E-06	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	1.1E-07	1.3E-05	mg/kg-day	3.0E-02	mg/kg-day	4.3E-04
				Acrolein	1.81E-02	mg/L	7.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	9.0E-04	mg/kg-day	5.0E-04	mg/kg-day	1.8E+00
				Benzene	1.52E-04	mg/L	6.5E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	3.6E-08	7.6E-06	mg/kg-day	4.0E-03	mg/kg-day	1.9E-03
				Bromodichloromethane	1.80E-04	mg/L	7.7E-07	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	No	4.8E-08	9.0E-06	mg/kg-day	2.0E-02	mg/kg-day	4.5E-04
				Carbon tetrachloride	1.72E-04	mg/L	7.4E-07	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	No	5.1E-08	8.6E-06	mg/kg-day	4.0E-03	mg/kg-day	2.1E-03
				Chloroform	4.87E-04	mg/L	2.1E-06	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	6.5E-08	2.4E-05	mg/kg-day	1.0E-02	mg/kg-day	2.4E-03
				Trichloroethene	3.01E-02	mg/L	1.3E-04	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	1.1E-05	1.5E-03	mg/kg-day	5.0E-04	mg/kg-day	3.0E+00
				Vinyl chloride	1.40E-04	mg/L	7.9E-06	mg/kg-day	1.4E+00	(mg/kg-day)$^{-1}$	See note	1.1E-05	7.0E-06	mg/kg-day	3.0E-03	mg/kg-day	2.3E-03
			Exp. Route Total									2.2E-05					6.2E+00
			Dermal Absorption (During Bathing)	Iron	1.99E+01	mg/L	3.8E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.4E-03	mg/kg-day	7.0E-01	mg/kg-day	6.3E-03
				1,4-Dioxane	2.59E-04	mg/L	3.5E-09	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	3.5E-10	4.1E-08	mg/kg-day	3.0E-02	mg/kg-day	1.4E-06
				Acrolein	1.81E-02	mg/L	4.6E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	5.4E-06	mg/kg-day	5.0E-04	mg/kg-day	1.1E-02
				Benzene	1.52E-04	mg/L	8.6E-08	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	4.7E-09	1.0E-06	mg/kg-day	4.0E-03	mg/kg-day	2.5E-04
				Bromodichloromethane	1.80E-04	mg/L	4.8E-08	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	No	3.0E-09	5.6E-07	mg/kg-day	2.0E-02	mg/kg-day	2.8E-05
				Carbon tetrachloride	1.72E-04	mg/L	1.7E-07	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	No	1.2E-08	2.0E-06	mg/kg-day	4.0E-03	mg/kg-day	5.1E-04
				Chloroform	4.87E-04	mg/L	1.7E-07	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	5.1E-09	1.9E-06	mg/kg-day	1.0E-02	mg/kg-day	1.9E-04
				Trichloroethene	3.01E-02	mg/L	1.9E-05	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	1.6E-06	2.2E-04	mg/kg-day	5.0E-04	mg/kg-day	4.4E-01
				Vinyl chloride	1.40E-04	mg/L	5.3E-07	mg/kg-day	1.4E+00	(mg/kg-day)$^{-1}$	See note	7.4E-07	4.7E-07	mg/kg-day	3.0E-03	mg/kg-day	1.6E-04
			Exp. Route Total									2.4E-06					4.6E-01
		Exposure Point Total										2.5E-05					6.7E+00
	Exposure Medium Total											2.5E-05					6.7E+00
Medium Total												2.5E-05					6.7E+00
											Total of Receptor Risks Across All Media					Total of Receptor Hazards Across All Media	

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	AA - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Adult / Affected Area Groundwater	Ingestion	Iron	1.99E+01	mg/L	1.7E-01	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.0E-01	mg/kg-day	7.0E-01	mg/kg-day	8.5E-01
				1,4-Dioxane	2.59E-04	mg/L	2.2E-06	mg/kg-day	1.0E-01	$(mg/kg\text{-}day)^{-1}$	No	2.2E-07	7.8E-06	mg/kg-day	3.0E-02	mg/kg-day	2.6E-04
				Acrolein	1.81E-02	mg/L	1.5E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	5.4E-04	mg/kg-day	5.0E-04	mg/kg-day	1.1E+00
				Benzene	1.52E-04	mg/L	1.3E-06	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	No	7.2E-08	4.6E-06	mg/kg-day	4.0E-03	mg/kg-day	1.1E-03
				Bromodichloromethane	1.80E-04	mg/L	1.5E-06	mg/kg-day	6.2E-02	$(mg/kg\text{-}day)^{-1}$	No	9.6E-08	5.4E-06	mg/kg-day	2.0E-02	mg/kg-day	2.7E-04
				Carbon tetrachloride	1.72E-04	mg/L	1.5E-06	mg/kg-day	7.0E-02	$(mg/kg\text{-}day)^{-1}$	No	1.0E-07	5.2E-06	mg/kg-day	4.0E-03	mg/kg-day	1.3E-03
				Chloroform	4.87E-04	mg/L	4.2E-06	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	No	1.3E-07	1.5E-05	mg/kg-day	1.0E-02	mg/kg-day	1.5E-03
				Trichloroethene	3.01E-02	mg/L	2.6E-04	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	1.4E-05	9.0E-04	mg/kg-day	5.0E-04	mg/kg-day	1.8E+00
				Vinyl chloride	1.40E-04	mg/L	1.2E-06	mg/kg-day	7.2E-01	$(mg/kg\text{-}day)^{-1}$	See note	8.6E-07	4.2E-06	mg/kg-day	3.0E-03	mg/kg-day	1.4E-03
			Exp. Route Total									1.6E-05					3.7E+00
			Dermal Absorption (During Showering)	Iron	1.99E+01	mg/L	1.0E-03	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.5E-03	mg/kg-day	7.0E-01	mg/kg-day	5.1E-03
				1,4-Dioxane	2.59E-04	mg/L	8.2E-09	mg/kg-day	1.0E-01	$(mg/kg\text{-}day)^{-1}$	No	8.2E-10	2.9E-08	mg/kg-day	3.0E-02	mg/kg-day	9.6E-07
				Acrolein	1.81E-02	mg/L	1.1E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.9E-06	mg/kg-day	5.0E-04	mg/kg-day	7.7E-03
				Benzene	1.52E-04	mg/L	2.1E-07	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	No	1.1E-08	7.3E-07	mg/kg-day	4.0E-03	mg/kg-day	1.8E-04
				Bromodichloromethane	1.80E-04	mg/L	1.1E-07	mg/kg-day	6.2E-02	$(mg/kg\text{-}day)^{-1}$	No	7.0E-09	3.9E-07	mg/kg-day	2.0E-02	mg/kg-day	2.0E-05
				Carbon tetrachloride	1.72E-04	mg/L	4.1E-07	mg/kg-day	7.0E-02	$(mg/kg\text{-}day)^{-1}$	No	2.9E-08	1.4E-06	mg/kg-day	4.0E-03	mg/kg-day	3.6E-04
				Chloroform	4.87E-04	mg/L	3.9E-07	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	No	1.2E-08	1.4E-06	mg/kg-day	1.0E-02	mg/kg-day	1.4E-04
				Trichloroethene	3.01E-02	mg/L	4.4E-05	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	2.4E-06	1.5E-04	mg/kg-day	5.0E-04	mg/kg-day	3.1E-01
				Vinyl chloride	1.40E-04	mg/L	9.9E-08	mg/kg-day	7.2E-01	$(mg/kg\text{-}day)^{-1}$	See note	7.1E-08	3.5E-07	mg/kg-day	3.0E-03	mg/kg-day	1.2E-04
			Exp. Route Total									2.6E-06					3.2E-01
		Indoor Air	Inhalation (During Showering)	Iron	-	mg/m^3	-	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	-	mg/m^3	-	mg/m^3	-
				1,4-Dioxane	4.55E-05	mg/m^3	3.7E-07	mg/m^3	5.0E-03	$(mg/m^3)^{-1}$	No	1.8E-09	1.3E-06	mg/m^3	3.0E-02	mg/m^3	4.3E-05
				Acrolein	6.15E-02	mg/m^3	5.0E-04	mg/m^3	-	$(mg/m^3)^{-1}$	No	-	1.7E-03	mg/m^3	2.0E-05	mg/m^3	8.7E+01
				Benzene	1.07E-03	mg/m^3	8.7E-06	mg/m^3	7.8E-03	$(mg/m^3)^{-1}$	No	6.8E-08	3.0E-05	mg/m^3	3.0E-02	mg/m^3	1.0E-03
				Bromodichloromethane	9.07E-04	mg/m^3	7.4E-06	mg/m^3	3.7E-02	$(mg/m^3)^{-1}$	No	2.7E-07	2.6E-05	mg/m^3	-	mg/m^3	-
				Carbon tetrachloride	9.64E-04	mg/m^3	7.8E-06	mg/m^3	6.0E-03	$(mg/m^3)^{-1}$	No	4.7E-08	2.7E-05	mg/m^3	1.0E-01	mg/m^3	2.7E-04
				Chloroform	2.88E-03	mg/m^3	2.3E-05	mg/m^3	2.3E-02	$(mg/m^3)^{-1}$	No	5.4E-07	8.2E-05	mg/m^3	9.8E-02	mg/m^3	8.3E-04
				Trichloroethene	1.77E-01	mg/m^3	1.4E-03	mg/m^3	4.1E-03	$(mg/m^3)^{-1}$	Yes	7.3E-06	5.0E-03	mg/m^3	2.0E-03	mg/m^3	2.5E+00
				Vinyl chloride	1.09E-03	mg/m^3	8.8E-06	mg/m^3	4.4E-03	$(mg/m^3)^{-1}$	See note	3.9E-08	3.1E-05	mg/m^3	1.0E-01	mg/m^3	3.1E-04
			Exp. Route Total									8.3E-06					9.0E+01
		Exposure Point Total										2.7E-05					9.4E+01
	Exposure Medium Total											2.7E-05					9.4E+01
Medium Total												2.7E-05					9.4E+01
											Total of Receptor Risks Across All Media				Total of Receptor Hazards Across All Media		
Lifetime Total for Groundwater												5.2E-05					N/A
Lifetime Total Across All Media												5.2E-05					N/A

Notes: (a) Per the USEPA (2005), the following default age-dependant adjustment factors (ADAF) were applied to the slope factor for the COPCS with a mutagenic mode of action:

AGE	ADAF
0-<2	10
2-<16	3
16-<30	1

For the purposes of application of the ADAF, the child receptor is aged 0 to 6 and the adult receptor is aged 6 to 26. Therefore, an ADAF of 5.3 was calculated for Child 0-6 years of age as the age-weighted ADAF for children 0<2 (ADAF=10) and children 2<6 (ADAF=3), [(2 yrs x 10) + (3 yrs x 4)] / 6 yrs = 5.3]. Similarly, an ADAF of 2 was calculated for the Adult 6 to 26 years of ages [((10 yrs x 3) + (10 yrs x 1)) / 20 yrs = 2]. The ADAF is only applied to the kidney portion of the CSF / Unit Risk for trichloroethene (9.3E-03 for oral and dermal exposures; 1E-03 for inhalation exposure). The ADAF is not applied to the lymphoid tissue or liver portions of the CSF / Unit Risk (3.7E-02 for oral and dermal exposure; 3.1E-03 for inhalaition exposure). Although vinly chloride is a mutagen, the ADAF approach is not used. Instead, the equations for intake include the sum of the prorated and unprorated terms for the child and just the prorated (conventional) term for the adult. See Table 4.2 for intake equations.

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	AA - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Affected Area	Ingestion	Iron	1.99E+01	mg/L	6.1E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.7E-01	mg/kg-day	7.0E-01	mg/kg-day	2.4E-01
				1,4-Dioxane	2.59E-04	mg/L	7.9E-07	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	7.9E-08	2.2E-06	mg/kg-day	3.0E-02	mg/kg-day	7.4E-05
				Acrolein	1.81E-02	mg/L	5.5E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.5E-04	mg/kg-day	5.0E-04	mg/kg-day	3.1E-01
				Benzene	1.52E-04	mg/L	4.6E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.6E-08	1.3E-06	mg/kg-day	4.0E-03	mg/kg-day	3.3E-04
				Bromodichloromethane	1.80E-04	mg/L	5.5E-07	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	3.4E-08	1.5E-06	mg/kg-day	2.0E-02	mg/kg-day	7.7E-05
				Carbon tetrachloride	1.72E-04	mg/L	5.3E-07	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	3.7E-08	1.5E-06	mg/kg-day	4.0E-03	mg/kg-day	3.7E-04
				Chloroform	4.87E-04	mg/L	1.5E-06	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	4.6E-08	4.2E-06	mg/kg-day	1.0E-02	mg/kg-day	4.2E-04
				Trichloroethene	3.01E-02	mg/L	9.2E-05	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	4.2E-06	2.6E-04	mg/kg-day	5.0E-04	mg/kg-day	5.2E-01
				Vinyl chloride	1.40E-04	mg/L	4.3E-07	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	3.1E-07	1.2E-06	mg/kg-day	3.0E-03	mg/kg-day	4.0E-04
			Exp. Route Total								4.8E-06					1.1E+00
			Dermal Absorption (During Use of Tap Water in the Workplace)	Iron	1.99E+01	mg/L	3.4E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.5E-05	mg/kg-day	7.0E-01	mg/kg-day	1.4E-04
				1,4-Dioxane	2.59E-04	mg/L	4.6E-10	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	4.6E-11	1.3E-09	mg/kg-day	3.0E-02	mg/kg-day	4.3E-08
				Acrolein	1.81E-02	mg/L	5.9E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.7E-07	mg/kg-day	5.0E-04	mg/kg-day	3.3E-04
				Benzene	1.52E-04	mg/L	1.1E-08	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	6.3E-10	3.2E-08	mg/kg-day	4.0E-03	mg/kg-day	8.0E-06
				Bromodichloromethane	1.80E-04	mg/L	6.3E-09	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	3.9E-10	1.8E-08	mg/kg-day	2.0E-02	mg/kg-day	8.9E-07
				Carbon tetrachloride	1.72E-04	mg/L	2.3E-08	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	1.6E-09	6.4E-08	mg/kg-day	4.0E-03	mg/kg-day	1.6E-05
				Chloroform	4.87E-04	mg/L	2.2E-08	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	6.8E-10	6.1E-08	mg/kg-day	1.0E-02	mg/kg-day	6.1E-06
				Trichloroethene	3.01E-02	mg/L	2.5E-06	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	1.1E-07	6.9E-06	mg/kg-day	5.0E-04	mg/kg-day	1.4E-02
				Vinyl chloride	1.40E-04	mg/L	5.3E-09	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	3.8E-09	1.5E-08	mg/kg-day	3.0E-03	mg/kg-day	5.0E-06
			Exp. Route Total								1.2E-07					1.4E-02
		Exposure Point Total									4.9E-06					1.1E+00
	Exposure Medium Total										4.9E-06					1.1E+00
Medium Total											4.9E-06					1.1E+00
										Total of Receptor Risks Across All Media	4.9E-06				Total of Receptor Hazards Across All Media	1.1E+00

Notes:

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	AA - Construction/Utility Worker
Receptor Age:	Adult

Age / Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Direct Contact During Trenching	Affected Area	Incidental Ingestion	Iron	1.99E+01	mg/L	4.9E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.4E-05	mg/kg-day	7.0E-01	mg/kg-day	4.9E-05
				1,4-Dioxane	2.59E-04	mg/L	6.3E-12	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	6.3E-13	4.4E-10	mg/kg-day	5.0E-01	mg/kg-day	8.9E-10
				Acrolein	1.81E-02	mg/L	4.4E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.1E-08	mg/kg-day	4.0E-03	mg/kg-day	7.7E-06
				Benzene	1.52E-04	mg/L	3.7E-12	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.0E-13	2.6E-10	mg/kg-day	1.0E-02	mg/kg-day	2.6E-08
				Bromodichloromethane	1.80E-04	mg/L	4.4E-12	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	2.7E-13	3.1E-10	mg/kg-day	8.0E-03	mg/kg-day	3.9E-08
				Carbon tetrachloride	1.72E-04	mg/L	4.2E-12	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	2.9E-13	2.9E-10	mg/kg-day	7.0E-03	mg/kg-day	4.2E-08
				Chloroform	4.87E-04	mg/L	1.2E-11	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	3.7E-13	8.3E-10	mg/kg-day	1.0E-01	mg/kg-day	8.3E-09
				Trichloroethene	3.01E-02	mg/L	7.4E-10	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	3.4E-11	5.2E-08	mg/kg-day	5.0E-04	mg/kg-day	1.0E-04
				Vinyl chloride	1.40E-04	mg/L	3.4E-12	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	2.5E-12	2.4E-10	mg/kg-day	3.0E-03	mg/kg-day	8.0E-08
			Exp. Route Total								3.8E-11					1.6E-04
			Dermal Absorption	Iron	1.99E+01	mg/L	1.4E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	9.6E-05	mg/kg-day	7.0E-01	mg/kg-day	1.4E-04
				1,4-Dioxane	2.59E-04	mg/L	6.9E-12	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	6.9E-13	4.8E-10	mg/kg-day	5.0E-01	mg/kg-day	9.7E-10
				Acrolein	1.81E-02	mg/L	1.0E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.2E-08	mg/kg-day	4.0E-03	mg/kg-day	1.8E-05
				Benzene	1.52E-04	mg/L	1.7E-10	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	9.5E-12	1.2E-08	mg/kg-day	1.0E-02	mg/kg-day	1.2E-06
				Bromodichloromethane	1.80E-04	mg/L	7.1E-11	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	4.4E-12	5.0E-09	mg/kg-day	8.0E-03	mg/kg-day	6.2E-07
				Carbon tetrachloride	1.72E-04	mg/L	2.6E-10	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	1.8E-11	1.8E-08	mg/kg-day	7.0E-03	mg/kg-day	2.6E-06
				Chloroform	4.87E-04	mg/L	2.8E-10	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	8.7E-12	2.0E-08	mg/kg-day	1.0E-01	mg/kg-day	2.0E-07
				Trichloroethene	3.01E-02	mg/L	3.0E-08	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	1.4E-09	2.1E-06	mg/kg-day	5.0E-04	mg/kg-day	4.2E-03
				Vinyl chloride	1.40E-04	mg/L	8.9E-11	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	6.4E-11	6.2E-09	mg/kg-day	3.00E-03	mg/kg-day	2.1E-06
			Exp. Route Total								1.5E-09					4.4E-03
		Trench Air	Inhalation (during trenching)	Iron	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	-	mg/m^3	-
				1,4-Dioxane	2.48E-04	mg/m^3	1.6E-08	mg/m^3	5.0E-03	(mg/m^3)$^{-1}$	8.1E-11	1.1E-06	mg/m^3	7.2E-01	mg/m^3	1.6E-06
				Acrolein	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	9.2E-05	mg/m^3	-
				Benzene	2.07E-03	mg/m^3	1.3E-07	mg/m^3	7.8E-03	(mg/m^3)$^{-1}$	1.1E-09	9.4E-06	mg/m^3	8.0E-02	mg/m^3	1.2E-04
				Bromodichloromethane	1.65E-03	mg/m^3	1.1E-07	mg/m^3	3.7E-02	(mg/m^3)$^{-1}$	4.0E-09	7.5E-06	mg/m^3	2.0E-02	mg/m^3	3.8E-04
				Carbon tetrachloride	1.68E-03	mg/m^3	1.1E-07	mg/m^3	6.0E-03	(mg/m^3)$^{-1}$	6.6E-10	7.7E-06	mg/m^3	1.9E-01	mg/m^3	4.1E-05
				Chloroform	5.33E-03	mg/m^3	3.5E-07	mg/m^3	2.3E-02	(mg/m^3)$^{-1}$	8.0E-09	2.4E-05	mg/m^3	2.4E-01	mg/m^3	1.0E-04
				Trichloroethene	3.17E-01	mg/m^3	2.1E-05	mg/m^3	4.1E-03	(mg/m^3)$^{-1}$	8.5E-08	1.4E-03	mg/m^3	2.0E-03	mg/m^3	7.2E-01
				Vinyl chloride	2.15E-03	mg/m^3	1.4E-07	mg/m^3	4.4E-03	(mg/m^3)$^{-1}$	6.2E-10	9.8E-06	mg/m^3	7.7E-02	mg/m^3	1.3E-04
			Exp. Route Total								9.9E-08					7.3E-01
		Exposure Point Total									1.0E-07					7.3E-01
	Exposure Medium Total										1.0E-07					7.3E-01
Medium Total											1.0E-07					7.3E-01
										Total of Receptor Risks Across All Media	1.0E-07				Total of Receptor Hazards Across All Media	7.3E-01

Notes:

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	WRT - Trespasser/Visitor
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Sediment	Sediment	Watering Run, Tributaries, and Streams	Incidental Ingestion	Arsenic	2.09E+01	mg/kg	3.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	4.7E-08	3.0E-06	mg/kg-day	3.0E-04	mg/kg-day	1.0E-02
				Cobalt	3.95E+01	mg/kg	9.8E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	3.8E-03
				Manganese	1.44E+04	mg/kg	3.6E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.2E-04	mg/kg-day	2.4E-02	mg/kg-day	1.7E-02
				Thallium	1.80E+00	mg/kg	4.5E-09	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	5.2E-08	mg/kg-day	1.0E-05	mg/kg-day	5.2E-03
			Exp. Route Total									4.7E-08					3.7E-02
			Dermal Absorption	Arsenic	2.09E+01	mg/kg	8.5E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	No	1.3E-08	9.9E-08	mg/kg-day	3.0E-04	mg/kg-day	3.3E-04
				Cobalt	3.95E+01	mg/kg	5.4E-09	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.3E-08	mg/kg-day	3.0E-04	mg/kg-day	2.1E-04
				Manganese	1.44E+04	mg/kg	2.0E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.3E-05	mg/kg-day	9.6E-04	mg/kg-day	2.4E-02
				Thallium	1.80E+00	mg/kg	2.4E-10	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.9E-09	mg/kg-day	1.00E-05	mg/kg-day	2.9E-04
			Exp. Route Total									1.3E-08					2.5E-02
		Exposure Point Total										5.9E-08					6.1E-02
	Exposure Medium Total											5.9E-08					6.1E-02
Medium Total												5.9E-08					6.1E-02
											Total of Receptor Risks Across All Media	5.9E-08			Total of Receptor Hazards Across All Media		6.1E-02

Notes: (a) Per the USEPA (2005), the following default age-dependant adjustment factors (ADAF) were applied to the slope factor for the COPCS with a mutagenic mode of action:

AGE	ADAF
0-<2	10
2-<16	3
16-<30	1

For the purposes of application of the ADAF, the trespasser receptor is aged 11 to 16.

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Arsenic ingestion intakes from soil and sediment reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	WRT - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Watering Run, Tributaries, and Streams	Incidental Ingestion	Arsenic	2.09E+01	mg/kg	5.1E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	7.6E-07	3.5E-05	mg/kg-day	3.0E-04	mg/kg-day	1.2E-01
				Cobalt	3.95E+01	mg/kg	1.6E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.1E-04	mg/kg-day	3.0E-03	mg/kg-day	3.7E-02
				Manganese	1.44E+04	mg/kg	5.8E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	4.1E-02	mg/kg-day	2.4E-02	mg/kg-day	1.7E+00
				Thallium	1.80E+00	mg/kg	7.3E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	5.1E-06	mg/kg-day	4.0E-05	mg/kg-day	1.3E-01
			Exp. Route Total								7.6E-07					2.0E+00
			Dermal Absorption	Arsenic	2.09E+01	mg/kg	8.1E-08	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.2E-07	5.7E-06	mg/kg-day	3.0E-04	mg/kg-day	1.9E-02
				Cobalt	3.95E+01	mg/kg	5.1E-08	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	3.6E-06	mg/kg-day	3.0E-03	mg/kg-day	1.2E-03
				Manganese	1.44E+04	mg/kg	1.9E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.3E-03	mg/kg-day	9.6E-04	mg/kg-day	1.4E+00
				Thallium	1.80E+00	mg/kg	2.3E-09	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	-	1.6E-07	mg/kg-day	4.00E-05	mg/kg-day	4.1E-03
			Exp. Route Total								1.2E-07					1.4E+00
		Exposure Point Total									8.8E-07					3.4E+00
	Exposure Medium Total										8.8E-07					3.4E+00
Medium Total											8.8E-07					3.4E+00
										Total of Receptor Risks Across All Media	8.8E-07				Total of Receptor Hazards Across All Media	3.4E+00

Notes:

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

Arsenic ingestion intakes from soil and sediment reflect USEPA's 2012 Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil of 60%.

TABLE 7.11.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	SIP - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Child / Surrounding Industrial Area	Ingestion	Formaldehyde	1.65E-02	mg/L	7.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	8.2E-04	mg/kg-day	2.0E-01	mg/kg-day	4.1E-03
				Iron	1.84E+01	mg/L	7.9E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	9.2E-01	mg/kg-day	7.0E-01	mg/kg-day	1.3E+00
				Manganese	6.58E+00	mg/L	2.8E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	3.3E-01	mg/kg-day	2.4E-02	mg/kg-day	1.4E+01
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	2.6E-05	mg/kg-day	1.4E-02	(mg/kg-day)$^{-1}$	No	3.7E-07	3.1E-04	mg/kg-day	2.0E-02	mg/kg-day	1.5E-02
				1,1-Dichloroethane	2.84E-03	mg/L	1.2E-05	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	No	6.9E-08	1.4E-04	mg/kg-day	2.0E-01	mg/kg-day	7.1E-04
				1,4-Dioxane	7.43E-03	mg/L	3.2E-05	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	3.2E-06	3.7E-04	mg/kg-day	3.0E-02	mg/kg-day	1.2E-02
				Acetone	4.20E-02	mg/L	1.8E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.1E-03	mg/kg-day	9.0E-01	mg/kg-day	2.3E-03
				Benzene	1.46E-04	mg/L	6.2E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	3.4E-08	7.3E-06	mg/kg-day	4.0E-03	mg/kg-day	1.8E-03
				Bromodichloromethane	1.50E-04	mg/L	6.4E-07	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	No	4.0E-08	7.5E-06	mg/kg-day	2.0E-02	mg/kg-day	3.7E-04
				Carbon tetrachloride	1.88E-04	mg/L	8.0E-07	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	No	5.6E-08	9.4E-06	mg/kg-day	4.0E-03	mg/kg-day	2.3E-03
				Chloroform	2.19E-03	mg/L	9.3E-06	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	2.9E-07	1.1E-04	mg/kg-day	1.0E-02	mg/kg-day	1.1E-02
				cis-1,2-Dichloroethene	4.08E-04	mg/L	1.7E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.0E-05	mg/kg-day	2.0E-03	mg/kg-day	1.0E-02
				Toluene	1.57E-02	mg/L	6.7E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	7.8E-04	mg/kg-day	8.0E-02	mg/kg-day	9.8E-03
				Trichloroethene	5.95E-02	mg/L	2.5E-04	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	2.2E-05	3.0E-03	mg/kg-day	5.0E-04	mg/kg-day	5.9E+00
				Vinyl chloride	2.63E-04	mg/L	1.5E-05	mg/kg-day	1.4E+00	(mg/kg-day)$^{-1}$	See note	2.1E-05	1.3E-05	mg/kg-day	3.0E-03	mg/kg-day	4.4E-03
			Exp. Route Total									4.7E-05					2.1E+01
			Dermal Absorption (During Bathing)	Formaldehyde	1.65E-02	mg/L	8.9E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.0E-05	mg/kg-day	2.0E-01	mg/kg-day	5.2E-05
				Iron	1.84E+01	mg/L	3.5E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	4.0E-03	mg/kg-day	7.0E-01	mg/kg-day	5.8E-03
				Manganese	6.58E+00	mg/L	1.2E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	1.4E-03	mg/kg-day	9.6E-04	mg/kg-day	1.5E+00
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	Not in EPD	mg/kg-day	1.4E-02	(mg/kg-day)$^{-1}$	No	-	Not in EPD	mg/kg-day	2.0E-02	mg/kg-day	-
				1,1-Dichloroethane	2.84E-03	mg/L	8.4E-07	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	No	4.8E-09	9.7E-06	mg/kg-day	2.0E-01	mg/kg-day	4.9E-05
				1,4-Dioxane	7.43E-03	mg/L	1.0E-07	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	No	1.0E-08	1.2E-06	mg/kg-day	3.0E-02	mg/kg-day	3.9E-05
				Acetone	4.20E-02	mg/L	7.4E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	8.6E-06	mg/kg-day	9.0E-01	mg/kg-day	9.6E-06
				Benzene	1.46E-04	mg/L	8.3E-08	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	No	4.6E-09	9.7E-07	mg/kg-day	4.0E-03	mg/kg-day	2.4E-04
				Bromodichloromethane	1.50E-04	mg/L	4.0E-08	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	No	2.5E-09	4.7E-07	mg/kg-day	2.0E-02	mg/kg-day	2.3E-05
				Carbon tetrachloride	1.88E-04	mg/L	1.9E-07	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	No	1.3E-08	2.2E-06	mg/kg-day	4.0E-03	mg/kg-day	5.5E-04
				Chloroform	2.19E-03	mg/L	7.4E-07	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	No	2.3E-08	8.7E-06	mg/kg-day	1.0E-02	mg/kg-day	8.7E-04
				cis-1,2-Dichloroethene	4.08E-04	mg/L	1.9E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.3E-06	mg/kg-day	2.0E-03	mg/kg-day	1.1E-03
				Toluene	1.57E-02	mg/L	2.0E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	No	-	2.4E-04	mg/kg-day	8.0E-02	mg/kg-day	3.0E-03
				Trichloroethene	5.95E-02	mg/L	3.7E-05	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	Yes	3.2E-06	4.3E-04	mg/kg-day	5.0E-04	mg/kg-day	8.6E-01
				Vinyl chloride	2.63E-04	mg/L	1.0E-06	mg/kg-day	1.4E+00	(mg/kg-day)$^{-1}$	See note	1.4E-06	8.9E-07	mg/kg-day	3.0E-03	mg/kg-day	3.0E-04
			Exp. Route Total									4.7E-06					2.4E+00
		Exposure Point Total										5.1E-05					2.3E+01
	Exposure Medium Total											5.1E-05					2.3E+01
Medium Total												5.1E-05					2.3E+01
							Total of Receptor Risks Across All Media					5.1E-05	Total of Receptor Hazards Across All Media				2.3E+01

TABLE 7.11.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	SIP - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Adult / Surrounding Industrial Area	Ingestion	Formaldehyde	1.65E-02	mg/L	1.4E-04	mg/kg-day	-	(mg/kg-day)-1	No	-	5.0E-04	mg/kg-day	2.0E-01	mg/kg-day	2.5E-03
				Iron	1.84E+01	mg/L	1.6E-01	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	5.5E-01	mg/kg-day	7.0E-01	mg/kg-day	7.9E-01
				Manganese	6.58E+00	mg/L	5.6E-02	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	2.0E-01	mg/kg-day	2.4E-02	mg/kg-day	8.2E+00
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	5.3E-05	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	No	7.4E-07	1.9E-04	mg/kg-day	2.0E-02	mg/kg-day	9.3E-03
				1,1-Dichloroethane	2.84E-03	mg/L	2.4E-05	mg/kg-day	5.7E-03	$(mg/kg\text{-}day)^{-1}$	No	1.4E-07	8.5E-05	mg/kg-day	2.0E-01	mg/kg-day	4.3E-04
				1,4-Dioxane	7.43E-03	mg/L	6.4E-05	mg/kg-day	1.0E-01	$(mg/kg\text{-}day)^{-1}$	No	6.4E-06	2.2E-04	mg/kg-day	3.0E-02	mg/kg-day	7.4E-03
				Acetone	4.20E-02	mg/L	3.6E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.3E-03	mg/kg-day	9.0E-01	mg/kg-day	1.4E-03
				Benzene	1.46E-04	mg/L	1.3E-06	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	No	6.9E-08	4.4E-06	mg/kg-day	4.0E-03	mg/kg-day	1.1E-03
				Bromodichloromethane	1.50E-04	mg/L	1.3E-06	mg/kg-day	6.2E-02	$(mg/kg\text{-}day)^{-1}$	No	8.0E-08	4.5E-06	mg/kg-day	2.0E-02	mg/kg-day	2.2E-04
				Carbon tetrachloride	1.88E-04	mg/L	1.6E-06	mg/kg-day	7.0E-02	$(mg/kg\text{-}day)^{-1}$	No	1.1E-07	5.6E-06	mg/kg-day	4.0E-03	mg/kg-day	1.4E-03
				Chloroform	2.19E-03	mg/L	1.9E-05	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	No	5.8E-07	6.6E-05	mg/kg-day	1.0E-02	mg/kg-day	6.6E-03
				cis-1,2-Dichloroethene	4.08E-04	mg/L	3.5E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.2E-05	mg/kg-day	2.0E-03	mg/kg-day	6.1E-03
				Toluene	1.57E-02	mg/L	1.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	4.7E-04	mg/kg-day	8.0E-02	mg/kg-day	5.9E-03
				Trichloroethene	5.95E-02	mg/L	5.1E-04	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	2.8E-05	1.8E-03	mg/kg-day	5.0E-04	mg/kg-day	3.6E+00
				Vinyl chloride	2.63E-04	mg/L	2.3E-06	mg/kg-day	7.2E-01	$(mg/kg\text{-}day)^{-1}$	See note	1.6E-06	7.9E-06	mg/kg-day	3.0E-03	mg/kg-day	2.6E-03
			Exp. Route Total									3.8E-05					1.3E+01
			Dermal Absorption (During Showering)	Formaldehyde	1.65E-02	mg/L	2.2E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	7.7E-06	mg/kg-day	2.0E-01	mg/kg-day	3.8E-05
				Iron	1.84E+01	mg/L	9.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	3.3E-03	mg/kg-day	7.0E-01	mg/kg-day	4.7E-03
				Manganese	6.58E+00	mg/L	3.3E-04	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.2E-03	mg/kg-day	9.6E-04	mg/kg-day	1.2E+00
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	Not in EPD	mg/kg-day	1.4E-02	$(mg/kg\text{-}day)^{-1}$	No	-	Not in EPD	mg/kg-day	2.0E-02	mg/kg-day	-
				1,1-Dichloroethane	2.84E-03	mg/L	2.0E-06	mg/kg-day	5.7E-03	$(mg/kg\text{-}day)^{-1}$	No	1.1E-08	6.9E-06	mg/kg-day	2.0E-01	mg/kg-day	3.4E-05
				1,4-Dioxane	7.43E-03	mg/L	2.4E-07	mg/kg-day	1.0E-01	$(mg/kg\text{-}day)^{-1}$	No	2.4E-08	8.2E-07	mg/kg-day	3.0E-02	mg/kg-day	2.7E-05
				Acetone	4.20E-02	mg/L	1.8E-06	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	6.2E-06	mg/kg-day	9.0E-01	mg/kg-day	6.9E-06
				Benzene	1.46E-04	mg/L	2.0E-07	mg/kg-day	5.5E-02	$(mg/kg\text{-}day)^{-1}$	No	1.1E-08	7.0E-07	mg/kg-day	4.0E-03	mg/kg-day	1.7E-04
				Bromodichloromethane	1.50E-04	mg/L	9.4E-08	mg/kg-day	6.2E-02	$(mg/kg\text{-}day)^{-1}$	No	5.8E-09	3.3E-07	mg/kg-day	2.0E-02	mg/kg-day	1.6E-05
				Carbon tetrachloride	1.88E-04	mg/L	4.5E-07	mg/kg-day	7.0E-02	$(mg/kg\text{-}day)^{-1}$	No	3.1E-08	1.6E-06	mg/kg-day	4.0E-03	mg/kg-day	3.9E-04
				Chloroform	2.19E-03	mg/L	1.7E-06	mg/kg-day	3.1E-02	$(mg/kg\text{-}day)^{-1}$	No	5.4E-08	6.1E-06	mg/kg-day	1.0E-02	mg/kg-day	6.1E-04
				cis-1,2-Dichloroethene	4.08E-04	mg/L	4.5E-07	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.6E-06	mg/kg-day	2.0E-03	mg/kg-day	7.9E-04
				Toluene	1.57E-02	mg/L	4.8E-05	mg/kg-day	-	$(mg/kg\text{-}day)^{-1}$	No	-	1.7E-04	mg/kg-day	8.0E-02	mg/kg-day	2.1E-03
				Trichloroethene	5.95E-02	mg/L	8.7E-05	mg/kg-day	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Yes	4.8E-06	3.0E-04	mg/kg-day	5.0E-04	mg/kg-day	6.1E-01
				Vinyl chloride	2.63E-04	mg/L	1.9E-07	mg/kg-day	7.2E-01	$(mg/kg\text{-}day)^{-1}$	See note	1.3E-07	6.5E-07	mg/kg-day	3.0E-03	mg/kg-day	2.2E-04
			Exp. Route Total									5.1E-06					1.8E+00

TABLE 7.11.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	SIP - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk			Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units	ADAF		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Adult / Surrounding Industrial Area	Inhalation (During Showering)	Formaldehyde	3.57E-04	mg/m^3	2.9E-06	mg/m^3	1.3E-02	(mg/m^3)$^{-1}$	No	3.8E-08	1.0E-05	mg/m^3	9.8E-03	mg/m^3	1.0E-03
				Iron	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	-	mg/m^3	-
				Manganese	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	-	mg/m^3	5.0E-05	mg/m^3	-
				Bis(2-ethylhexyl)phthalate	2.98E-05	mg/m^3	2.4E-07	mg/m^3	2.4E-03	(mg/m^3)$^{-1}$	No	5.8E-10	8.5E-07	mg/m^3	-	mg/m^3	-
				1,1-Dichloroethane	1.83E-02	mg/m^3	1.5E-04	mg/m^3	1.6E-03	(mg/m^3)$^{-1}$	No	2.4E-07	5.2E-04	mg/m^3	-	mg/m^3	-
				1,4-Dioxane	1.31E-03	mg/m^3	1.1E-05	mg/m^3	5.0E-03	(mg/m^3)$^{-1}$	No	5.3E-08	3.7E-05	mg/m^3	3.0E-02	mg/m^3	1.2E-03
				Acetone	5.68E-02	mg/m^3	4.6E-04	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	1.6E-03	mg/m^3	3.1E+01	mg/m^3	5.2E-05
				Benzene	1.03E-03	mg/m^3	8.3E-06	mg/m^3	7.8E-03	(mg/m^3)$^{-1}$	No	6.5E-08	2.9E-05	mg/m^3	3.0E-02	mg/m^3	9.7E-04
				Bromodichloromethane	7.56E-04	mg/m^3	6.1E-06	mg/m^3	3.7E-02	(mg/m^3)$^{-1}$	No	2.3E-07	2.1E-05	mg/m^3	-	mg/m^3	-
				Carbon tetrachloride	1.05E-03	mg/m^3	8.5E-06	mg/m^3	6.0E-03	(mg/m^3)$^{-1}$	No	5.1E-08	3.0E-05	mg/m^3	1.0E-01	mg/m^3	3.0E-04
				Chloroform	1.29E-02	mg/m^3	1.0E-04	mg/m^3	2.3E-02	(mg/m^3)$^{-1}$	No	2.4E-06	3.7E-04	mg/m^3	9.8E-02	mg/m^3	3.7E-03
				cis-1,2-Dichloroethene	2.62E-03	mg/m^3	2.1E-05	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	7.4E-05	mg/m^3	-	mg/m^3	-
				Toluene	1.04E-01	mg/m^3	8.4E-04	mg/m^3	-	(mg/m^3)$^{-1}$	No	-	3.0E-03	mg/m^3	5.0E+00	mg/m^3	5.9E-04
				Trichloroethene	3.50E-01	mg/m^3	2.8E-03	mg/m^3	4.1E-03	(mg/m^3)$^{-1}$	Yes	1.4E-05	9.9E-03	mg/m^3	2.0E-03	mg/m^3	5.0E+00
				Vinyl chloride	2.05E-03	mg/m^3	1.7E-05	mg/m^3	4.4E-03	(mg/m^3)$^{-1}$	See note	7.3E-08	5.8E-05	mg/m^3	1.0E-01	mg/m^3	5.8E-04
			Exp. Route Total									1.8E-05					5.0E+00
		Exposure Point Total										6.1E-05					1.9E+01
	Exposure Medium Total											6.1E-05					1.9E+01
Medium Total												6.1E-05					1.9E+01
											Total of Receptor Risks Across All Media	6.1E-05			Total of Receptor Hazards Across All Media		1.9E+01
Lifetime Total Across All Media												1.1E-04					NA

Notes: (a) Per the USEPA (2005), the following default age-dependant adjustment factors (ADAF) were applied to the slope factor for the COPCS with a mutagenic mode of action:

AGE	ADAF
0-<2	10
2-<16	3
16-<30	1

For the purposes of application of the ADAF, the child receptor is aged 0 to 6 and the adult receptor is aged 6 to 26. Therefore, an ADAF of 5.3 was calculated for Child 0-6 years of age as the age-weighted ADAF for children 0<2 (ADAF=10) and children 2<6 (ADAF=3), [(2 yrs x 10) + (3 yrs x 4)] / 6 yrs = 5.3]. Similarly, an ADAF of 2 was calculated for the Adult 6 to 26 years of ages [((10 yrs x 3) + (10 yrs x 1)) / 20 yrs = 2]. The ADAF is only applied to the kidney portion of the CSF / Unit Risk for trichloroethene (9.3E-03 for oral and dermal exposures; 1E-03 for inhalation exposure). The ADAF is not applied to the lymphoid tissue or liver portions of the CSF / Unit Risk (3.7E-02 for oral and dermal exposure; 3.1E-03 for inhalaition exposure). Although vinly chloride is a mutagen, the ADAF approach is not used. Instead, the equations for intake include the sum of the prorated and unprorated terms for the child and just the prorated (conventional) term for the adult. See Table 4.2 for intake equations.

Intakes assoiciated with dermal expousre to bis(2-ethylhexyl)phthalate in groundwater could not be quatified as the time to reach steady state is outside the effective predictive domain (EPD) of methodology used to predict dermal absorption

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

TABLE 7.12.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future (Hypothetical)
Receptor Population:	SIP- Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater Used as Tap Water	Surrounding Industrial Properties	Ingestion	Formaldehyde	1.65E-02	mg/L	5.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.4E-04	mg/kg-day	2.0E-01	mg/kg-day	7.1E-04
				Iron	1.84E+01	mg/L	5.6E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.6E-01	mg/kg-day	7.0E-01	mg/kg-day	2.2E-01
				Manganese	6.58E+00	mg/L	2.0E-02	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	5.6E-02	mg/kg-day	2.4E-02	mg/kg-day	2.3E+00
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	1.9E-05	mg/kg-day	1.4E-02	(mg/kg-day)$^{-1}$	2.7E-07	5.3E-05	mg/kg-day	2.0E-02	mg/kg-day	2.7E-03
				1,1-Dichloroethane	2.84E-03	mg/L	8.7E-06	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	5.0E-08	2.4E-05	mg/kg-day	2.0E-01	mg/kg-day	1.2E-04
				1,4-Dioxane	7.43E-03	mg/L	2.3E-05	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	2.3E-06	6.4E-05	mg/kg-day	3.0E-02	mg/kg-day	2.1E-03
				Acetone	4.20E-02	mg/L	1.3E-04	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.6E-04	mg/kg-day	9.0E-01	mg/kg-day	4.0E-04
				Benzene	1.46E-04	mg/L	4.5E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.5E-08	1.3E-06	mg/kg-day	4.0E-03	mg/kg-day	3.1E-04
				Bromodichloromethane	1.50E-04	mg/L	4.6E-07	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	2.8E-08	1.3E-06	mg/kg-day	2.0E-02	mg/kg-day	6.4E-05
				Carbon tetrachloride	1.88E-04	mg/L	5.7E-07	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	4.0E-08	1.6E-06	mg/kg-day	4.0E-03	mg/kg-day	4.0E-04
				Chloroform	2.19E-03	mg/L	6.7E-06	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	2.1E-07	1.9E-05	mg/kg-day	1.0E-02	mg/kg-day	1.9E-03
				cis-1,2-Dichloroethene	4.08E-04	mg/L	1.2E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.5E-06	mg/kg-day	2.0E-03	mg/kg-day	1.7E-03
				Toluene	1.57E-02	mg/L	4.8E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.3E-04	mg/kg-day	8.0E-02	mg/kg-day	1.7E-03
				Trichloroethene	5.95E-02	mg/L	1.8E-04	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	8.4E-06	5.1E-04	mg/kg-day	5.0E-04	mg/kg-day	1.0E+00
				Vinyl chloride	2.63E-04	mg/L	8.0E-07	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	5.8E-07	2.3E-06	mg/kg-day	3.0E-03	mg/kg-day	7.5E-04
			Exp. Route Total								1.2E-05					3.6E+00
			Dermal Absorption (During Use of Tap Water in the Workplace)	Formaldehyde	1.65E-02	mg/L	1.1E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.1E-07	mg/kg-day	2.0E-01	mg/kg-day	1.6E-06
				Iron	1.84E+01	mg/L	3.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.7E-05	mg/kg-day	7.0E-01	mg/kg-day	1.2E-04
				Manganese	6.58E+00	mg/L	1.1E-05	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.1E-05	mg/kg-day	9.6E-04	mg/kg-day	3.3E-02
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	Not in EPD	mg/kg-day	1.4E-02	(mg/kg-day)$^{-1}$	-	Not in EPD	mg/kg-day	2.0E-02	mg/kg-day	-
				1,1-Dichloroethane	2.84E-03	mg/L	1.1E-07	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	6.3E-10	3.1E-07	mg/kg-day	2.0E-01	mg/kg-day	1.5E-06
				1,4-Dioxane	7.43E-03	mg/L	1.3E-08	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	1.3E-09	3.7E-08	mg/kg-day	3.0E-02	mg/kg-day	1.2E-06
				Acetone	4.20E-02	mg/L	9.5E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.7E-07	mg/kg-day	9.0E-01	mg/kg-day	3.0E-07
				Benzene	1.46E-04	mg/L	1.1E-08	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	6.0E-10	3.1E-08	mg/kg-day	4.0E-03	mg/kg-day	7.7E-06
				Bromodichloromethane	1.50E-04	mg/L	5.3E-09	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	3.3E-10	1.5E-08	mg/kg-day	2.0E-02	mg/kg-day	7.4E-07
				Carbon tetrachloride	1.88E-04	mg/L	2.5E-08	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	1.8E-09	7.0E-08	mg/kg-day	4.0E-03	mg/kg-day	1.8E-05
				Chloroform	2.19E-03	mg/L	9.8E-08	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	3.0E-09	2.7E-07	mg/kg-day	1.0E-02	mg/kg-day	2.7E-05
				cis-1,2-Dichloroethene	4.08E-04	mg/L	2.6E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.1E-08	mg/kg-day	2.0E-03	mg/kg-day	3.6E-05
				Toluene	1.57E-02	mg/L	2.7E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.5E-06	mg/kg-day	8.0E-02	mg/kg-day	9.4E-05
				Trichloroethene	5.95E-02	mg/L	4.9E-06	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	2.3E-07	1.4E-05	mg/kg-day	5.0E-04	mg/kg-day	2.7E-02
				Vinyl chloride	2.63E-04	mg/L	1.0E-08	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	7.2E-09	2.8E-08	mg/kg-day	3.0E-03	mg/kg-day	9.4E-06
			Exp. Route Total								2.4E-07					6.0E-02
		Exposure Point Total									1.2E-05					3.7E+00
	Exposure Medium Total										1.2E-05					3.7E+00
Medium Total											1.2E-05					3.7E+00
										Total of Receptor Risks Across All Media	1.2E-05				Total of Receptor Hazards Across All Media	3.7E+00

Notes:

Intakes assoiciated with dermal expousre to bis(2-ethylhexyl)phthalate in groundwater could not be quatified as the time to reach steady state is outside the effective predictive domain (EPD) of methodology used to predict dermal absorption

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

TABLE 7.13.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	SIP - Construction/Utility Worker
Receptor Age:	Adult

Age / Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Direct Contact During Trenching	Surrounding Industrial Properties	Incidental Ingestion	Formaldehyde	1.65E-02	mg/L	4.0E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.8E-08	mg/kg-day	3.0E-01	mg/kg-day	9.4E-08
				Iron	1.84E+01	mg/L	4.5E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.1E-05	mg/kg-day	7.0E-01	mg/kg-day	4.5E-05
				Manganese	6.58E+00	mg/L	1.6E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.1E-05	mg/kg-day	2.4E-02	mg/kg-day	4.7E-04
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	1.5E-10	mg/kg-day	1.4E-02	(mg/kg-day)$^{-1}$	2.1E-12	1.1E-08	mg/kg-day	1.0E-01	mg/kg-day	1.1E-07
				1,1-Dichloroethane	2.84E-03	mg/L	6.9E-11	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	4.0E-13	4.9E-09	mg/kg-day	2.0E+00	mg/kg-day	2.4E-09
				1,4-Dioxane	7.43E-03	mg/L	1.8E-10	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	1.8E-11	1.3E-08	mg/kg-day	5.0E-01	mg/kg-day	2.5E-08
				Acetone	4.20E-02	mg/L	1.0E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.2E-08	mg/kg-day	2.0E+00	mg/kg-day	3.6E-08
				Benzene	1.46E-04	mg/L	3.6E-12	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.0E-13	2.5E-10	mg/kg-day	1.0E-02	mg/kg-day	2.5E-08
				Bromodichloromethane	1.50E-04	mg/L	3.7E-12	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	2.3E-13	2.6E-10	mg/kg-day	8.0E-03	mg/kg-day	3.2E-08
				Carbon tetrachloride	1.88E-04	mg/L	4.6E-12	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	3.2E-13	3.2E-10	mg/kg-day	7.0E-03	mg/kg-day	4.6E-08
				Chloroform	2.19E-03	mg/L	5.3E-11	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	1.7E-12	3.7E-09	mg/kg-day	1.0E-01	mg/kg-day	3.7E-08
				cis-1,2-Dichloroethene	4.08E-04	mg/L	1.0E-11	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	7.0E-10	mg/kg-day	2.0E-02	mg/kg-day	3.5E-08
				Toluene	1.57E-02	mg/L	3.8E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.7E-08	mg/kg-day	8.0E-01	mg/kg-day	3.3E-08
				Trichloroethene	5.95E-02	mg/L	1.5E-09	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	6.7E-11	1.0E-07	mg/kg-day	5.0E-04	mg/kg-day	2.0E-04
				Vinyl chloride	2.63E-04	mg/L	6.4E-12	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	4.6E-12	4.5E-10	mg/kg-day	3.0E-03	mg/kg-day	1.5E-07
			Exp. Route Total								9.5E-11					7.2E-04
			Dermal Absorption	Formaldehyde	1.65E-02	mg/L	2.2E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.6E-07	mg/kg-day	3.0E-01	mg/kg-day	5.2E-07
				Iron	1.84E+01	mg/L	1.3E-06	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	8.9E-05	mg/kg-day	7.0E-01	mg/kg-day	1.3E-04
				Manganese	6.58E+00	mg/L	4.5E-07	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	3.2E-05	mg/kg-day	9.6E-04	mg/kg-day	3.3E-02
				Bis(2-ethylhexyl)phthalate	6.20E-03	mg/L	Not in EPD	mg/kg-day	1.4E-02	(mg/kg-day)$^{-1}$	-	Not in EPD	mg/kg-day	1.0E-01	mg/kg-day	-
				1,1-Dichloroethane	2.84E-03	mg/L	1.5E-09	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	8.8E-12	1.1E-07	mg/kg-day	2.0E+00	mg/kg-day	5.4E-08
				1,4-Dioxane	7.43E-03	mg/L	2.0E-10	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	2.0E-11	1.4E-08	mg/kg-day	5.0E-01	mg/kg-day	2.8E-08
				Acetone	4.20E-02	mg/L	1.6E-09	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	1.2E-07	mg/kg-day	2.00E+00	mg/kg-day	5.8E-08
				Benzene	1.46E-04	mg/L	1.7E-10	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	9.1E-12	1.2E-08	mg/kg-day	1.00E-02	mg/kg-day	1.2E-06
				Bromodichloromethane	1.50E-04	mg/L	5.9E-11	mg/kg-day	6.2E-02	(mg/kg-day)$^{-1}$	3.7E-12	4.1E-09	mg/kg-day	8.00E-03	mg/kg-day	5.2E-07
				Carbon tetrachloride	1.88E-04	mg/L	2.8E-10	mg/kg-day	7.0E-02	(mg/kg-day)$^{-1}$	2.0E-11	2.0E-08	mg/kg-day	7.00E-03	mg/kg-day	2.8E-06
				Chloroform	2.19E-03	mg/L	1.3E-09	mg/kg-day	3.1E-02	(mg/kg-day)$^{-1}$	3.9E-11	8.8E-08	mg/kg-day	1.00E-01	mg/kg-day	8.8E-07
				cis-1,2-Dichloroethene	4.08E-04	mg/L	3.6E-10	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.5E-08	mg/kg-day	2.00E-02	mg/kg-day	1.2E-06
				Toluene	1.57E-02	mg/L	3.7E-08	mg/kg-day	-	(mg/kg-day)$^{-1}$	-	2.6E-06	mg/kg-day	8.00E-01	mg/kg-day	3.2E-06
				Trichloroethene	5.95E-02	mg/L	6.0E-08	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	2.7E-09	4.2E-06	mg/kg-day	5.00E-04	mg/kg-day	8.3E-03
				Vinyl chloride	2.63E-04	mg/L	1.7E-10	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	1.2E-10	1.2E-08	mg/kg-day	3.00E-03	mg/kg-day	3.9E-06
			Exp. Route Total								3.0E-09					4.2E-02

TABLE 7.13.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	SIP - Construction/Utility Worker
Receptor Age:	Adult

Age / Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		Subchronic RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Direct Contact During Trenching	Surrounding Industrial Properties	Inhalation (during trenching)	Formaldehyde	-	mg/m^3	-	mg/m^3	1.3E-02	(mg/m^3)$^{-1}$	-	-	mg/m^3	3.7E-02	mg/m^3	-
				Iron	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	-	mg/m^3	-
				Manganese	-	mg/m^3	-	mg/m^3	-	(mg/m^3)$^{-1}$	-	-	mg/m^3	5.0E-05	mg/m^3	-
				Bis(2-ethylhexyl)phthalate	1.22E-04	mg/m^3	8.0E-09	mg/m^3	2.4E-03	(mg/m^3)$^{-1}$	1.9E-11	5.6E-07	mg/m^3	-	mg/m^3	-
				1,1-Dichloroethane	5.10E-02	mg/m^3	3.3E-06	mg/m^3	1.6E-03	(mg/m^3)$^{-1}$	5.3E-09	2.3E-04	mg/m^3	-	mg/m^3	-
				1,4-Dioxane	1.06E-02	mg/m^3	6.9E-07	mg/m^3	5.0E-03	(mg/m^3)$^{-1}$	3.4E-09	4.8E-05	mg/m^3	7.2E-01	mg/m^3	6.7E-05
				Acetone	3.74E-01	mg/m^3	2.4E-05	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.7E-03	mg/m^3	3.1E+01	mg/m^3	5.5E-05
				Benzene	2.95E-03	mg/m^3	1.9E-07	mg/m^3	7.8E-03	(mg/m^3)$^{-1}$	1.5E-09	1.3E-05	mg/m^3	8.0E-02	mg/m^3	1.7E-04
				Bromodichloromethane	2.05E-03	mg/m^3	1.3E-07	mg/m^3	3.7E-02	(mg/m^3)$^{-1}$	4.9E-09	9.3E-06	mg/m^3	2.0E-02	mg/m^3	4.7E-04
				Carbon tetrachloride	2.73E-03	mg/m^3	1.8E-07	mg/m^3	6.0E-03	(mg/m^3)$^{-1}$	1.1E-09	1.2E-05	mg/m^3	1.9E-01	mg/m^3	6.6E-05
				Chloroform	3.56E-02	mg/m^3	2.3E-06	mg/m^3	2.3E-02	(mg/m^3)$^{-1}$	5.3E-08	1.6E-04	mg/m^3	2.4E-01	mg/m^3	6.7E-04
				cis-1,2-Dichloroethene	7.38E-03	mg/m^3	4.8E-07	mg/m^3	-	(mg/m^3)$^{-1}$	-	3.4E-05	mg/m^3	-	mg/m^3	-
				Toluene	2.92E-01	mg/m^3	1.9E-05	mg/m^3	-	(mg/m^3)$^{-1}$	-	1.3E-03	mg/m^3	5.0E+00	mg/m^3	2.7E-04
				Trichloroethene	9.32E-01	mg/m^3	6.1E-05	mg/m^3	4.1E-03	(mg/m^3)$^{-1}$	2.5E-07	4.3E-03	mg/m^3	2.0E-03	mg/m^3	2.1E+00
				Vinyl chloride	5.99E-03	mg/m^3	3.9E-07	mg/m^3	4.4E-03	(mg/m^3)$^{-1}$	1.7E-09	2.7E-05	mg/m^3	7.7E-02	mg/m^3	3.6E-04
			Exp. Route Total								3.2E-07					2.1E+00
		Exposure Point Total									3.2E-07					2.2E+00
	Exposure Medium Total										3.2E-07					2.2E+00
Medium Total											3.2E-07					2.2E+00
										Total of Receptor Risks Across All Media	3.2E-07				Total of Receptor Hazards Across All Media	2.2E+00

Notes:

Intakes assoiciated with dermal expousre to bis(2-ethylhexyl)phthalate in groundwater could not be quatified as the time to reach steady state is outside the effective predictive domain (EPD) of methodology used to predict dermal absorption

HI =CDI / Toxicity Value

ELCR = CDI * Toxicity Value

TABLE 9.1A.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Child / Former FWEC Facility	Formaldehyde	-	-	-	0.0E+00	Urinary, GI, Respiratory	1.6E-03	2.0E-05	-	1.6E-03
			Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	4.7E-01	2.1E-03	-	4.7E-01
			Aluminum	-	-	-	0.0E+00	CNS	3.1E-02	1.4E-04	-	3.2E-02
			Barium	-	-	-	0.0E+00	Kidney	3.5E-02	2.2E-03	-	3.7E-02
			Cadmium	-	-	-	0.0E+00	Urinary	1.4E-01	6.8E-02	-	2.1E-01
			Chromium	7.9E-05	4.9E-05	-	1.3E-04	GI	1.2E-01	7.2E-02	-	1.9E-01
			Cobalt	-	-	-	0.0E+00	Blood, Respiratory	9.0E-01	1.6E-03	-	9.0E-01
			Iron	-	-	-	0.0E+00	Stomach	2.2E+00	9.7E-03	-	2.2E+00
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	8.8E+00	9.7E-01	-	9.8E+00
			Mercury	-	-	-	0.0E+00	CNS	-	-	-	0.0E+00
			1,2,4-Trichlorobenzene	2.8E-08	3.4E-08	-	6.2E-08	Adrenal	1.1E-03	1.4E-03	-	2.5E-03
			1,1,2-Trichloroethane	8.3E-08	3.4E-08	-	1.2E-07	Blood	4.2E-03	1.4E-03	-	5.6E-03
			1,1-Dichloroethane	4.3E-08	2.9E-09	-	4.6E-08	No data	4.4E-04	3.0E-05	-	4.7E-04
			1,1-Dichloroethene	-	-	-	0.0E+00	Liver	6.2E-03	7.3E-04	-	6.9E-03
			1,2-Dichloroethane	8.2E-08	3.5E-09	-	8.5E-08	No data	1.7E-03	7.5E-05	-	1.8E-03
			1,4-Dioxane	2.3E-06	7.3E-09	-	2.3E-06	Liver, Kidney, Nasal	9.0E-03	2.8E-05	-	9.1E-03
			Benzene	3.0E-08	4.0E-09	-	3.4E-08	Lymph	1.6E-03	2.1E-04	-	1.8E-03
			Chloroform	1.3E-08	1.0E-09	-	1.4E-08	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	4.8E-04	3.8E-05	-	5.2E-04
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	3.5E-02	3.9E-03	-	3.9E-02
			Tetrachloroethene	1.3E-08	6.8E-09	-	2.0E-08	CNS, Neurotoxicity	1.2E-02	6.3E-03	-	1.8E-02
			Trichloroethene	2.8E-04	4.0E-05	-	3.2E-04	Immunotoxicity, Fetal, Endocrine	7.4E+01	1.1E+01	-	8.5E+01
			Vinyl chloride	2.6E-05	1.8E-06	-	2.8E-05	Liver	5.5E-03	3.7E-04	-	5.9E-03
		Exposure Point Total					4.7E-04					9.9E+01
	Exposure Medium Total						4.7E-04					9.9E+01
Medium Total							4.7E-04					9.9E+01
Soil	All Soil (0 -15 ft bgs)	MIP1	Arsenic	7.0E-06	8.3E-07	1.8E-09	7.8E-06	Skin, CNS, Heart	1.8E-01	2.2E-02	3.3E-04	2.0E-01
			Cobalt	-	-	4.6E-09	4.6E-09	Blood, Respiratory	3.6E-01	8.6E-03	1.0E-03	3.7E-01
			Iron	-	-	-	0.0E+00	Stomach	3.7E-01	8.9E-03	-	3.8E-01
			Manganese	-	-	-	0.0E+00	CNS, Brain	2.2E-01	1.3E-01	5.9E-03	3.6E-01
			1,1,2,2-Tetrachloroethane	9.4E-07	1.1E-09	1.1E-06	2.0E-06	Liver	2.8E-03	3.3E-06	-	2.8E-03
			1,1,2-Trichloroethane	1.8E-07	2.2E-10	4.1E-07	6.0E-07	Blood	9.4E-03	1.1E-05	1.5E+00	1.5E+00
			Trichloroethene	3.9E-05	4.6E-08	9.9E-05	1.4E-04	Immunotoxicity, Fetal, Endocrine	1.0E+01	1.2E-02	6.9E+01	7.9E+01
		Exposure Point Total					1.5E-04					8.2E+01
		MIP2	Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	6.2E-03	7.3E-06	7.7E-02	8.3E-02
			Arsenic	6.2E-06	7.3E-07	1.6E-09	6.9E-06	Skin, CNS, Heart	1.6E-01	1.9E-02	2.9E-04	1.8E-01
			Cobalt	-	-	5.9E-09	5.9E-09	Blood, Respiratory	4.6E-01	1.1E-02	1.3E-03	4.7E-01
			Iron	-	-	-	0.0E+00	Stomach	3.9E-01	9.2E-03	-	4.0E-01
			Manganese	-	-	-	0.0E+00	CNS, Brain	3.8E-01	2.2E-01	9.9E-03	6.1E-01
			Benzo[a]anthracene	1.5E-06	4.5E-07	1.2E-11	1.9E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	3.6E-06	1.1E-06	3.0E-11	4.7E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	9.8E-07	3.0E-07	8.1E-12	1.3E-06	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.2E-06	3.6E-07	1.0E-11	1.5E-06	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					1.6E-05					1.7E+00

TABLE 9.1A.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	All Soil (0 -15 ft bgs) (cont.)	Former Shot Blast Area (FBSA)	Aluminum	-	-	-	0.0E+00	CNS	7.9E-02	1.9E-03	8.7E-04	8.2E-02
			Arsenic	6.6E-06	7.8E-07	1.7E-09	7.4E-06	Skin, CNS, Heart	1.7E-01	2.0E-02	3.1E-04	1.9E-01
			Chromium VI	2.8E-06	2.6E-06	2.6E-08	5.4E-06	GI, Lung (Cr VI particulates)	4.0E-03	3.8E-03	6.7E-06	7.9E-03
			Cobalt	-	-	1.6E-08	1.6E-08	Blood, Respiratory	1.3E+00	3.0E-02	3.5E-03	1.3E+00
			Copper	-	-	-	0.0E+00	No data	9.9E-02	2.4E-03	-	1.0E-01
			Iron	-	-	-	0.0E+00	Stomach	4.3E-01	1.0E-02	-	4.4E-01
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	2.6E-01	1.5E-01	6.9E-03	4.2E-01
			Nickel	-	-	3.2E-09	3.2E-09	Growth, Respiratory	1.3E-01	7.8E-02	1.6E-03	2.1E-01
			Benzo[a]anthracene	3.2E-06	1.0E-06	2.7E-10	4.2E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	4.7E-05	1.4E-05	3.9E-11	6.1E-05	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	3.4E-06	1.0E-06	2.8E-11	4.4E-06	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	5.9E-06	1.8E-06	5.4E-11	7.8E-06	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	2.1E-06	6.6E-07	1.8E-11	2.8E-06	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					9.3E-05					2.8E+00
		Expended Waste Area (EWA)	Arsenic	8.3E-06	9.8E-07	2.2E-09	9.3E-06	Skin, CNS, Heart	2.1E-01	2.5E-02	4.0E-04	2.4E-01
			Cobalt	-	-	1.8E-08	1.8E-08	Blood, Respiratory	1.4E+00	3.4E-02	4.0E-03	1.5E+00
			Copper	-	-	-	0.0E+00	No data	1.0E-01	2.5E-03	-	1.1E-01
			Iron	-	-	-	0.0E+00	Stomach	5.1E-01	1.2E-02	-	5.3E-01
			Manganese	-	-	-	0.0E+00	CNS, Brain	4.6E-01	2.7E-01	1.2E-02	7.4E-01
			Nickel	-	-	3.0E-09	3.0E-09	Growth, Respiratory	1.2E-01	7.2E-02	1.5E-03	2.0E-01
			Benzo[a]anthracene	1.2E-06	3.7E-07	9.9E-12	1.6E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	1.1E-05	3.4E-06	9.1E-11	1.4E-05	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	1.7E-06	5.3E-07	1.4E-11	2.2E-06	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	2.0E-06	6.3E-07	1.8E-11	2.7E-06	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	7.9E-07	2.4E-07	6.6E-12	1.0E-06	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					3.1E-05					3.3E+00
	Exposure Medium Total - Average for All Areas						7.2E-05					2.2E+01
Medium Total							7.2E-05					2.2E+01

TABLE 9.1A.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Retention Pond	Arsenic	6.6E-08	3.1E-08	-	9.7E-08	Skin, CNS, Heart	1.7E-03	8.1E-04	-	2.5E-03
			Manganese	-	-	-	0.0E+00	CNS, Brain	9.1E-03	2.2E-02	-	3.1E-02
			Benzo[a]anthracene	4.2E-06	5.2E-06	-	9.4E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	3.3E-05	4.1E-05	-	7.3E-05	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	4.0E-06	5.0E-06	-	9.0E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[k]fluoranthene	1.9E-07	2.3E-07	-	4.2E-07	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.2E-05	1.4E-05	-	2.6E-05	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	2.0E-06	2.5E-06	-	4.4E-06	Reviewed; No Value	-	-	-	0.0E+00
	Exposure Medium Total						1.2E-04					3.3E-02
Medium Total							1.2E-04					3.3E-02
Air	Indoor Air Vapor Intrusion from Groundwater	Indoor Air Former FWEC Facility MIP Area 2	1,1,1-Trichloroethane	-	-	-	0.0E+00	Body weight, Liver	-	-	8.1E+00	8.1E+00
			1,1,2-Trichloroethane	-	-	5.2E-05	5.2E-05	Blood	-	-	1.9E+02	1.9E+02
			1,1-Dichloroethane	-	-	3.8E-04	3.8E-04	No data	-	-	-	0.0E+00
			1,1-Dichloroethene	-	-	-	0.0E+00	Liver	-	-	3.0E+01	3.0E+01
			Mercury	-	-	-	0.0E+00	CNS	-	-	3.1E+00	3.1E+00
			Naphthalene	-	-	5.9E-05	5.9E-05	Body weight, Respiratory	-	-	6.7E+00	6.7E+00
			Ethylbenzene	-	-	8.7E-06	8.7E-06	Liver, Kidney, Developmental	-	-	4.0E-02	4.0E-02
			Tetrachloroethene	-	-	1.4E-06	1.4E-06	CNS, Neurotoxicity	-	-	1.5E+00	1.5E+00
			Trichloroethene	-	-	4.6E-05	4.6E-05	Immunotoxicity, Fetal, Endocrine	-	-	3.2E+01	3.2E+01
			Xylenes, Total	-	-	-	0.0E+00	Body weight, Increased mortality, CNS	-	-	2.8E+00	2.8E+00
	Exposure Medium Total						5.4E-04					2.7E+02
Medium Total							5.4E-04					2.7E+02
						Receptor Total ELCR	1.2E-03				Receptor HI Total	3.9E+02

Chromium (total) in groundwater is assumed to be Chromium VI due to the absence of valid groundwater chromium speciation data.

Total Stomach, GI HI Across All Media =	4.2E+00
Total Liver HI Across All Media =	3.0E+01
Total Blood HI Across All Media =	1.9E+02
Total Body Weight HI Across All Media =	1.8E+01
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	2.0E+02
Total CNS, Brain HI Across All Media =	2.0E+01

TABLE 9.1B.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Adult / Former FWEC Facility	Formaldehyde	-	-	1.4E-08	1.4E-08	Urinary, GI, Respiratory	9.4E-04	1.4E-05	3.9E-04	1.3E-03
			Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	2.8E-01	1.7E-03	2.0E+00	2.3E+00
			Aluminum	-	-	-	0.0E+00	CNS	1.9E-02	1.1E-04	-	1.9E-02
			Barium	-	-	-	0.0E+00	Kidney	2.1E-02	1.8E-03	-	2.3E-02
			Cadmium	-	-	-	0.0E+00	Urinary	8.7E-02	4.7E-02	-	1.3E-01
			Chromium	5.9E-05	4.4E-05	-	1.0E-04	GI	6.9E-02	5.2E-02	-	1.2E-01
			Cobalt	-	-	-	0.0E+00	Blood, Respiratory	5.4E-01	1.3E-03	-	5.4E-01
			Iron	-	-	-	0.0E+00	Stomach	1.3E+00	7.8E-03	-	1.3E+00
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	5.3E+00	7.9E-01	-	6.1E+00
			Mercury	-	-	-	0.0E+00	CNS	-	-	1.1E-01	1.1E-01
			1,2,4-Trichlorobenzene	5.6E-08	8.0E-08	-	1.4E-07	Adrenal	6.7E-04	9.7E-04	1.5E-02	1.6E-02
			1,1,2-Trichloroethane	1.7E-07	1.2E-08	2.1E-07	3.9E-07	Blood	2.5E-03	1.9E-04	2.3E-01	2.4E-01
			1,1-Dichloroethane	8.6E-08	6.9E-09	1.5E-10	9.3E-08	No data	2.6E-04	2.1E-05	-	2.8E-04
			1,1-Dichloroethene	-	-	-	0.0E+00	Liver	3.7E-03	5.1E-04	5.8E-06	4.2E-03
			1,2-Dichloroethane	1.6E-07	8.2E-09	2.6E-07	4.3E-07	No data	1.0E-03	5.3E-05	4.9E-03	6.0E-03
			1,4-Dioxane	4.6E-06	1.7E-08	3.9E-11	4.7E-06	Liver, Kidney, Nasal	5.4E-03	2.0E-05	9.0E-07	5.4E-03
			Benzene	6.1E-08	9.7E-09	5.7E-11	7.0E-08	Lymph	9.7E-04	1.5E-04	8.6E-07	1.1E-03
			Chloroform	2.6E-08	2.4E-09	1.1E-10	2.8E-08	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	2.9E-04	2.7E-05	1.6E-07	3.2E-04
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	2.1E-02	2.8E-03	-	2.4E-02
			Tetrachloroethene	2.6E-08	1.6E-08	1.7E-11	4.2E-08	CNS, Neurotoxicity	7.3E-03	4.5E-03	5.6E-06	1.2E-02
			Trichloroethene	3.6E-04	6.1E-05	1.2E-06	4.2E-04	Immunotoxicity, Fetal, Endocrine	4.5E+01	7.6E+00	6.2E-02	5.2E+01
			Vinyl chloride	2.0E-06	1.7E-07	9.2E-08	2.3E-06	Liver	3.3E-03	2.7E-04	7.3E-04	4.3E-03
		Exposure Point Total					5.3E-04					6.3E+01
	Exposure Medium Total						5.3E-04					6.3E+01
Medium Total							5.3E-04					6.3E+01

TABLE 9.1B.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	All Soil (0 -15 ft bgs)	MIP1	Arsenic	2.2E-06	4.6E-07	6.2E-09	2.7E-06	Skin, CNS, Heart	1.7E-02	3.6E-03	3.3E-04	2.1E-02
			Cobalt	-	-	1.5E-08	1.5E-08	Blood, Respiratory	3.4E-02	1.4E-03	1.0E-03	3.6E-02
			Iron	-	-	-	0.0E+00	Stomach	3.5E-02	1.5E-03	-	3.6E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	2.1E-02	2.2E-02	5.9E-03	4.9E-02
			1,1,2,2-Tetrachloroethane	3.0E-07	6.2E-10	3.5E-06	3.8E-06	Liver	2.6E-04	5.5E-07	-	2.6E-04
			1,1,2-Trichloroethane	5.7E-08	1.2E-10	1.4E-06	1.4E-06	Blood	8.8E-04	1.9E-06	1.5E+00	1.5E+00
			Trichloroethene	7.8E-06	1.6E-08	1.3E-03	1.3E-03	Immunotoxicity, Fetal, Endocrine	9.8E-01	2.1E-03	6.9E+01	7.0E+01
		Exposure Point Total					1.3E-03					7.1E+01
		MIP2	Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	5.8E-04	1.2E-06	7.7E-02	7.8E-02
			Arsenic	1.9E-06	4.1E-07	5.4E-09	2.3E-06	Skin, CNS, Heart	1.5E-02	3.2E-03	2.9E-04	1.8E-02
			Cobalt	-	-	2.0E-08	2.0E-08	Blood, Respiratory	4.3E-02	1.8E-03	1.3E-03	4.6E-02
			Iron	-	-	-	0.0E+00	Stomach	3.6E-02	1.5E-03	-	3.8E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	3.5E-02	3.7E-02	9.9E-03	8.2E-02
			Benzo[a]anthracene	1.7E-07	9.3E-08	1.5E-11	2.6E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	4.3E-07	2.3E-07	3.8E-11	6.6E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	1.2E-07	6.3E-08	1.0E-11	1.8E-07	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.4E-07	7.4E-08	1.3E-11	2.1E-07	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					3.7E-06					2.6E-01

TABLE 9.1B.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
		Former Shot Blast Area (FBSA)	Aluminum	-	-	-	0.0E+00	CNS	7.4E-03	3.1E-04	8.7E-04	8.6E-03
			Arsenic	2.1E-06	4.3E-07	5.8E-09	2.5E-06	Skin, CNS, Heart	1.6E-02	3.4E-03	3.1E-04	2.0E-02
			Chromium VI	3.2E-07	5.5E-07	3.2E-08	9.0E-07	GI, Lung (Cr VI particulates)	3.8E-04	6.4E-04	6.7E-06	1.0E-03
			Cobalt	-	-	5.4E-08	5.4E-08	Blood, Respiratory	1.2E-01	5.1E-03	3.5E-03	1.3E-01
			Copper	-	-	-	0.0E+00	No data	9.3E-03	3.9E-04	-	9.7E-03
			Iron	-	-	-	0.0E+00	Stomach	4.0E-02	1.7E-03	-	4.2E-02
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	2.4E-02	2.6E-02	6.9E-03	5.7E-02
			Nickel	-	-	1.1E-08	1.1E-08	Growth, Respiratory	1.2E-02	1.3E-02	1.6E-03	2.7E-02
			Benzo[a]anthracene	3.8E-07	2.1E-07	3.4E-11	5.9E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	5.5E-06	3.0E-06	4.9E-10	8.5E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	4.0E-07	2.2E-07	3.5E-11	6.1E-07	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	7.0E-07	3.8E-07	6.7E-11	1.1E-06	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	2.5E-07	1.4E-07	2.2E-11	3.9E-07	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					1.5E-05					2.9E-01
		Expended Waste Area (EWA)	Arsenic	2.6E-06	5.5E-07	7.3E-09	3.1E-06	Skin, CNS, Heart	2.0E-02	4.3E-03	4.0E-04	2.5E-02
			Cobalt	-	-	6.2E-08	6.2E-08	Blood, Respiratory	1.4E-01	5.7E-03	4.0E-03	1.5E-01
			Copper	-	-	-	0.0E+00	No data	9.8E-03	4.1E-04	-	1.0E-02
			Iron	-	-	-	0.0E+00	Stomach	4.8E-02	2.0E-03	-	5.0E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	4.3E-02	4.5E-02	1.2E-02	1.0E-01
			Nickel	-	-	1.0E-08	1.0E-08	Growth, Respiratory	1.1E-02	1.2E-02	1.5E-03	2.5E-02
			Benzo[a]anthracene	1.4E-07	7.7E-08	1.2E-11	2.2E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	1.3E-06	7.1E-07	1.1E-10	2.0E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	2.0E-07	1.1E-07	1.8E-11	3.1E-07	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	2.4E-07	1.3E-07	2.3E-11	3.7E-07	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	9.3E-08	5.1E-08	8.2E-12	1.4E-07	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					6.2E-06					3.5E-01
	Exposure Medium Total - Average for All Areas						3.3E-04					1.8E+01
Medium Total							3.3E-04					1.8E+01

TABLE 9.1B.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	FFF - Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Retention Pond	Arsenic	1.6E-08	1.7E-08	-	3.4E-08	Skin, CNS, Heart	1.3E-04	1.3E-04	-	2.6E-04
			Manganese	-	-	-	0.0E+00	CNS, Brain	6.8E-04	3.6E-03	-	4.3E-03
			Benzo[a]anthracene	3.9E-07	1.1E-06	-	1.5E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	3.1E-06	8.5E-06	-	1.2E-05	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	3.8E-07	1.0E-06	-	1.4E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[k]fluoranthene	1.7E-08	4.8E-08	-	6.5E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.1E-06	3.0E-06	-	4.1E-06	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	1.9E-07	5.1E-07	-	7.0E-07	Reviewed; No Value	-	-	-	0.0E+00
	Exposure Medium Total						1.9E-05					4.6E-03
Medium Total							1.9E-05					4.6E-03
Air	Indoor Air Vapor Intrusion from Groundwater	Indoor Air Former FWEC Facility MIP Area 2	1,1,1-Trichloroethane	-	-	-	0.0E+00	Body weight, Liver	-	-	8.1E+00	8.1E+00
			1,1,2-Trichloroethane	-	-	1.7E-04	1.7E-04	Blood	-	-	1.9E+02	1.9E+02
			1,1-Dichloroethane	-	-	1.3E-03	1.3E-03	No data	-	-	-	0.0E+00
			1,1-Dichloroethene	-	-	-	0.0E+00	Liver	-	-	3.0E+01	3.0E+01
			Mercury	-	-	-	0.0E+00	CNS	-	-	3.1E+00	3.1E+00
			Naphthalene	-	-	2.0E-04	2.0E-04	Body weight, Respiratory	-	-	6.7E+00	6.7E+00
			Ethylbenzene	-	-	2.9E-05	2.9E-05	Liver, Kidney, Developmental	-	-	4.0E-02	4.0E-02
			Tetrachloroethene	-	-	4.6E-06	4.6E-06	CNS, Neurotoxicity	-	-	1.5E+00	1.5E+00
			Trichloroethene	-	-	6.0E-04	6.0E-04	Immunotoxicity, Fetal, Endocrine	-	-	3.2E+01	3.2E+01
			Xylenes, Total	-	-	-	0.0E+00	Body weight, Increased mortality, CNS	-	-	2.8E+00	2.8E+00
	Exposure Medium Total						2.3E-03					2.7E+02
Medium Total							2.3E-03					2.7E+02
						Receptor Total ELCR	3.1E-03				Receptor HI Total	3.5E+02

Chromium (total) in groundwater is assumed to be Chromium VI due to the absence of valid groundwater chromium speciation data.

Total Blood HI Across All Media =	1.9E+02
Total Body Weight HI Across All Media =	1.8E+01
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	1.5E+02
Total Liver HI Across All Media =	3.8E+01

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Former FWEC Facility	Formaldehyde	-	-	-	0.0E+00	Urinary, GI, Respiratory	1.1E-04	5.9E-07	-	1.1E-04
			Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	3.2E-02	4.5E-05	-	3.2E-02
			Aluminum	-	-	-	0.0E+00	CNS	2.2E-03	3.0E-06	-	2.2E-03
			Barium	-	-	-	0.0E+00	Kidney	2.4E-03	4.8E-05	-	2.4E-03
			Cadmium	-	-	-	0.0E+00	Urinary	9.9E-03	2.0E-03	-	1.2E-02
			Chromium	1.1E-05	1.2E-06	-	1.2E-05	GI	7.9E-03	2.2E-03	-	1.0E-02
			Cobalt	-	-	-	0.0E+00	Blood, Respiratory	6.2E-02	3.4E-05	-	6.2E-02
			Iron	-	-	-	0.0E+00	Stomach	1.5E-01	2.1E-04	-	1.5E-01
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	6.1E-01	2.1E-02	-	6.3E-01
			Mercury	-	-	-	0.0E+00	CNS	-	-	-	0.0E+00
			1,2,4-Trichlorobenzene	2.0E-08	4.5E-09	-	2.4E-08	Adrenal	7.7E-05	4.4E-05	-	1.2E-04
			1,1,2-Trichloroethane	5.9E-08	7.0E-10	-	6.0E-08	Blood	2.9E-04	8.6E-06	-	3.0E-04
			1,1-Dichloroethane	3.1E-08	3.9E-10	-	3.1E-08	No data	3.0E-05	9.6E-07	-	3.1E-05
			1,1-Dichloroethene	-	-	-	0.0E+00	Liver	4.2E-04	2.3E-05	-	4.5E-04
			1,2-Dichloroethane	5.8E-08	4.6E-10	-	5.9E-08	No data	1.2E-04	2.4E-06	-	1.2E-04
			1,4-Dioxane	1.7E-06	9.7E-10	-	1.7E-06	Liver, Kidney, Nasal	6.2E-04	9.0E-07	-	6.2E-04
			Benzene	2.2E-08	5.3E-10	-	2.2E-08	Lymph	1.1E-04	6.8E-06	-	1.2E-04
			Chloroform	9.1E-09	1.3E-10	-	9.3E-09	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	3.3E-05	1.2E-06	-	3.4E-05
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	2.4E-03	1.2E-04	-	2.5E-03
			Tetrachloroethene	9.3E-09	9.0E-10	-	1.0E-08	CNS, Neurotoxicity	8.3E-04	2.0E-04	-	1.0E-03
			Trichloroethene	1.0E-04	2.8E-06	-	1.1E-04	Immunotoxicity, Fetal, Endocrine	5.1E+00	3.4E-01	-	5.5E+00
			Vinyl chloride	7.3E-07	9.1E-09	-	7.4E-07	Liver	3.8E-04	1.2E-05	-	3.9E-04
		Exposure Point Total					1.2E-04					6.4E+00
	Exposure Medium Total						1.2E-04					6.4E+00
Medium Total							1.2E-04					6.4E+00
Soil	All Soil (0 -15 ft bgs)	MIP1	Arsenic	9.8E-07	4.1E-07	1.8E-09	1.4E-06	Skin, CNS, Heart	6.1E-03	2.6E-03	7.9E-05	8.7E-03
			Cobalt	-	-	4.6E-09	4.6E-09	Blood, Respiratory	1.2E-02	1.0E-03	2.4E-04	1.3E-02
			Iron	-	-	-	0.0E+00	Stomach	1.3E-02	1.1E-03	-	1.4E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	7.5E-03	1.6E-02	1.4E-03	2.5E-02
			1,1,2,2-Tetrachloroethane	1.3E-07	5.6E-10	1.0E-06	1.2E-06	Liver	9.2E-05	3.9E-07	-	9.3E-05
			1,1,2-Trichloroethane	2.6E-08	1.1E-10	4.1E-07	4.4E-07	Blood	3.1E-04	1.3E-06	3.6E-01	3.6E-01
			Trichloroethene	2.9E-06	1.2E-08	4.8E-05	5.1E-05	Immunotoxicity, Fetal, Endocrine	3.5E-01	1.5E-03	1.6E+01	1.7E+01
		Exposure Point Total					5.4E-05					1.7E+01
		MIP2	Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	2.1E-04	8.8E-07	1.8E-02	1.9E-02
			Arsenic	8.6E-07	3.6E-07	1.6E-09	1.2E-06	Skin, CNS, Heart	5.4E-03	2.3E-03	7.0E-05	7.7E-03
			Cobalt	-	-	5.8E-09	5.8E-09	Blood, Respiratory	1.5E-02	1.3E-03	3.0E-04	1.7E-02
			Iron	-	-	-	0.0E+00	Stomach	1.3E-02	1.1E-03	-	1.4E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	1.3E-02	2.7E-02	2.4E-03	4.2E-02
			Benzo[a]anthracene	3.8E-08	4.2E-08	2.2E-12	8.0E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	9.5E-08	1.0E-07	5.6E-12	2.0E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	2.6E-08	2.8E-08	1.5E-12	5.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	3.0E-08	3.3E-08	1.9E-12	6.3E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					1.6E-06					9.9E-02

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	All Soil (0 -15 ft bgs) (cont.)	Former Shot Blast Area (FBSA)	Arsenic	9.2E-07	3.9E-07	1.7E-09	1.3E-06	Skin, CNS, Heart	5.7E-03	2.4E-03	7.5E-05	8.2E-03
			Chromium VI	7.2E-08	2.4E-07	4.8E-09	3.2E-07	GI, Lung (Cr VI particulates)	1.3E-04	4.6E-04	1.6E-06	5.9E-04
			Cobalt	-	-	1.6E-08	1.6E-08	Blood, Respiratory	4.3E-02	3.6E-03	8.4E-04	4.7E-02
			Copper	-	-	-	0.0E+00	No data	3.3E-03	2.8E-04	-	3.6E-03
			Iron	-	-	-	0.0E+00	Stomach	1.5E-02	1.2E-03	-	1.6E-02
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	8.7E-03	1.8E-02	1.6E-03	2.9E-02
			Nickel	-	-	3.2E-09	3.2E-09	Growth, Respiratory	4.4E-03	9.3E-03	3.8E-04	1.4E-02
			Benzo[a]anthracene	8.4E-08	9.3E-08	5.0E-11	1.8E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	1.2E-06	1.3E-06	7.2E-12	2.6E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	8.8E-08	9.7E-08	5.2E-12	1.9E-07	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.6E-07	1.7E-07	1.0E-11	3.3E-07	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	5.6E-08	6.1E-08	3.3E-12	1.2E-07	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					5.0E-06					1.2E-01
		Expended Waste Area (EWA)	Arsenic	1.2E-06	4.9E-07	2.2E-09	1.6E-06	Skin, CNS, Heart	7.2E-03	3.0E-03	9.4E-05	1.0E-02
			Cobalt	-	-	1.8E-08	1.8E-08	Blood, Respiratory	4.9E-02	4.1E-03	9.5E-04	5.4E-02
			Copper	-	-	-	0.0E+00	No data	3.5E-03	3.0E-04	-	3.8E-03
			Iron	-	-	-	0.0E+00	Stomach	1.7E-02	1.5E-03	-	1.9E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	1.5E-02	3.2E-02	2.9E-03	5.1E-02
			Nickel	-	-	3.0E-09	3.0E-09	Growth, Respiratory	4.1E-03	8.6E-03	3.6E-04	1.3E-02
			Benzo[a]anthracene	3.1E-08	3.4E-08	1.8E-12	6.5E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	2.9E-07	3.2E-07	1.7E-11	6.0E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	4.5E-08	4.9E-08	2.7E-12	9.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	5.3E-08	5.9E-08	3.4E-12	1.1E-07	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	2.1E-08	2.3E-08	1.2E-12	4.4E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					2.6E-06					1.5E-01
	Exposure Medium Total - Average for All Areas						1.6E-05					4.4E+00
Medium Total							1.6E-05					4.4E+00
Air	Indoor Air Vapor Intrusion from Groundwater	Indoor Air Former FWEC Facility MIP Area 2	1,1,1-Trichloroethane	-	-	-	0.0E+00	Body weight, Liver	-	-	1.9E+00	1.9E+00
			1,1,2-Trichloroethane	-	-	5.1E-05	5.1E-05	Blood	-	-	4.5E+01	4.5E+01
			1,1-Dichloroethane	-	-	3.8E-04	3.8E-04	No data	-	-	-	0.0E+00
			1,1-Dichloroethene	-	-	-	0.0E+00	Liver	-	-	7.1E+00	7.1E+00
			Mercury	-	-	-	0.0E+00	CNS	-	-	7.5E-01	7.5E-01
			Naphthalene	-	-	5.8E-05	5.8E-05	Body weight, Respiratory	-	-	1.6E+00	1.6E+00
			Ethylbenzene	-	-	8.6E-06	8.6E-06	Liver, Kidney, Developmental	-	-	9.6E-03	9.6E-03
			Tetrachloroethene	-	-	1.4E-06	1.4E-06	CNS, Neurotoxicity	-	-	3.7E-01	3.7E-01
			Trichloroethene	-	-	2.2E-05	2.2E-05	Immunotoxicity, Fetal, Endocrine	-	-	7.6E+00	7.6E+00
			Xylenes, Total	-	-	-	0.0E+00	Body weight, Increased mortality, CNS	-	-	6.8E-01	6.8E-01
	Exposure Medium Total						5.2E-04					6.5E+01
Medium Total							5.2E-04					6.5E+01
						Receptor Total ELCR	6.5E-04				Receptor HI Total	7.6E+01

Chromium (total) in groundwater is assumed to be Chromium VI due to the absence of valid groundwater chromium speciation data.

Total Blood HI Across All Media =	4.5E+01
Total Body Weight HI Across All Media =	4.2E+00
Total Liver HI Across All Media =	9.0E+00
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	1.3E+01
Total Stomach, GI HI Across All Media =	2.2E-01

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	FFF - Trespasser
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	All Soil (0 -15 ft bgs)	MIP1	1,1,2,2-Tetrachloroethane	1.8E-08	4.9E-11	2.5E-08	4.3E-08	Liver	5.2E-05	1.4E-07	-	5.2E-05
			1,1,2-Trichloroethane	3.5E-09	9.5E-12	9.9E-09	1.3E-08	Blood	1.8E-04	4.9E-07	3.6E-02	3.6E-02
			Trichloroethene	5.5E-07	1.5E-09	1.7E-06	2.3E-06	Immunotoxicity, Fetal, Endocrine	2.0E-01	5.4E-04	1.6E+00	1.8E+00
		Exposure Point Total					2.3E-06					1.9E+00
		Former Shot Blast Area (FBSA)	Aluminum	-	-	-	0.0E+00	CNS	1.5E-03	8.2E-05	2.1E-05	1.6E-03
			Arsenic	1.2E-07	3.4E-08	4.1E-11	1.6E-07	Skin, CNS, Heart	3.2E-03	8.8E-04	7.5E-06	4.1E-03
			Chromium VI	2.9E-08	6.4E-08	3.4E-10	9.4E-08	GI, Lung (Cr VI particulates)	7.6E-05	1.7E-04	1.6E-07	2.4E-04
			Cobalt	-	-	3.9E-10	3.9E-10	Blood, Respiratory	2.4E-02	1.3E-03	8.4E-05	2.6E-02
			Copper	-	-	-	0.0E+00	No data	1.9E-03	1.0E-04	-	2.0E-03
			Iron	-	-	-	0.0E+00	Stomach	8.2E-03	4.5E-04	-	8.6E-03
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	4.9E-03	6.7E-03	1.6E-04	1.2E-02
			Nickel	-	-	7.7E-11	7.7E-11	Growth, Respiratory	2.5E-03	3.4E-03	3.8E-05	5.9E-03
			Benzo[a]anthracene	3.4E-08	2.4E-08	3.6E-12	5.9E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	5.0E-07	3.5E-07	5.2E-13	8.5E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	3.6E-08	2.6E-08	3.8E-13	6.1E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	6.3E-08	4.5E-08	7.2E-13	1.1E-07	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	2.3E-08	1.6E-08	2.4E-13	3.9E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					1.4E-06					6.0E-02
		Expended Waste Area (EWA)	Arsenic	1.6E-07	4.3E-08	5.2E-11	2.0E-07	Skin, CNS, Heart	4.1E-03	1.1E-03	9.4E-06	5.2E-03
			Cobalt	-	-	4.4E-10	4.4E-10	Blood, Respiratory	2.7E-02	1.5E-03	9.5E-05	2.9E-02
			Copper	-	-	-	0.0E+00	No data	2.0E-03	1.1E-04	-	2.1E-03
			Iron	-	-	-	0.0E+00	Stomach	9.7E-03	5.3E-04	-	1.0E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	8.6E-03	1.2E-02	2.9E-04	2.1E-02
			Nickel	-	-	7.1E-11	7.1E-11	Growth, Respiratory	2.3E-03	3.2E-03	3.6E-05	5.5E-03
			Benzo[a]anthracene	1.3E-08	9.0E-09	1.3E-13	2.2E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	1.2E-07	8.3E-08	1.2E-12	2.0E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	1.8E-08	1.3E-08	1.9E-13	3.1E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	2.2E-08	1.5E-08	2.5E-13	3.7E-08	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	8.4E-09	6.0E-09	8.8E-14	1.4E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					5.0E-07					7.3E-02
	Exposure Medium Total - Average for All Areas						1.4E-06					6.6E-01
Medium Total							1.4E-06					6.6E-01
Sediment	Retention Pond	Incidental Ingestion	Arsenic	1.7E-08	4.7E-09	-	2.2E-08	Skin, CNS, Heart	4.5E-04	1.2E-04	-	5.7E-04
			Manganese	-	-	-	0.0E+00	CNS, Brain	2.4E-03	3.3E-03	-	5.7E-03
			Benzo[a]anthracene	6.2E-07	4.4E-07	-	1.1E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	4.9E-06	3.5E-06	-	8.4E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	6.0E-07	4.3E-07	-	1.0E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[k]fluoranthene	2.8E-08	2.0E-08	-	4.7E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.7E-06	1.2E-06	-	3.0E-06	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	3.0E-07	2.1E-07	-	5.1E-07	Reviewed; No Value	-	-	-	0.0E+00
	Exposure Medium Total						1.4E-05					6.3E-03
Medium Total							1.4E-05					6.3E-03
						Receptor Total ELCR	1.5E-05				Receptor HI Total	6.7E-01

TABLE 9.4A.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil (0 -1 ft bgs)	MIP1	1,1,2,2-Tetrachloroethane	5.5E-08	1.2E-10	5.4E-08	1.1E-07	Liver	3.8E-05	8.1E-08	-	3.8E-05
			1,1,2-Trichloroethane	1.1E-08	2.3E-11	2.1E-08	3.2E-08	Blood	1.3E-04	2.8E-07	1.9E-02	1.9E-02
			Trichloroethene	1.2E-06	2.5E-09	2.5E-06	3.7E-06	Immunotoxicity, Fetal, Endocrine	1.5E-01	3.1E-04	8.5E-01	1.0E+00
		Exposure Point Total					3.8E-06					1.0E+00
		Former Shot Blast Area (FBSA)	Aluminum	-	-	-	0.0E+00	CNS	1.1E-03	4.7E-05	1.1E-05	1.2E-03
			Arsenic	3.8E-07	8.1E-08	8.9E-11	4.6E-07	Skin, CNS, Heart	2.4E-03	5.0E-04	3.9E-06	2.9E-03
			Chromium VI	3.0E-08	5.1E-08	2.5E-10	8.1E-08	GI, Lung (Cr VI particulates)	5.6E-05	9.5E-05	8.2E-08	1.5E-04
			Cobalt	-	-	8.4E-10	8.4E-10	Blood, Respiratory	1.8E-02	7.5E-04	4.4E-05	1.9E-02
			Copper	-	-	-	0.0E+00	No data	1.4E-03	5.9E-05	-	1.4E-03
			Iron	-	-	-	0.0E+00	Stomach	6.0E-03	2.6E-04	-	6.3E-03
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	3.6E-03	3.8E-03	8.5E-05	7.5E-03
			Nickel	-	-	1.7E-10	1.7E-10	Growth, Respiratory	1.8E-03	1.9E-03	2.0E-05	3.8E-03
			Benzo[a]anthracene	3.5E-08	1.9E-08	2.6E-12	5.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	5.1E-07	2.8E-07	3.8E-13	7.9E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	3.7E-08	2.0E-08	2.7E-13	5.7E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	6.5E-08	3.6E-08	5.2E-13	1.0E-07	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	2.3E-08	1.3E-08	1.7E-13	3.6E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					1.6E-06					4.2E-02
		Expended Waste Area (EWA)	Arsenic	4.8E-07	1.0E-07	1.1E-10	5.8E-07	Skin, CNS, Heart	3.0E-03	6.3E-04	4.9E-06	3.6E-03
			Cobalt	-	-	9.5E-10	9.5E-10	Blood, Respiratory	2.0E-02	8.5E-04	4.9E-05	2.1E-02
			Copper	-	-	-	0.0E+00	No data	1.5E-03	6.2E-05	-	1.5E-03
			Iron	-	-	-	0.0E+00	Stomach	7.1E-03	3.0E-04	-	7.5E-03
			Manganese	-	-	-	0.0E+00	CNS, Brain	6.4E-03	6.7E-03	1.5E-04	1.3E-02
			Nickel	-	-	1.5E-10	1.5E-10	Growth, Respiratory	1.7E-03	1.8E-03	1.8E-05	3.5E-03
			Benzo[a]anthracene	1.3E-08	7.1E-09	9.6E-14	2.0E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	1.2E-07	6.6E-08	8.8E-13	1.8E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	1.9E-08	1.0E-08	1.4E-13	2.9E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	2.2E-08	1.2E-08	1.8E-13	3.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	8.6E-09	4.8E-09	6.4E-14	1.3E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					8.7E-07					5.0E-02
	Exposure Medium Total - Average for All Areas						2.1E-06					3.7E-01
Medium Total							2.1E-06					3.7E-01
						Receptor Total ELCR	2.1E-06				Receptor HI Total	3.7E-01

TABLE 9.4B.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Site User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	All Soil (0 -15 ft bgs)	MIP1	Arsenic	4.1E-07	8.6E-08	9.5E-11	4.9E-07	Skin, CNS, Heart	2.5E-03	5.4E-04	4.1E-06	3.1E-03
			Cobalt	-	-	2.4E-10	2.4E-10	Blood, Respiratory	5.0E-03	2.1E-04	1.2E-05	5.3E-03
			Iron	-	-	-	0.0E+00	Stomach	5.2E-03	2.2E-04	-	5.4E-03
			Manganese	-	-	-	0.0E+00	CNS, Brain	3.1E-03	3.3E-03	7.3E-05	6.5E-03
			1,1,2,2-Tetrachloroethane	5.5E-08	1.2E-10	5.4E-08	1.1E-07	Liver	3.8E-05	8.1E-08	-	3.8E-05
			1,1,2-Trichloroethane	1.1E-08	2.3E-11	2.1E-08	3.2E-08	Blood	1.3E-04	2.8E-07	1.9E-02	1.9E-02
			Trichloroethene	1.2E-06	2.5E-09	2.5E-06	3.7E-06	Immunotoxicity, Fetal, Endocrine	1.5E-01	3.1E-04	8.5E-01	1.0E+00
		Exposure Point Total					4.3E-06					1.0E+00
		MIP2	Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	8.6E-05	1.8E-07	9.5E-04	1.0E-03
			Arsenic	3.6E-07	7.6E-08	8.4E-11	4.3E-07	Skin, CNS, Heart	2.2E-03	4.7E-04	3.6E-06	2.7E-03
			Cobalt	-	-	3.0E-10	3.0E-10	Blood, Respiratory	6.4E-03	2.7E-04	1.6E-05	6.7E-03
			Iron	-	-	-	0.0E+00	Stomach	5.4E-03	2.3E-04	-	5.6E-03
			Manganese	-	-	-	0.0E+00	CNS, Brain	5.2E-03	5.5E-03	1.2E-04	1.1E-02
			Benzo[a]anthracene	1.6E-08	8.7E-09	1.2E-13	2.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	3.9E-08	2.2E-08	2.9E-13	6.1E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	1.1E-08	5.9E-09	7.9E-14	1.7E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.3E-08	6.9E-09	1.0E-13	1.9E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					5.6E-07					2.7E-02
		Former Shot Blast Area (FBSA)	Aluminum	-	-	-	0.0E+00	CNS	1.1E-03	4.7E-05	1.1E-05	1.2E-03
			Arsenic	3.8E-07	8.1E-08	8.9E-11	4.6E-07	Skin, CNS, Heart	2.4E-03	5.0E-04	3.9E-06	2.9E-03
			Chromium VI	3.0E-08	5.1E-08	2.5E-10	8.1E-08	GI, Lung (Cr VI particulates)	5.6E-05	9.5E-05	8.2E-08	1.5E-04
			Cobalt	-	-	8.4E-10	8.4E-10	Blood, Respiratory	1.8E-02	7.5E-04	4.4E-05	1.9E-02
			Copper	-	-	-	0.0E+00	No data	1.4E-03	5.9E-05	-	1.4E-03
			Iron	-	-	-	0.0E+00	Stomach	6.0E-03	2.6E-04	-	6.3E-03
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	3.6E-03	3.8E-03	8.5E-05	7.5E-03
			Nickel	-	-	1.7E-10	1.7E-10	Growth, Respiratory	1.8E-03	1.9E-03	2.0E-05	3.8E-03
			Benzo[a]anthracene	3.5E-08	1.9E-08	2.6E-13	5.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	5.1E-07	2.8E-07	3.8E-12	7.9E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	3.7E-08	2.0E-08	2.7E-13	5.7E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	6.5E-08	3.6E-08	5.2E-13	1.0E-07	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	2.3E-08	1.3E-08	1.7E-13	3.6E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					1.6E-06					4.2E-02
		Expended Waste Area (EWA)	Arsenic	4.8E-07	1.0E-07	1.1E-10	5.8E-07	Skin, CNS, Heart	3.0E-03	6.3E-04	4.9E-06	3.6E-03
			Cobalt	-	-	9.5E-10	9.5E-10	Blood, Respiratory	2.0E-02	8.5E-04	4.9E-05	2.1E-02
			Copper	-	-	-	0.0E+00	No data	1.5E-03	6.2E-05	-	1.5E-03
			Iron	-	-	-	0.0E+00	Stomach	7.1E-03	3.0E-04	-	7.5E-03
			Manganese	-	-	-	0.0E+00	CNS, Brain	6.4E-03	6.7E-03	1.5E-04	1.3E-02
			Nickel	-	-	1.5E-10	1.5E-10	Growth, Respiratory	1.7E-03	1.8E-03	1.8E-05	3.5E-03
			Benzo[a]anthracene	1.3E-08	7.1E-09	9.6E-14	2.0E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	1.2E-07	6.6E-08	8.8E-13	1.8E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	1.9E-08	1.0E-08	1.4E-13	2.9E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	2.2E-08	1.2E-08	1.8E-13	3.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	8.6E-09	4.8E-09	6.4E-14	1.3E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					8.7E-07					5.0E-02
	Exposure Medium Total - Average for All Areas						1.8E-06					2.9E-01
Medium Total							1.8E-06					2.9E-01
						Receptor Total ELCR	1.8E-06				Receptor HI Total	2.9E-01

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater During Trenching	Former FWEC Facility	Formaldehyde	-	-	-	0.0E+00	Urinary, GI, Respiratory	3.6E-08	2.0E-07	-	2.3E-07
			Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	4.8E-07	1.4E-06	-	1.8E-06
			Aluminum	-	-	-	0.0E+00	CNS	1.1E-06	3.0E-06	-	4.1E-06
			Barium	-	-	-	0.0E+00	Kidney	1.2E-06	4.8E-05	-	5.0E-05
			Cadmium	-	-	-	0.0E+00	Urinary	5.0E-06	6.8E-04	-	6.9E-04
			Chromium	8.5E-11	2.1E-08	-	2.1E-08	GI	2.4E-06	5.9E-04	-	5.9E-04
			Cobalt	-	-	-	0.0E+00	Blood, Respiratory	3.1E-06	3.5E-06	-	6.5E-06
			Iron	-	-	-	0.0E+00	Stomach	7.6E-05	2.1E-04	-	2.9E-04
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	3.0E-04	2.1E-02	-	2.2E-02
			Mercury	-	-	-	0.0E+00	CNS	-	-	4.7E-02	4.7E-02
			1,2,4-Trichlorobenzene	1.6E-13	4.6E-11	-	4.7E-11	Adrenal	4.3E-09	1.2E-06	7.0E-04	7.0E-04
			1,1,2-Trichloroethane	4.7E-13	8.6E-12	5.5E-09	5.5E-09	Blood	1.5E-07	2.6E-06	1.2E-02	1.2E-02
			1,1-Dichloroethane	2.4E-13	5.4E-12	3.5E-09	3.5E-09	No data	1.5E-09	3.3E-08	-	3.5E-08
			1,1-Dichloroethene	-	-	-	0.0E+00	Liver	1.2E-06	4.5E-05	6.9E-03	6.9E-03
			1,2-Dichloroethane	4.7E-13	6.5E-12	6.4E-09	6.5E-09	No data	1.8E-08	2.5E-07	2.5E-04	2.5E-04
			1,4-Dioxane	1.3E-11	1.4E-11	2.7E-09	2.7E-09	Liver, Kidney, Nasal	1.9E-08	2.0E-08	5.2E-05	5.2E-05
			Benzene	1.7E-13	8.0E-12	1.4E-09	1.4E-09	Lymph	2.2E-08	1.0E-06	1.6E-04	1.6E-04
			Chloroform	7.3E-14	1.7E-12	2.5E-09	2.5E-09	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	1.6E-09	3.9E-08	3.1E-05	3.1E-05
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	1.2E-07	4.3E-06	-	4.4E-06
			Tetrachloroethene	7.5E-14	9.7E-12	3.6E-10	3.7E-10	CNS, Neurotoxicity	2.5E-08	3.2E-06	2.5E-03	2.5E-03
			Trichloroethene	8.4E-10	3.4E-08	3.3E-06	3.3E-06	Immunotoxicity, Fetal, Endocrine	2.6E-03	1.0E-01	2.8E+01	2.8E+01
			Vinyl chloride	5.8E-12	1.5E-10	2.3E-09	2.4E-09	Liver	1.9E-07	4.9E-06	4.7E-04	4.8E-04
		Exposure Point Total					3.4E-06					2.8E+01
	Exposure Medium Total						3.4E-06					2.8E+01
Medium Total							3.4E-06					2.8E+01
Soil	All Soil (0 -15 ft bgs)	MIP1	Arsenic	2.6E-07	4.1E-08	5.1E-09	3.0E-07	Skin, CNS, Heart	4.0E-02	6.4E-03	5.5E-03	5.2E-02
			Cobalt	-	-	1.3E-08	1.3E-08	Blood, Respiratory	8.0E-03	2.6E-04	4.9E-03	1.3E-02
			Iron	-	-	-	0.0E+00	Stomach	8.3E-02	2.7E-03	-	8.5E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	4.9E-02	4.0E-02	9.7E-02	1.9E-01
			1,1,2,2-Tetrachloroethane	3.5E-08	5.6E-11	4.2E-08	7.7E-08	Liver	2.4E-05	3.9E-08	-	2.4E-05
			1,1,2-Trichloroethane	6.8E-09	1.1E-11	1.6E-08	2.3E-08	Blood	2.1E-03	3.3E-06	3.6E-02	3.8E-02
			Trichloroethene	7.6E-07	1.2E-09	1.9E-06	2.7E-06	Immunotoxicity, Fetal, Endocrine	2.3E+00	3.7E-03	1.6E+01	1.9E+01
		Exposure Point Total					3.1E-06					1.9E+01
		MIP2	Cyanide	-	-	-	0.0E+00	Reproductive, Thyroid	4.1E-05	6.6E-08	1.8E-02	1.8E-02
			Arsenic	2.3E-07	3.6E-08	4.5E-09	2.7E-07	Skin, CNS, Heart	3.5E-02	5.7E-03	4.8E-03	4.6E-02
			Cobalt	-	-	1.6E-08	1.6E-08	Blood, Respiratory	1.0E-02	3.3E-04	6.3E-03	1.7E-02
			Iron	-	-	-	0.0E+00	Stomach	8.6E-02	2.8E-03	-	8.9E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	8.3E-02	6.6E-02	1.6E-01	3.1E-01
			Benzo[a]anthracene	1.0E-08	4.2E-09	6.2E-12	1.4E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	2.5E-08	1.0E-08	1.5E-11	3.5E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	6.8E-09	2.8E-09	4.2E-12	9.6E-09	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	8.0E-09	3.3E-09	5.4E-12	1.1E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					3.5E-07					4.8E-01

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
FWEC/Church Road TCE Site
Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	FFF - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	All Soil (0 -15 ft bgs) (cont.)	Former Shot Blast Area (FBSA)	Aluminum	-	-	-	0.0E+00	CNS	1.8E-02	5.6E-04	1.4E-02	3.2E-02
			Arsenic	2.4E-07	3.9E-08	4.7E-09	2.9E-07	Skin, CNS, Heart	3.8E-02	6.0E-03	5.1E-03	4.9E-02
			Chromium VI	1.9E-08	2.4E-08	1.3E-08	5.7E-08	GI, Lung (Cr VI particulates)	5.3E-04	6.8E-04	3.7E-05	1.3E-03
			Cobalt	-	-	4.5E-08	4.5E-08	Blood, Respiratory	2.8E-02	9.1E-04	1.7E-02	4.7E-02
			Copper	-	-	-	0.0E+00	No data	8.8E-02	2.8E-03	-	9.1E-02
			Iron	-	-	-	0.0E+00	Stomach	9.6E-02	3.1E-03	-	9.9E-02
			Lead	-	-	-	0.0E+00	Reviewed; No Value	-	-	-	0.0E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	5.7E-02	4.6E-02	1.1E-01	2.2E-01
			Nickel	-	-	8.9E-09	8.9E-09	Growth, Respiratory	2.9E-02	2.3E-02	1.2E-02	6.4E-02
			Benzo[a]anthracene	2.2E-08	9.3E-09	1.4E-11	3.2E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	3.2E-07	1.3E-07	2.0E-10	4.6E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	2.3E-08	9.7E-09	1.4E-11	3.3E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	4.1E-08	1.7E-08	2.8E-11	5.8E-08	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	1.5E-08	6.1E-09	9.1E-12	2.1E-08	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					1.0E-06					6.0E-01
		Expended Waste Area (EWA)	Arsenic	3.1E-07	4.9E-08	6.0E-09	3.6E-07	Skin, CNS, Heart	4.7E-02	7.6E-03	6.5E-03	6.2E-02
			Cobalt	-	-	5.1E-08	5.1E-08	Blood, Respiratory	3.2E-02	1.0E-03	2.0E-02	5.3E-02
			Copper	-	-	-	0.0E+00	No data	9.2E-02	3.0E-03	-	9.5E-02
			Iron	-	-	-	0.0E+00	Stomach	1.1E-01	3.6E-03	-	1.2E-01
			Manganese	-	-	-	0.0E+00	CNS, Brain	1.0E-01	8.1E-02	2.0E-01	3.8E-01
			Nickel	-	-	8.2E-09	8.2E-09	Growth, Respiratory	2.7E-02	2.2E-02	1.1E-02	6.0E-02
			Benzo[a]anthracene	8.2E-09	3.4E-09	5.1E-12	1.2E-08	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	7.6E-08	3.2E-08	4.7E-11	1.1E-07	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	1.2E-08	4.9E-09	7.3E-12	1.7E-08	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	1.4E-08	5.9E-09	9.5E-12	2.0E-08	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	5.5E-09	2.3E-09	3.4E-12	7.8E-09	Reviewed; No Value	-	-	-	0.0E+00
		Exposure Point Total					5.8E-07					7.7E-01
	Exposure Medium Total - Average for All Areas						1.3E-06					5.2E+00
Medium Total							1.3E-06					5.2E+00
Sediment	Sediment	Retention Pond	Arsenic	2.8E-07	4.5E-08	-	3.3E-07	Skin, CNS, Heart	4.4E-02	7.0E-03	-	5.1E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	2.4E-01	1.9E-01	-	4.2E-01
			Benzo[a]anthracene	3.4E-06	1.4E-06	-	4.8E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[a]pyrene	2.7E-05	1.1E-05	-	3.8E-05	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[b]fluoranthene	3.2E-06	1.4E-06	-	4.6E-06	Reviewed; No Value	-	-	-	0.0E+00
			Benzo[k]fluoranthene	1.5E-07	6.3E-08	-	2.1E-07	Reviewed; No Value	-	-	-	0.0E+00
			Dibenz(a,h)anthracene	9.4E-06	3.9E-06	-	1.3E-05	Reviewed; No Value	-	-	-	0.0E+00
			Indeno[1,2,3-cd]pyrene	1.6E-06	6.7E-07	-	2.3E-06	Reviewed; No Value	-	-	-	0.0E+00
	Exposure Medium Total						6.3E-05					4.8E-01
Medium Total							6.3E-05					4.8E-01
						Receptor Total ELCR	6.8E-05				Receptor HI Total	3.4E+01

Total CNS HI Across All Media =	1.9E+00
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	4.7E+01

TABLE 9.6A.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	AA - Resident
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Child / Affected Area	Iron	-	-	-	0.0E+00	Stomach	1.4E+00	6.3E-03	-	1.4E+00
			1,4-Dioxane	1.1E-07	3.5E-10	-	1.1E-07	Liver, Kidney, Nasal	4.3E-04	1.4E-06	-	4.3E-04
			Acrolein	-	-	-	0.0E+00	Decreased survival, Respiratory	1.8E+00	1.1E-02	-	1.8E+00
			Benzene	3.6E-08	4.7E-09	-	4.0E-08	Lymph	1.9E-03	2.5E-04	-	2.1E-03
			Bromodichloromethane	4.8E-08	3.0E-09	-	5.1E-08	Kidney	4.5E-04	2.8E-05	-	4.8E-04
			Carbon tetrachloride	5.1E-08	1.2E-08	-	6.4E-08	Liver	2.1E-03	5.1E-04	-	2.7E-03
			Chloroform	6.5E-08	5.1E-09	-	7.0E-08	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	2.4E-03	1.9E-04	-	2.6E-03
			Trichloroethene	1.1E-05	1.6E-06	-	1.3E-05	Immunotoxicity, Fetal, Endocrine	3.0E+00	4.4E-01	-	3.4E+00
			Vinyl chloride	1.1E-05	7.4E-07	-	1.2E-05	Liver	2.3E-03	1.6E-04	-	2.5E-03
		Exposure Point Total					2.5E-05					6.7E+00
	Exposure Medium Total						2.5E-05					6.7E+00
Medium Total							2.5E-05					6.7E+00
						Receptor Total ELCR	2.5E-05				Receptor HI Total	6.7E+00

Total Stomach HI Across All Media =	1.4E+00
Total Decreased survival, Respiratory HI Across All Media =	1.8E+00
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	3.4E+00

TABLE 9.6B.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	AA - Resident
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Adult / Affected Area	Iron	-	-	-	0.0E+00	Stomach	8.5E-01	5.1E-03	-	8.6E-01
			1,4-Dioxane	2.2E-07	8.2E-10	1.8E-09	2.2E-07	Liver, Kidney, Nasal	2.6E-04	9.6E-07	4.3E-05	3.0E-04
			Acrolein	-	-	-	0.0E+00	Decreased survival, Respiratory	1.1E+00	7.7E-03	8.7E+01	8.8E+01
			Benzene	7.2E-08	1.1E-08	6.8E-08	1.5E-07	Lymph	1.1E-03	1.8E-04	1.0E-03	2.3E-03
			Bromodichloromethane	9.6E-08	7.0E-09	2.7E-07	3.7E-07	Kidney	2.7E-04	2.0E-05	-	2.9E-04
			Carbon tetrachloride	1.0E-07	2.9E-08	4.7E-08	1.8E-07	Liver	1.3E-03	3.6E-04	2.7E-04	1.9E-03
			Chloroform	1.3E-07	1.2E-08	5.4E-07	6.8E-07	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	1.5E-03	1.4E-04	8.3E-04	2.4E-03
			Trichloroethene	1.4E-05	2.4E-06	7.3E-06	2.4E-05	Immunotoxicity, Fetal, Endocrine	1.8E+00	3.1E-01	2.5E+00	4.6E+00
			Vinyl chloride	8.6E-07	7.1E-08	3.9E-08	9.7E-07	Liver	1.4E-03	1.2E-04	3.1E-04	1.8E-03
		Exposure Point Total					2.7E-05					9.4E+01
	Exposure Medium Total						2.7E-05					9.4E+01
Medium Total							2.7E-05					9.4E+01
						Receptor Total ELCR	2.7E-05				Receptor HI Total	9.4E+01

Total Decreased survival, Respiratory HI Across All Media =	8.8E+01
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	4.6E+00

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	AA - Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Affected Area	Iron	-	-	-	0.0E+00	Stomach	2.4E-01	1.4E-04	-	2.4E-01
			1,4-Dioxane	7.9E-08	4.6E-11	-	7.9E-08	Liver, Kidney, Nasal	7.4E-05	4.3E-08	-	7.4E-05
			Acrolein	-	-	-		Decreased survival, Respiratory	3.1E-01	3.3E-04	-	3.1E-01
			Benzene	2.6E-08	6.3E-10	-	2.6E-08	Lymph	3.3E-04	8.0E-06	-	3.3E-04
			Bromodichloromethane	3.4E-08	3.9E-10	-		Kidney	7.7E-05	8.9E-07	-	7.8E-05
			Carbon tetrachloride	3.7E-08	1.6E-09	-	3.8E-08	Liver	3.7E-04	1.6E-05	-	3.8E-04
			Chloroform	4.6E-08	6.8E-10	-	4.7E-08	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	4.2E-04	6.1E-06	-	4.2E-04
			Trichloroethene	4.2E-06	1.1E-07	-	4.4E-06	Immunotoxicity, Fetal, Endocrine	5.2E-01	1.4E-02	-	5.3E-01
			Vinyl chloride	3.1E-07	3.8E-09	-	3.1E-07	Liver	4.0E-04	5.0E-06	-	4.0E-04
		Exposure Point Total					4.9E-06					1.1E+00
	Exposure Medium Total						4.9E-06					1.1E+00
Medium Total							4.9E-06					1.1E+00
						Receptor Total ELCR	4.9E-06				Receptor HI Total	1.1E+00

Total Decreased survival, Respiratory HI Across All Media =	3.1E-01
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	5.3E-01

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	AA - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater During Trenching	Affected Area	Iron	-	-	-	0.0E+00	Stomach	4.9E-05	1.4E-04	-	1.9E-04
			1,4-Dioxane	6.3E-13	6.9E-13	8.1E-11	8.2E-11	Liver, Kidney, Nasal	8.9E-10	9.7E-10	1.6E-06	1.6E-06
			Acrolein	-	-	-	0.0E+00	Decreased survival, Respiratory	7.7E-06	1.8E-05	-	2.6E-05
			Benzene	2.0E-13	9.5E-12	1.1E-09	1.1E-09	Lymph	2.6E-08	1.2E-06	1.2E-04	1.2E-04
			Bromodichloromethane	2.7E-13	4.4E-12	4.0E-09	4.0E-09	Kidney	3.9E-08	6.2E-07	3.8E-04	3.8E-04
			Carbon tetrachloride	2.9E-13	1.8E-11	6.6E-10	6.8E-10	Liver	4.2E-08	2.6E-06	4.1E-05	4.3E-05
			Chloroform	3.7E-13	8.7E-12	8.0E-09	8.0E-09	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	8.3E-09	2.0E-07	1.0E-04	1.0E-04
			Trichloroethene	3.4E-11	1.4E-09	8.5E-08	8.6E-08	Immunotoxicity, Fetal, Endocrine	1.0E-04	4.2E-03	7.2E-01	7.3E-01
			Vinyl chloride	2.5E-12	6.4E-11	6.2E-10	6.8E-10	Liver	8.0E-08	2.1E-06	1.3E-04	1.3E-04
		Exposure Point Total					1.0E-07					7.3E-01
	Exposure Medium Total						1.0E-07					7.3E-01
Medium Total							1.0E-07					7.3E-01
						Receptor Total ELCR	1.0E-07				Receptor HI Total	7.3E-01
Medium Total							1.0E-07					7.3E-01
						Receptor Total ELCR	1.0E-07				Receptor HI Total	7.3E-01

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	WRT - Trespasser/Visitor
Receptor Age:	Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Watering Run, Tributaries, and Streams	Arsenic	4.7E-08	1.3E-08	-	5.9E-08	Skin, CNS, Heart	1.0E-02	3.3E-04	-	1.0E-02
			Cobalt	-	-	-	0.0E+00	Blood, Respiratory	3.8E-03	2.1E-04	-	4.0E-03
			Manganese	-	-	-	0.0E+00	CNS, Brain	1.7E-02	2.4E-02	-	4.1E-02
			Thallium	-	-	-	0.0E+00	No data	5.2E-03	2.9E-04	-	5.5E-03
		Exposure Point Total					5.9E-08					6.1E-02
	Exposure Medium Total						5.9E-08					6.1E-02
Medium Total							5.9E-08					6.1E-02
						Receptor Total ELCR	5.9E-08				Receptor HI Total	6.1E-02

Total CNS HI Across All Media = 5.2E-02

TABLE 9.10.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future
Receptor Population:	WRT - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Watering Run, Tributaries, and Streams	Arsenic	7.6E-07	1.2E-07	-	8.8E-07	Skin, CNS, Heart	1.2E-01	1.9E-02	-	1.4E-01
			Cobalt	-	-	-	0.0E+00	Blood, Respiratory	3.7E-02	1.2E-03	-	3.8E-02
			Manganese	-	-	-	0.0E+00	CNS, Brain	1.7E+00	1.4E+00	-	3.1E+00
			Thallium	-	-	-	0.0E+00	No data	1.3E-01	4.1E-03	-	1.3E-01
		Exposure Point Total					8.8E-07					3.4E+00
	Exposure Medium Total						8.8E-07					3.4E+00
Medium Total							8.8E-07					3.4E+00
						Receptor Total ELCR	8.8E-07				Receptor HI Total	3.4E+00

Total CNS HI Across All Media = 3.2E+00

TABLE 9.11A.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	SIP - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Child / Surrounding Industrial Area	Formaldehyde	-	-	-	0.0E+00	Urinary, GI, Respiratory	4.1E-03	5.2E-05	-	4.2E-03
			Iron	-	-	-	0.0E+00	Stomach	1.3E+00	5.8E-03	-	1.3E+00
			Manganese	-	-	-	0.0E+00	CNS, Brain	1.4E+01	1.5E+00	-	1.5E+01
			Bis(2-ethylhexyl)phthalate	3.7E-07	-	-	3.7E-07	Liver	1.5E-02	-	-	1.5E-02
			1,1-Dichloroethane	6.9E-08	4.8E-09	-	7.4E-08	No data	7.1E-04	4.9E-05	-	7.6E-04
			1,4-Dioxane	3.2E-06	1.0E-08	-	3.2E-06	Liver, Kidney, Nasal	1.2E-02	3.9E-05	-	1.2E-02
			Acetone	-	-	-	0.0E+00	Kidney, Blood Forming, CNS	2.3E-03	9.6E-06	-	2.3E-03
			Benzene	3.4E-08	4.6E-09	-	3.9E-08	Lymph	1.8E-03	2.4E-04	-	2.1E-03
			Bromodichloromethane	4.0E-08	2.5E-09	-	4.2E-08	Kidney	3.7E-04	2.3E-05	-	4.0E-04
			Carbon tetrachloride	5.6E-08	1.3E-08	-	7.0E-08	Liver	2.3E-03	5.5E-04	-	2.9E-03
			Chloroform	2.9E-07	2.3E-08	-	3.1E-07	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	1.1E-02	8.7E-04	-	1.2E-02
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	1.0E-02	1.1E-03	-	1.1E-02
			Toluene	-	-	-	0.0E+00	Kidney, Neurotoxicity	9.8E-03	3.0E-03	-	1.3E-02
			Trichloroethene	2.2E-05	3.2E-06	-	2.5E-05	Immunotoxicity, Fetal, Endocrine	5.9E+00	8.6E-01	-	6.8E+00
			Vinyl chloride	2.1E-05	1.4E-06	-	2.2E-05	Liver	4.4E-03	3.0E-04	-	4.7E-03
		Exposure Point Total					5.1E-05					2.3E+01
	Exposure Medium Total						5.1E-05					2.3E+01
Medium Total							5.1E-05					2.3E+01
						Receptor Total ELCR	5.1E-05				Receptor HI Total	2.3E+01

Total Stomach, GI HI Across All Media =	1.3E+00
Total CNS, Brain, Neurotoxicity HI Across All Media =	1.5E+01
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	6.8E+00

TABLE 9.11B.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Future (Hypothetical)
Receptor Population:	SIP - Resident
Receptor Age:	Adult / Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Adult / Surrounding Industrial Area	Formaldehyde	-	-	3.8E-08	3.8E-08	Urinary, GI, Respiratory	2.5E-03	3.8E-05	1.0E-03	3.5E-03
			Iron	-	-	-	0.0E+00	Stomach	7.9E-01	4.7E-03	-	7.9E-01
			Manganese	-	-	-	0.0E+00	CNS, Brain	8.2E+00	1.2E+00	-	9.4E+00
			Bis(2-ethylhexyl)phthalate	7.4E-07	-	5.8E-10	7.4E-07	Liver	9.3E-03	-	-	9.3E-03
			1,1-Dichloroethane	1.4E-07	1.1E-08	2.4E-07	3.9E-07	No data	4.3E-04	3.4E-05	-	4.6E-04
			1,4-Dioxane	6.4E-06	2.4E-08	5.3E-08	6.4E-06	Liver, Kidney, Nasal	7.4E-03	2.7E-05	1.2E-03	8.7E-03
			Acetone	-	-	-	0.0E+00	Kidney, Blood Forming, CNS	1.4E-03	6.9E-06	5.2E-05	1.5E-03
			Benzene	6.9E-08	1.1E-08	6.5E-08	1.4E-07	Lymph	1.1E-03	1.7E-04	9.7E-04	2.2E-03
			Bromodichloromethane	8.0E-08	5.8E-09	2.3E-07	3.1E-07	Kidney	2.2E-04	1.6E-05	-	2.4E-04
			Carbon tetrachloride	1.1E-07	3.1E-08	5.1E-08	2.0E-07	Liver	1.4E-03	3.9E-04	3.0E-04	2.1E-03
			Chloroform	5.8E-07	5.4E-08	2.4E-06	3.0E-06	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	6.6E-03	6.1E-04	3.7E-03	1.1E-02
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	6.1E-03	7.9E-04	-	6.9E-03
			Toluene	-	-	-	0.0E+00	Kidney, Neurotoxicity	5.9E-03	2.1E-03	5.9E-04	8.5E-03
			Trichloroethene	2.8E-05	4.8E-06	1.4E-05	4.8E-05	Immunotoxicity, Fetal, Endocrine	3.6E+00	6.1E-01	5.0E+00	9.1E+00
			Vinyl chloride	1.6E-06	1.3E-07	7.3E-08	1.8E-06	Liver	2.6E-03	2.2E-04	5.8E-04	3.4E-03
		Exposure Point Total					6.1E-05					1.9E+01
	Exposure Medium Total						6.1E-05					1.9E+01
Medium Total							6.1E-05					1.9E+01
						Receptor Total ELCR	6.1E-05				Receptor HI Total	1.9E+01

Total Stomach, GI HI Across All Media =	8.0E-01
Total CNS, Brain, Neurotoxicity HI Across All Media =	9.4E+00
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	9.1E+00

TABLE 9.12.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future (Hypothetical)
Receptor Population:	SIP- Commercial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater Used as Tap Water	Surrounding Industrial Area	Formaldehyde	-	-	-	0.0E+00	Urinary, GI, Respiratory	7.1E-04	1.6E-06	-	7.1E-04
			Iron	-	-	-	0.0E+00	Stomach	2.2E-01	1.2E-04	-	2.2E-01
			Manganese	-	-	-	0.0E+00	CNS, Brain	2.3E+00	3.3E-02	-	2.4E+00
			Bis(2-ethylhexyl)phthalate	2.7E-07	-	-	2.7E-07	Liver	2.7E-03	-	-	2.7E-03
			1,1-Dichloroethane	5.0E-08	6.3E-10	-	5.0E-08	No data	1.2E-04	1.5E-06	-	1.2E-04
			1,4-Dioxane	2.3E-06	1.3E-09	-	2.3E-06	Liver, Kidney, Nasal	2.1E-03	1.2E-06	-	2.1E-03
			Acetone	-	-	-	0.0E+00	Kidney, Blood Forming, CNS	4.0E-04	3.0E-07	-	4.0E-04
			Benzene	2.5E-08	6.0E-10	-	2.5E-08	Lymph	3.1E-04	7.7E-06	-	3.2E-04
			Bromodichloromethane	2.8E-08	3.3E-10	-	2.9E-08	Kidney	6.4E-05	7.4E-07	-	6.5E-05
			Carbon tetrachloride	4.0E-08	1.8E-09	-	4.2E-08	Liver	4.0E-04	1.8E-05	-	4.2E-04
			Chloroform	2.1E-07	3.0E-09	-	2.1E-07	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	1.9E-03	2.7E-05	-	1.9E-03
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	1.7E-03	3.6E-05	-	1.8E-03
			Toluene	-	-	-	0.0E+00	Kidney, Neurotoxicity	1.7E-03	9.4E-05	-	1.8E-03
			Trichloroethene	8.4E-06	2.3E-07	-	8.6E-06	Immunotoxicity, Fetal, Endocrine	1.0E+00	2.7E-02	-	1.0E+00
			Vinyl chloride	5.8E-07	7.2E-09	-	5.9E-07	Liver	7.5E-04	9.4E-06	-	7.6E-04
		Exposure Point Total					1.2E-05					3.7E+00
	Exposure Medium Total						1.2E-05					3.7E+00
Medium Total							1.2E-05					3.7E+00
Receptor Total							1.2E-05				Receptor HI Total	3.7E+00

Total Stomach, GI HI Across All Media =	2.3E-01
Total CNS, Brain, Neurotoxicity HI Across All Media =	2.4E+00
Total Immunotoxicity, Fetal, Endocrine HI Across All Media =	1.0E+00

TABLE 9.13.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

FWEC/Church Road TCE Site

Mountain Top, Luzerne County, Pennsylvania

Scenario Timeframe:	Current / Future
Receptor Population:	SIP - Construction/Utility Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Groundwater	Groundwater During Trenching	Surrounding Industrial Area	Formaldehyde	-	-	-	0.0E+00	Urinary, GI, Respiratory	9.4E-08	5.2E-07	-	6.1E-07
			Iron	-	-	-	0.0E+00	Stomach	4.5E-05	1.3E-04	-	1.7E-04
			Manganese	-	-	-	0.0E+00	CNS, Brain	4.7E-04	3.3E-02	-	3.4E-02
			Bis(2-ethylhexyl)phthalate	2.1E-12	-	1.9E-11	2.1E-11	Liver	1.1E-07	-	-	1.1E-07
			1,1-Dichloroethane	4.0E-13	8.8E-12	5.3E-09	5.3E-09	No data	2.4E-09	5.4E-08	-	5.7E-08
			1,4-Dioxane	1.8E-11	2.0E-11	3.4E-09	3.5E-09	Liver, Kidney, Nasal	2.5E-08	2.8E-08	6.7E-05	6.7E-05
			Acetone	-	-	-	0.0E+00	Kidney, Blood Forming, CNS	3.6E-08	5.8E-08	5.5E-05	5.5E-05
			Benzene	2.0E-13	9.1E-12	1.5E-09	1.5E-09	Lymph	2.5E-08	1.2E-06	1.7E-04	1.7E-04
			Bromodichloromethane	2.3E-13	3.7E-12	4.9E-09	4.9E-09	Kidney	3.2E-08	5.2E-07	4.7E-04	4.7E-04
			Carbon tetrachloride	3.2E-13	2.0E-11	1.1E-09	1.1E-09	Liver	4.6E-08	2.8E-06	6.6E-05	6.9E-05
			Chloroform	1.7E-12	3.9E-11	5.3E-08	5.3E-08	Cardiovascular, Developmental, Liver, CNS, Kidney, Reproductive	3.7E-08	8.8E-07	6.7E-04	6.7E-04
			cis-1,2-Dichloroethene	-	-	-	0.0E+00	Kidney	3.5E-08	1.2E-06	-	1.3E-06
			Toluene	-	-	-	0.0E+00	Kidney, Neurotoxicity	3.3E-08	3.2E-06	2.7E-04	2.7E-04
			Trichloroethene	6.7E-11	2.7E-09	2.5E-07	2.5E-07	Immunotoxicity, Fetal, Endocrine	2.0E-04	8.3E-03	2.1E+00	2.1E+00
			Vinyl chloride	4.6E-12	1.2E-10	1.7E-09	1.8E-09	Liver	1.5E-07	3.9E-06	3.6E-04	3.6E-04
		Exposure Point Total					3.2E-07					2.2E+00
	Exposure Medium Total						3.2E-07					2.2E+00
Medium Total							3.2E-07					2.2E+00
						Receptor Total ELCR	3.2E-07				Receptor HI Total	2.2E+00

Total Immunotoxicity, Fetal, Endocrine HI Across All Media = 2.1E+00

ATTACHMENT B

PROUCL OUTPUT FOR EXPOSURE POINT CONCENTRATION CALCULATIONS

FORMER FWEC FACILITY - MIP AREA 1 - SURFACE SOIL

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:49:38 PM
From File	ProUCL Input Files_d.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (1,1,2,2-tetrachloroethane)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	1
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable Value (1,1,2,2-tetrachloroethane) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Value (1,1,2-trichloroethane)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	1
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable Value (1,1,2-trichloroethane) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Value (trichloroethene)

General Statistics

Total Number of Observations	17	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	0.021	Mean	3.892
Maximum	29	Median	0.72
SD	7.518	Std. Error of Mean	1.823
Coefficient of Variation	1.932	Skewness	2.737

	A	B	C	D	E	F	G	H	I	J	K	L
52	**Normal GOF Test**											
53					Shapiro Wilk Test Statistic	0.58	**Shapiro Wilk GOF Test**					
54					5% Shapiro Wilk Critical Value	0.892	Data Not Normal at 5% Significance Level					
55					Lilliefors Test Statistic	0.339	**Lilliefors GOF Test**					
56					5% Lilliefors Critical Value	0.215	Data Not Normal at 5% Significance Level					
57	**Data Not Normal at 5% Significance Level**											
58												
59	**Assuming Normal Distribution**											
60			**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**					
61					95% Student's-t UCL	7.076	95% Adjusted-CLT UCL (Chen-1995)					8.185
62							95% Modified-t UCL (Johnson-1978)					7.278
63												
64	**Gamma GOF Test**											
65					A-D Test Statistic	0.737	**Anderson-Darling Gamma GOF Test**					
66					5% A-D Critical Value	0.822	Detected data appear Gamma Distributed at 5% Significance Level					
67					K-S Test Statistic	0.203	**Kolmogrov-Smirnoff Gamma GOF Test**					
68					5% K-S Critical Value	0.224	Detected data appear Gamma Distributed at 5% Significance Level					
69	**Detected data appear Gamma Distributed at 5% Significance Level**											
70												
71	**Gamma Statistics**											
72					k hat (MLE)	0.392	k star (bias corrected MLE)					0.362
73					Theta hat (MLE)	9.94	Theta star (bias corrected MLE)					10.76
74					nu hat (MLE)	13.31	nu star (bias corrected)					12.3
75					MLE Mean (bias corrected)	3.892	MLE Sd (bias corrected)					6.472
76							Approximate Chi Square Value (0.05)					5.424
77					Adjusted Level of Significance	0.0346	Adjusted Chi Square Value					4.952
78												
79	**Assuming Gamma Distribution**											
80					95% Approximate Gamma UCL (use when n>=50)	8.826	95% Adjusted Gamma UCL (use when n<50)					9.666
81												
82	**Lognormal GOF Test**											
83					Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**					
84					5% Shapiro Wilk Critical Value	0.892	Data appear Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.104	**Lilliefors Lognormal GOF Test**					
86					5% Lilliefors Critical Value	0.215	Data appear Lognormal at 5% Significance Level					
87	**Data appear Lognormal at 5% Significance Level**											
88												
89	**Lognormal Statistics**											
90					Minimum of Logged Data	-3.863	Mean of logged Data					-0.327
91					Maximum of Logged Data	3.367	SD of logged Data					2.044
92												
93	**Assuming Lognormal Distribution**											
94					95% H-UCL	57.05	90% Chebyshev (MVUE) UCL					11.98
95					95% Chebyshev (MVUE) UCL	15.44	97.5% Chebyshev (MVUE) UCL					20.24
96					99% Chebyshev (MVUE) UCL	29.68						
97												
98	**Nonparametric Distribution Free UCL Statistics**											
99	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
100												
101	**Nonparametric Distribution Free UCLs**											
102					95% CLT UCL	6.892	95% Jackknife UCL					7.076

	A	B	C	D	E	F	G	H	I	J	K	L
103					95% Standard Bootstrap UCL	6.724					95% Bootstrap-t UCL	10.97
104					95% Hall's Bootstrap UCL	14.54					95% Percentile Bootstrap UCL	7.027
105					95% BCA Bootstrap UCL	8.121						
106					90% Chebyshev(Mean, Sd) UCL	9.363					95% Chebyshev(Mean, Sd) UCL	11.84
107					97.5% Chebyshev(Mean, Sd) UCL	15.28					99% Chebyshev(Mean, Sd) UCL	22.04
108												
109					**Suggested UCL to Use**							
110					95% Adjusted Gamma UCL	9.666						
111												
112	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
113	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
114	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
115	For additional insight the user may want to consult a statistician.											
116												

FORMER FWEC FACILITY - MIP AREA 1 - ALL SOIL

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:48:44 PM
From File	ProUCL Input Files_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (1,1,2,2-tetrachloroethane)

General Statistics

Total Number of Observations	38	Number of Distinct Observations	13
Number of Detects	2	Number of Non-Detects	36
Number of Distinct Detects	2	Number of Distinct Non-Detects	11
Minimum Detect	0.0029	Minimum Non-Detect	7.2000E-4
Maximum Detect	11	Maximum Non-Detect	1
Variance Detects	60.47	Percent Non-Detects	94.74%
Mean Detects	5.501	SD Detects	7.776
Median Detects	5.501	CV Detects	1.413
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.723	SD of Logged Detects	5.827

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.29	Standard Error of Mean	0.404
SD	1.761	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.972	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.955	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.502	95% KM Chebyshev UCL	2.051
97.5% KM Chebyshev UCL	2.813	99% KM Chebyshev UCL	4.309

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.213	k star (bias corrected MLE)	N/A
Theta hat (MLE)	25.87	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	0.851	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0272	nu hat (KM)	2.067
		Adjusted Level of Significance (β)	0.0434

	A	B	C	D	E	F	G	H	I	J	K	L
52	Approximate Chi Square Value (2.07, α)					0.16	Adjusted Chi Square Value (2.07, β)					0.149
53	95% Gamma Approximate KM-UCL (use when n>=50)					3.751	95% Gamma Adjusted KM-UCL (use when n<50)					4.039
54	Gamma (KM) may not be used when k hat (KM) is < 0.1											
55												
56	**Lognormal GOF Test on Detected Observations Only**											
57	**Not Enough Data to Perform GOF Test**											
58												
59	**Lognormal ROS Statistics Using Imputed Non-Detects**											
60	Mean in Original Scale					0.29	Mean in Log Scale					-22.7
61	SD in Original Scale					1.784	SD in Log Scale					8.682
62	95% t UCL (assumes normality of ROS data)					0.778	95% Percentile Bootstrap UCL					0.868
63	95% BCA Bootstrap UCL					1.447	95% Bootstrap t UCL					98577
64	95% H-UCL (Log ROS)					3.490E+15						
65												
66	**DL/2 Statistics**											
67	**DL/2 Normal**						**DL/2 Log-Transformed**					
68	Mean in Original Scale					0.315	Mean in Log Scale					-5.582
69	SD in Original Scale					1.783	SD in Log Scale					1.936
70	95% t UCL (Assumes normality)					0.803	95% H-Stat UCL					0.0785
71	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
72												
73	**Nonparametric Distribution Free UCL Statistics**											
74	**Data do not follow a Discernible Distribution at 5% Significance Level**											
75												
76	**Suggested UCL to Use**											
77	99% KM (Chebyshev) UCL					4.309						
78												
79	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
80	Recommendations are based upon data size, data distribution, and skewness.											
81	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
82	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
83												
84	**Value (1,1,2-trichloroethane)**											
85												
86	**General Statistics**											
87	Total Number of Observations					38	Number of Distinct Observations					13
88	Number of Detects					2	Number of Non-Detects					36
89	Number of Distinct Detects					2	Number of Distinct Non-Detects					11
90	Minimum Detect					0.0032	Minimum Non-Detect					5.6000E-4
91	Maximum Detect					7.5	Maximum Non-Detect					1
92	Variance Detects					28.1	Percent Non-Detects					94.74%
93	Mean Detects					3.752	SD Detects					5.301
94	Median Detects					3.752	CV Detects					1.413
95	Skewness Detects					N/A	Kurtosis Detects					N/A
96	Mean of Logged Detects					-1.865	SD of Logged Detects					5.487
97												
98	**Warning: Data set has only 2 Detected Values.**											
99	**This is not enough to compute meaningful or reliable statistics and estimates.**											
100												
101												
102	**Normal GOF Test on Detects Only**											

	A	B	C	D	E	F	G	H	I	J	K	L
103	**Not Enough Data to Perform GOF Test**											
104												
105	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
106					Mean	0.199			Standard Error of Mean			0.275
107					SD	1.2			95% KM (BCA) UCL			N/A
108					95% KM (t) UCL	0.664			95% KM (Percentile Bootstrap) UCL			N/A
109					95% KM (z) UCL	0.652			95% KM Bootstrap t UCL			N/A
110					90% KM Chebyshev UCL	1.025			95% KM Chebyshev UCL			1.399
111					97.5% KM Chebyshev UCL	1.919			99% KM Chebyshev UCL			2.939
112												
113	**Gamma GOF Tests on Detected Observations Only**											
114	**Not Enough Data to Perform GOF Test**											
115												
116	**Gamma Statistics on Detected Data Only**											
117					k hat (MLE)	0.226			k star (bias corrected MLE)			N/A
118					Theta hat (MLE)	16.57			Theta star (bias corrected MLE)			N/A
119					nu hat (MLE)	0.906			nu star (bias corrected)			N/A
120					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A
121												
122	**Gamma Kaplan-Meier (KM) Statistics**											
123					k hat (KM)	0.0275			nu hat (KM)			2.093
124									Adjusted Level of Significance (β)			0.0434
125					Approximate Chi Square Value (2.09, α)	0.164			Adjusted Chi Square Value (2.09, β)			0.152
126					95% Gamma Approximate KM-UCL (use when n>=50)	2.544			95% Gamma Adjusted KM-UCL (use when n<50)			2.744
127	Gamma (KM) may not be used when k hat (KM) is < 0.1											
128												
129	**Lognormal GOF Test on Detected Observations Only**											
130	**Not Enough Data to Perform GOF Test**											
131												
132	**Lognormal ROS Statistics Using Imputed Non-Detects**											
133					Mean in Original Scale	0.2			Mean in Log Scale			-8.618
134					SD in Original Scale	1.216			SD in Log Scale			3.543
135					95% t UCL (assumes normality of ROS data)	0.533			95% Percentile Bootstrap UCL			0.595
136					95% BCA Bootstrap UCL	0.794			95% Bootstrap t UCL			42.54
137					95% H-UCL (Log ROS)	3.446						
138												
139	**DL/2 Statistics**											
140	**DL/2 Normal**						**DL/2 Log-Transformed**					
141					Mean in Original Scale	0.225			Mean in Log Scale			-5.179
142					SD in Original Scale	1.216			SD in Log Scale			1.78
143					95% t UCL (Assumes normality)	0.557			95% H-Stat UCL			0.0748
144	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
145												
146	**Nonparametric Distribution Free UCL Statistics**											
147	**Data do not follow a Discernible Distribution at 5% Significance Level**											
148												
149	**Suggested UCL to Use**											
150					99% KM (Chebyshev) UCL	2.939						
151												
152	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
153	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L
154	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
155	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
156												
157	**Value (trichloroethene)**											
158												
159	**General Statistics**											
160	Total Number of Observations					53	Number of Distinct Observations					46
161	Number of Detects					48	Number of Non-Detects					5
162	Number of Distinct Detects					45	Number of Distinct Non-Detects					1
163	Minimum Detect					0.002	Minimum Non-Detect					0.006
164	Maximum Detect					1900	Maximum Non-Detect					0.006
165	Variance Detects					75029	Percent Non-Detects					9.434%
166	Mean Detects					42.43	SD Detects					273.9
167	Median Detects					0.333	CV Detects					6.456
168	Skewness Detects					6.921	Kurtosis Detects					47.93
169	Mean of Logged Detects					-1.204	SD of Logged Detects					2.798
170												
171	**Normal GOF Test on Detects Only**											
172	Shapiro Wilk Test Statistic					0.158	**Shapiro Wilk GOF Test**					
173	5% Shapiro Wilk Critical Value					0.947	Detected Data Not Normal at 5% Significance Level					
174	Lilliefors Test Statistic					0.497	**Lilliefors GOF Test**					
175	5% Lilliefors Critical Value					0.128	Detected Data Not Normal at 5% Significance Level					
176	**Detected Data Not Normal at 5% Significance Level**											
177												
178	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
179	Mean					38.43	Standard Error of Mean					35.85
180	SD					258.2	95% KM (BCA) UCL					110.7
181	95% KM (t) UCL					98.46	95% KM (Percentile Bootstrap) UCL					109.8
182	95% KM (z) UCL					97.39	95% KM Bootstrap t UCL					2120
183	90% KM Chebyshev UCL					146	95% KM Chebyshev UCL					194.7
184	97.5% KM Chebyshev UCL					262.3	99% KM Chebyshev UCL					395.1
185												
186	**Gamma GOF Tests on Detected Observations Only**											
187	A-D Test Statistic					7.369	**Anderson-Darling GOF Test**					
188	5% A-D Critical Value					0.955	Detected Data Not Gamma Distributed at 5% Significance Level					
189	K-S Test Statistic					0.314	**Kolmogrov-Smirnoff GOF**					
190	5% K-S Critical Value					0.144	Detected Data Not Gamma Distributed at 5% Significance Level					
191	**Detected Data Not Gamma Distributed at 5% Significance Level**											
192												
193	**Gamma Statistics on Detected Data Only**											
194	k hat (MLE)					0.155	k star (bias corrected MLE)					0.159
195	Theta hat (MLE)					274.5	Theta star (bias corrected MLE)					267.2
196	nu hat (MLE)					14.84	nu star (bias corrected)					15.24
197	MLE Mean (bias corrected)					42.43	MLE Sd (bias corrected)					106.5
198												
199	**Gamma Kaplan-Meier (KM) Statistics**											
200	k hat (KM)					0.0221	nu hat (KM)					2.347
201	Approximate Chi Square Value (2.35, α)					0.209	Adjusted Chi Square Value (2.35, β)					0.197
202	95% Gamma Approximate KM-UCL (use when n>=50)					432.5	95% Gamma Adjusted KM-UCL (use when n<50)					458.6
203	Gamma (KM) may not be used when k hat (KM) is < 0.1											
204												

	A	B	C	D	E	F	G	H	I	J	K	L
205	**Gamma ROS Statistics using Imputed Non-Detects**											
206	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
207	GROS may not be used when kstar of detected data is small such as < 0.1											
208	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
209	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
210					Minimum	0.002				Mean		38.43
211					Maximum	1900				Median		0.19
212					SD	260.7				CV		6.785
213					k hat (MLE)	0.149				k star (bias corrected MLE)		0.153
214					Theta hat (MLE)	258.3				Theta star (bias corrected MLE)		251.3
215					nu hat (MLE)	15.77				nu star (bias corrected)		16.21
216					MLE Mean (bias corrected)	38.43				MLE Sd (bias corrected)		98.27
217										Adjusted Level of Significance (β)		0.0455
218					Approximate Chi Square Value (16.21, α)	8.109				Adjusted Chi Square Value (16.21, β)		7.948
219					95% Gamma Approximate UCL (use when n>=50)	76.8				95% Gamma Adjusted UCL (use when n<50)		78.36
220												
221	**Lognormal GOF Test on Detected Observations Only**											
222					Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**					
223					5% Shapiro Wilk Critical Value	0.947	Detected Data appear Lognormal at 5% Significance Level					
224					Lilliefors Test Statistic	0.092	**Lilliefors GOF Test**					
225					5% Lilliefors Critical Value	0.128	Detected Data appear Lognormal at 5% Significance Level					
226	**Detected Data appear Lognormal at 5% Significance Level**											
227												
228	**Lognormal ROS Statistics Using Imputed Non-Detects**											
229					Mean in Original Scale	38.43				Mean in Log Scale		-1.678
230					SD in Original Scale	260.7				SD in Log Scale		3.059
231					95% t UCL (assumes normality of ROS data)	98.4				95% Percentile Bootstrap UCL		109.8
232					95% BCA Bootstrap UCL	147.2				95% Bootstrap t UCL		2142
233					95% H-UCL (Log ROS)	182.5						
234												
235	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
236					KM Mean (logged)	-1.629				95% H-UCL (KM -Log)		118.9
237					KM SD (logged)	2.949				95% Critical H Value (KM-Log)		5.037
238					KM Standard Error of Mean (logged)	0.41						
239												
240	**DL/2 Statistics**											
241	**DL/2 Normal**						**DL/2 Log-Transformed**					
242					Mean in Original Scale	38.43				Mean in Log Scale		-1.638
243					SD in Original Scale	260.7				SD in Log Scale		2.987
244					95% t UCL (Assumes normality)	98.4				95% H-Stat UCL		138.7
245	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
246												
247	**Nonparametric Distribution Free UCL Statistics**											
248	**Detected Data appear Lognormal Distributed at 5% Significance Level**											
249												
250	**Suggested UCL to Use**											
251					99% KM (Chebyshev) UCL	395.1						
252												
253	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
254	Recommendations are based upon data size, data distribution, and skewness.											
255	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											

	A	B	C	D	E	F	G	H	I	J	K	L
256	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
257												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			6/6/2016 9:58:45 AM								
5	From File			MIP1-AS Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Arsenic											
12												
13	General Statistics											
14	Total Number of Observations					2	Number of Distinct Observations					2
15							Number of Missing Observations					0
16	Minimum					5.7	Mean					6.4
17	Maximum					7.1	Median					6.4
18												
19	Warning: This data set only has 2 observations!											
20	Data set is too small to compute reliable and meaningful statistics and estimates!											
21	The data set for variable Arsenic was not processed!											
22												
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
25												
26												
27												
28	Cobalt											
29												
30	General Statistics											
31	Total Number of Observations					2	Number of Distinct Observations					2
32							Number of Missing Observations					0
33	Minimum					6.7	Mean					7.6
34	Maximum					8.5	Median					7.6
35												
36	Warning: This data set only has 2 observations!											
37	Data set is too small to compute reliable and meaningful statistics and estimates!											
38	The data set for variable Cobalt was not processed!											
39												
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
42												
43												
44												
45	Iron											
46												
47	General Statistics											
48	Total Number of Observations					2	Number of Distinct Observations					2
49							Number of Missing Observations					0
50	Minimum					18400	Mean					19450
51	Maximum					20500	Median					19450
52												

	A	B	C	D	E	F	G	H	I	J	K	L
53	Warning: This data set only has 2 observations!											
54	Data set is too small to compute reliable and meaningful statistics and estimates!											
55	The data set for variable Iron was not processed!											
56												
57	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
58	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
59												
60												
61												
62	Manganese											
63												
64	General Statistics											
65	Total Number of Observations					2	Number of Distinct Observations				2	
66							Number of Missing Observations				0	
67	Minimum					207	Mean				313.5	
68	Maximum					420	Median				313.5	
69												
70	Warning: This data set only has 2 observations!											
71	Data set is too small to compute reliable and meaningful statistics and estimates!											
72	The data set for variable Manganese was not processed!											
73												
74	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
75	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
76												
77												

FORMER FWEC FACILITY - MIP AREA 2 - ALL SOIL

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:50:29 PM
From File	ProUCL Input Files_e.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (benzo[a]pyrene)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	4
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Value (benzo[a]pyrene) was not processed!

Value (benzo[a]anthracene)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	4
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Value (benzo[a]anthracene) was not processed!

Value (benzo[b]fluoranthene)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	4
Number of Detects	1	Number of Non-Detects	4
Number of Distinct Detects	1	Number of Distinct Non-Detects	3

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Value (benzo[b]fluoranthene) was not processed!

Value (dibenz(a,h)anthracene)

General Statistics

	A	B	C	D	E	F	G	H	I	J	K	L
53					Total Number of Observations	5				Number of Distinct Observations		3
54					Number of Detects	1				Number of Non-Detects		4
55					Number of Distinct Detects	1				Number of Distinct Non-Detects		2
56												
57	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
58	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
59												
60	The data set for variable Value (dibenz(a,h)anthracene) was not processed!											
61												
62												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			6/6/2016 8:59:55 AM								
5	From File			3 MIP2-AS Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Cyanide											
11												
12	General Statistics											
13	Total Number of Observations					5	Number of Distinct Observations					4
14	Number of Detects					2	Number of Non-Detects					3
15	Number of Distinct Detects					2	Number of Distinct Non-Detects					2
16	Minimum Detect					0.2	Minimum Non-Detect					0.12
17	Maximum Detect					0.29	Maximum Non-Detect					0.13
18	Variance Detects					0.00405	Percent Non-Detects					60%
19	Mean Detects					0.245	SD Detects					0.0636
20	Median Detects					0.245	CV Detects					0.26
21	Skewness Detects					N/A	Kurtosis Detects					N/A
22	Mean of Logged Detects					-1.424	SD of Logged Detects					0.263
23												
24	Warning: Data set has only 2 Detected Values.											
25	This is not enough to compute meaningful or reliable statistics and estimates.											
26												
27												
28	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
29	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
30	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
31	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
32												
33	Normal GOF Test on Detects Only											
34	Not Enough Data to Perform GOF Test											
35												
36	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
37	Mean					0.17	Standard Error of Mean					0.0427
38	SD					0.0675	95% KM (BCA) UCL					N/A
39	95% KM (t) UCL					0.261	95% KM (Percentile Bootstrap) UCL					N/A
40	95% KM (z) UCL					0.24	95% KM Bootstrap t UCL					N/A
41	90% KM Chebyshev UCL					0.298	95% KM Chebyshev UCL					0.356
42	97.5% KM Chebyshev UCL					0.437	99% KM Chebyshev UCL					0.595
43												
44	Gamma GOF Tests on Detected Observations Only											
45	Not Enough Data to Perform GOF Test											
46												
47	Gamma Statistics on Detected Data Only											
48	k hat (MLE)					29.3	k star (bias corrected MLE)					N/A
49	Theta hat (MLE)					0.00836	Theta star (bias corrected MLE)					N/A
50	nu hat (MLE)					117.2	nu star (bias corrected)					N/A
51	MLE Mean (bias corrected)					N/A	MLE Sd (bias corrected)					N/A
52												

	A	B	C	D	E	F	G	H	I	J	K	L
53	Gamma Kaplan-Meier (KM) Statistics											
54					k hat (KM)	6.338					nu hat (KM)	63.38
55											Adjusted Level of Significance (β)	0.0086
56				Approximate Chi Square Value (63.38, α)		46.06					Adjusted Chi Square Value (63.38, β)	39.69
57			95% Gamma Approximate KM-UCL (use when n>=50)			0.234					95% Gamma Adjusted KM-UCL (use when n<50)	0.271
58												
59	Lognormal GOF Test on Detected Observations Only											
60	Not Enough Data to Perform GOF Test											
61												
62	Lognormal ROS Statistics Using Imputed Non-Detects											
63				Mean in Original Scale		0.148					Mean in Log Scale	-2.066
64				SD in Original Scale		0.0947					SD in Log Scale	0.622
65			95% t UCL (assumes normality of ROS data)			0.239					95% Percentile Bootstrap UCL	0.213
66				95% BCA Bootstrap UCL		0.217					95% Bootstrap t UCL	0.518
67				95% H-UCL (Log ROS)		0.438						
68												
69	DL/2 Statistics											
70		DL/2 Normal					DL/2 Log-Transformed					
71				Mean in Original Scale		0.136					Mean in Log Scale	-2.225
72				SD in Original Scale		0.104					SD in Log Scale	0.744
73				95% t UCL (Assumes normality)		0.236					95% H-Stat UCL	0.594
74	DL/2 is not a recommended method, provided for comparisons and historical reasons											
75												
76	Nonparametric Distribution Free UCL Statistics											
77	Data do not follow a Discernible Distribution at 5% Significance Level											
78												
79	Suggested UCL to Use											
80				95% KM (t) UCL		0.261					95% KM (% Bootstrap) UCL	N/A
81	Warning: One or more Recommended UCL(s) not available!											
82												
83	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
84	Recommendations are based upon data size, data distribution, and skewness.											
85	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
86	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
87												
88												
89	Arsenic											
90												
91	General Statistics											
92				Total Number of Observations		5					Number of Distinct Observations	4
93											Number of Missing Observations	0
94				Minimum		5.3					Mean	5.7
95				Maximum		6.7					Median	5.5
96				SD		0.583					Std. Error of Mean	0.261
97				Coefficient of Variation		0.102					Skewness	1.816
98												
99	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
100	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
101	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
102	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
103												
104	Normal GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L
105					Shapiro Wilk Test Statistic	0.775	**Shapiro Wilk GOF Test**					
106					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
107					Lilliefors Test Statistic	0.3	**Lilliefors GOF Test**					
108					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
109	**Data appear Normal at 5% Significance Level**											
110												
111	**Assuming Normal Distribution**											
112	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
113					95% Student's-t UCL	6.256	95% Adjusted-CLT UCL (Chen-1995)					6.355
114							95% Modified-t UCL (Johnson-1978)					6.291
115												
116	**Gamma GOF Test**											
117					A-D Test Statistic	0.612	**Anderson-Darling Gamma GOF Test**					
118					5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level					
119					K-S Test Statistic	0.288	**Kolmogrov-Smirnoff Gamma GOF Test**					
120					5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level					
121	**Detected data appear Gamma Distributed at 5% Significance Level**											
122												
123	**Gamma Statistics**											
124					k hat (MLE)	127.7	k star (bias corrected MLE)					51.23
125					Theta hat (MLE)	0.0446	Theta star (bias corrected MLE)					0.111
126					nu hat (MLE)	1277	nu star (bias corrected)					512.3
127					MLE Mean (bias corrected)	5.7	MLE Sd (bias corrected)					0.796
128							Approximate Chi Square Value (0.05)					460.8
129					Adjusted Level of Significance	0.0086	Adjusted Chi Square Value					439.2
130												
131	**Assuming Gamma Distribution**											
132					95% Approximate Gamma UCL (use when n>=50))	6.337	95% Adjusted Gamma UCL (use when n<50)					6.649
133												
134	**Lognormal GOF Test**											
135					Shapiro Wilk Test Statistic	0.792	**Shapiro Wilk Lognormal GOF Test**					
136					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
137					Lilliefors Test Statistic	0.284	**Lilliefors Lognormal GOF Test**					
138					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
139	**Data appear Lognormal at 5% Significance Level**											
140												
141	**Lognormal Statistics**											
142					Minimum of Logged Data	1.668	Mean of logged Data					1.737
143					Maximum of Logged Data	1.902	SD of logged Data					0.0974
144												
145	**Assuming Lognormal Distribution**											
146					95% H-UCL	N/A	90% Chebyshev (MVUE) UCL					6.443
147					95% Chebyshev (MVUE) UCL	6.781	97.5% Chebyshev (MVUE) UCL					7.248
148					99% Chebyshev (MVUE) UCL	8.167						
149												
150	**Nonparametric Distribution Free UCL Statistics**											
151	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
152												
153	**Nonparametric Distribution Free UCLs**											
154					95% CLT UCL	6.129	95% Jackknife UCL					6.256
155					95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL					N/A
156					95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL					N/A

	A	B	C	D	E	F	G	H	I	J	K	L
157				95% BCA Bootstrap UCL		N/A						
158				90% Chebyshev(Mean, Sd) UCL		6.482				95% Chebyshev(Mean, Sd) UCL		6.837
159				97.5% Chebyshev(Mean, Sd) UCL		7.328				99% Chebyshev(Mean, Sd) UCL		8.295
160												
161						Suggested UCL to Use						
162				95% Student's-t UCL		6.256						
163												
164				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
165				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
166				and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.								
167				For additional insight the user may want to consult a statistician.								
168												
169												
170	Cobalt											
171												
172						General Statistics						
173				Total Number of Observations		5				Number of Distinct Observations		4
174										Number of Missing Observations		0
175				Minimum		6.6				Mean		9
176				Maximum		11.9				Median		8.9
177				SD		1.889				Std. Error of Mean		0.845
178				Coefficient of Variation		0.21				Skewness		0.651
179												
180				Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use								
181				guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.								
182				For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).								
183				Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0								
184												
185						Normal GOF Test						
186				Shapiro Wilk Test Statistic		0.893				Shapiro Wilk GOF Test		
187				5% Shapiro Wilk Critical Value		0.762				Data appear Normal at 5% Significance Level		
188				Lilliefors Test Statistic		0.321				Lilliefors GOF Test		
189				5% Lilliefors Critical Value		0.396				Data appear Normal at 5% Significance Level		
190						Data appear Normal at 5% Significance Level						
191												
192						Assuming Normal Distribution						
193				95% Normal UCL						95% UCLs (Adjusted for Skewness)		
194				95% Student's-t UCL		10.8				95% Adjusted-CLT UCL (Chen-1995)		10.65
195										95% Modified-t UCL (Johnson-1978)		10.84
196												
197						Gamma GOF Test						
198				A-D Test Statistic		0.449				Anderson-Darling Gamma GOF Test		
199				5% A-D Critical Value		0.679				Detected data appear Gamma Distributed at 5% Significance Level		
200				K-S Test Statistic		0.299				Kolmogrov-Smirnoff Gamma GOF Test		
201				5% K-S Critical Value		0.357				Detected data appear Gamma Distributed at 5% Significance Level		
202						Detected data appear Gamma Distributed at 5% Significance Level						
203												
204						Gamma Statistics						
205				k hat (MLE)		28.87				k star (bias corrected MLE)		11.68
206				Theta hat (MLE)		0.312				Theta star (bias corrected MLE)		0.77
207				nu hat (MLE)		288.7				nu star (bias corrected)		116.8
208				MLE Mean (bias corrected)		9				MLE Sd (bias corrected)		2.633

	A	B	C	D	E	F	G	H	I	J	K	L
209											Approximate Chi Square Value (0.05)	92.87
210					Adjusted Level of Significance	0.0086					Adjusted Chi Square Value	83.54
211												
212					**Assuming Gamma Distribution**							
213				95% Approximate Gamma UCL (use when n>=50))		11.32					95% Adjusted Gamma UCL (use when n<50)	12.59
214												
215					**Lognormal GOF Test**							
216					Shapiro Wilk Test Statistic	0.906			**Shapiro Wilk Lognormal GOF Test**			
217					5% Shapiro Wilk Critical Value	0.762			Data appear Lognormal at 5% Significance Level			
218					Lilliefors Test Statistic	0.288			**Lilliefors Lognormal GOF Test**			
219					5% Lilliefors Critical Value	0.396			Data appear Lognormal at 5% Significance Level			
220					**Data appear Lognormal at 5% Significance Level**							
221												
222					**Lognormal Statistics**							
223					Minimum of Logged Data	1.887					Mean of logged Data	2.18
224					Maximum of Logged Data	2.477					SD of logged Data	0.209
225												
226					**Assuming Lognormal Distribution**							
227					95% H-UCL	11.39					90% Chebyshev (MVUE) UCL	11.51
228					95% Chebyshev (MVUE) UCL	12.65					97.5% Chebyshev (MVUE) UCL	14.24
229					99% Chebyshev (MVUE) UCL	17.34						
230												
231					**Nonparametric Distribution Free UCL Statistics**							
232					**Data appear to follow a Discernible Distribution at 5% Significance Level**							
233												
234					**Nonparametric Distribution Free UCLs**							
235					95% CLT UCL	10.39					95% Jackknife UCL	10.8
236					95% Standard Bootstrap UCL	N/A					95% Bootstrap-t UCL	N/A
237					95% Hall's Bootstrap UCL	N/A					95% Percentile Bootstrap UCL	N/A
238					95% BCA Bootstrap UCL	N/A						
239					90% Chebyshev(Mean, Sd) UCL	11.53					95% Chebyshev(Mean, Sd) UCL	12.68
240					97.5% Chebyshev(Mean, Sd) UCL	14.28					99% Chebyshev(Mean, Sd) UCL	17.41
241												
242					**Suggested UCL to Use**							
243					95% Student's-t UCL	10.8						
244												
245					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
246					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
247					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
248					For additional insight the user may want to consult a statistician.							
249												
250												
251	**Iron**											
252												
253					**General Statistics**							
254					Total Number of Observations	5					Number of Distinct Observations	5
255											Number of Missing Observations	0
256					Minimum	17700					Mean	19720
257					Maximum	21600					Median	19300
258					SD	1610					Std. Error of Mean	720
259					Coefficient of Variation	0.0816					Skewness	0.0404
260												

	A	B	C	D	E	F	G	H	I	J	K	L
261	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
262	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
263	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
264	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
265												
266	Normal GOF Test											
267					Shapiro Wilk Test Statistic	0.941	Shapiro Wilk GOF Test					
268					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
269					Lilliefors Test Statistic	0.204	Lilliefors GOF Test					
270					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
271	Data appear Normal at 5% Significance Level											
272												
273	Assuming Normal Distribution											
274	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
275					95% Student's-t UCL	21255				95% Adjusted-CLT UCL (Chen-1995)		20918
276										95% Modified-t UCL (Johnson-1978)		21257
277												
278	Gamma GOF Test											
279					A-D Test Statistic	0.289	Anderson-Darling Gamma GOF Test					
280					5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level					
281					K-S Test Statistic	0.232	Kolmogrov-Smirnoff Gamma GOF Test					
282					5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level					
283	Detected data appear Gamma Distributed at 5% Significance Level											
284												
285	Gamma Statistics											
286					k hat (MLE)	187.2				k star (bias corrected MLE)		75
287					Theta hat (MLE)	105.4				Theta star (bias corrected MLE)		262.9
288					nu hat (MLE)	1872				nu star (bias corrected)		750
289					MLE Mean (bias corrected)	19720				MLE Sd (bias corrected)		2277
290										Approximate Chi Square Value (0.05)		687.5
291					Adjusted Level of Significance	0.0086				Adjusted Chi Square Value		660.9
292												
293	Assuming Gamma Distribution											
294					95% Approximate Gamma UCL (use when n>=50))	21514				95% Adjusted Gamma UCL (use when n<50)		22380
295												
296	Lognormal GOF Test											
297					Shapiro Wilk Test Statistic	0.943	Shapiro Wilk Lognormal GOF Test					
298					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
299					Lilliefors Test Statistic	0.205	Lilliefors Lognormal GOF Test					
300					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
301	Data appear Lognormal at 5% Significance Level											
302												
303	Lognormal Statistics											
304					Minimum of Logged Data	9.781				Mean of logged Data		9.887
305					Maximum of Logged Data	9.98				SD of logged Data		0.0818
306												
307	Assuming Lognormal Distribution											
308					95% H-UCL	N/A				90% Chebyshev (MVUE) UCL		21884
309					95% Chebyshev (MVUE) UCL	22865				97.5% Chebyshev (MVUE) UCL		24225
310					99% Chebyshev (MVUE) UCL	26898						
311												
312	Nonparametric Distribution Free UCL Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
313	Data appear to follow a Discernible Distribution at 5% Significance Level											
314												
315	Nonparametric Distribution Free UCLs											
316	95% CLT UCL					20904	95% Jackknife UCL					21255
317	95% Standard Bootstrap UCL					20769	95% Bootstrap-t UCL					21959
318	95% Hall's Bootstrap UCL					22540	95% Percentile Bootstrap UCL					20940
319	95% BCA Bootstrap UCL					20680						
320	90% Chebyshev(Mean, Sd) UCL					21880	95% Chebyshev(Mean, Sd) UCL					22858
321	97.5% Chebyshev(Mean, Sd) UCL					24216	99% Chebyshev(Mean, Sd) UCL					26884
322												
323	Suggested UCL to Use											
324	95% Student's-t UCL					21255						
325												
326	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
327	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
328	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
329	For additional insight the user may want to consult a statistician.											
330												
331												
332	Manganese											
333												
334	General Statistics											
335	Total Number of Observations					5	Number of Distinct Observations					5
336							Number of Missing Observations					0
337	Minimum					196	Mean					523.4
338	Maximum					657	Median					595
339	SD					189.6	Std. Error of Mean					84.79
340	Coefficient of Variation					0.362	Skewness					-1.88
341												
342	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
343	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
344	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
345	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
346												
347	Normal GOF Test											
348	Shapiro Wilk Test Statistic					0.772	Shapiro Wilk GOF Test					
349	5% Shapiro Wilk Critical Value					0.762	Data appear Normal at 5% Significance Level					
350	Lilliefors Test Statistic					0.312	Lilliefors GOF Test					
351	5% Lilliefors Critical Value					0.396	Data appear Normal at 5% Significance Level					
352	Data appear Normal at 5% Significance Level											
353												
354	Assuming Normal Distribution											
355	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
356	95% Student's-t UCL					704.2	95% Adjusted-CLT UCL (Chen-1995)					586.7
357							95% Modified-t UCL (Johnson-1978)					692.3
358												
359	Gamma GOF Test											
360	A-D Test Statistic					0.812	Anderson-Darling Gamma GOF Test					
361	5% A-D Critical Value					0.68	Data Not Gamma Distributed at 5% Significance Level					
362	K-S Test Statistic					0.364	Kolmogrov-Smirnoff Gamma GOF Test					
363	5% K-S Critical Value					0.358	Data Not Gamma Distributed at 5% Significance Level					
364	Data Not Gamma Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
365												
366						Gamma Statistics						
367					k hat (MLE)	6.187			k star (bias corrected MLE)			2.608
368					Theta hat (MLE)	84.59			Theta star (bias corrected MLE)			200.7
369					nu hat (MLE)	61.87			nu star (bias corrected)			26.08
370					MLE Mean (bias corrected)	523.4			MLE Sd (bias corrected)			324.1
371									Approximate Chi Square Value (0.05)			15.44
372					Adjusted Level of Significance	0.0086			Adjusted Chi Square Value			12.01
373												
374						Assuming Gamma Distribution						
375				95% Approximate Gamma UCL (use when n>=50))		884			95% Adjusted Gamma UCL (use when n<50)			1136
376												
377						Lognormal GOF Test						
378					Shapiro Wilk Test Statistic	0.695			Shapiro Wilk Lognormal GOF Test			
379					5% Shapiro Wilk Critical Value	0.762			Data Not Lognormal at 5% Significance Level			
380					Lilliefors Test Statistic	0.373			Lilliefors Lognormal GOF Test			
381					5% Lilliefors Critical Value	0.396			Data appear Lognormal at 5% Significance Level			
382						Data appear Approximate Lognormal at 5% Significance Level						
383												
384						Lognormal Statistics						
385					Minimum of Logged Data	5.278			Mean of logged Data			6.177
386					Maximum of Logged Data	6.488			SD of logged Data			0.51
387												
388						Assuming Lognormal Distribution						
389					95% H-UCL	1172			90% Chebyshev (MVUE) UCL			894.9
390					95% Chebyshev (MVUE) UCL	1059			97.5% Chebyshev (MVUE) UCL			1286
391					99% Chebyshev (MVUE) UCL	1732						
392												
393						Nonparametric Distribution Free UCL Statistics						
394						Data appear to follow a Discernible Distribution at 5% Significance Level						
395												
396						Nonparametric Distribution Free UCLs						
397					95% CLT UCL	662.9			95% Jackknife UCL			704.2
398					95% Standard Bootstrap UCL	650.1			95% Bootstrap-t UCL			640.2
399					95% Hall's Bootstrap UCL	597.1			95% Percentile Bootstrap UCL			628.8
400					95% BCA Bootstrap UCL	615.6						
401					90% Chebyshev(Mean, Sd) UCL	777.8			95% Chebyshev(Mean, Sd) UCL			893
402					97.5% Chebyshev(Mean, Sd) UCL	1053			99% Chebyshev(Mean, Sd) UCL			1367
403												
404						Suggested UCL to Use						
405					95% Student's-t UCL	704.2						
406												
407						Recommended UCL exceeds the maximum observation						
408												
409						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
410						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
411						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
412						For additional insight the user may want to consult a statistician.						
413												
414						Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be						
415						reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.						
416												

FORMER FWEC FACILITY - EXPENDED WASTE AREA - ALL SOIL

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:51:19 PM
From File	ProUCL Input Files_f.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (benzo[a]pyrene)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	0.016	Mean	0.121
Maximum	0.33	Median	0.027
SD	0.143	Std. Error of Mean	0.0639
Coefficient of Variation	1.185	Skewness	0.988

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.793	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.344	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.257	95% Adjusted-CLT UCL (Chen-1995)	0.256
		95% Modified-t UCL (Johnson-1978)	0.262

Gamma GOF Test

A-D Test Statistic	0.591	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.347	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.366	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.792	k star (bias corrected MLE)	0.45
Theta hat (MLE)	0.152	Theta star (bias corrected MLE)	0.268
nu hat (MLE)	7.919	nu star (bias corrected)	4.501
MLE Mean (bias corrected)	0.121	MLE Sd (bias corrected)	0.18
		Approximate Chi Square Value (0.05)	0.929
Adjusted Level of Significance	0.0086	Adjusted Chi Square Value	0.407

	A	B	C	D	E	F	G	H	I	J	K	L
53												
54						Assuming Gamma Distribution						
55					95% Approximate Gamma UCL (use when n>=50))	0.584				95% Adjusted Gamma UCL (use when n<50)		1.332
56												
57						Lognormal GOF Test						
58					Shapiro Wilk Test Statistic	0.826				Shapiro Wilk Lognormal GOF Test		
59					5% Shapiro Wilk Critical Value	0.762				Data appear Lognormal at 5% Significance Level		
60					Lilliefors Test Statistic	0.301				Lilliefors Lognormal GOF Test		
61					5% Lilliefors Critical Value	0.396				Data appear Lognormal at 5% Significance Level		
62						Data appear Lognormal at 5% Significance Level						
63												
64						Lognormal Statistics						
65					Minimum of Logged Data	-4.135				Mean of logged Data		-2.866
66					Maximum of Logged Data	-1.109				SD of logged Data		1.419
67												
68						Assuming Lognormal Distribution						
69					95% H-UCL	18.79				90% Chebyshev (MVUE) UCL		0.32
70					95% Chebyshev (MVUE) UCL	0.412				97.5% Chebyshev (MVUE) UCL		0.539
71					99% Chebyshev (MVUE) UCL	0.79						
72												
73						Nonparametric Distribution Free UCL Statistics						
74						Data appear to follow a Discernible Distribution at 5% Significance Level						
75												
76						Nonparametric Distribution Free UCLs						
77					95% CLT UCL	0.226				95% Jackknife UCL		0.257
78					95% Standard Bootstrap UCL	0.215				95% Bootstrap-t UCL		3.027
79					95% Hall's Bootstrap UCL	1.777				95% Percentile Bootstrap UCL		0.219
80					95% BCA Bootstrap UCL	0.243						
81					90% Chebyshev(Mean, Sd) UCL	0.312				95% Chebyshev(Mean, Sd) UCL		0.399
82					97.5% Chebyshev(Mean, Sd) UCL	0.52				99% Chebyshev(Mean, Sd) UCL		0.756
83												
84						Suggested UCL to Use						
85					95% Student's-t UCL	0.257						
86												
87						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
88						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
89						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
90						For additional insight the user may want to consult a statistician.						
91												
92	Value (benzo[a]anthracene)											
93												
94						General Statistics						
95					Total Number of Observations	5				Number of Distinct Observations		4
96					Number of Detects	3				Number of Non-Detects		2
97					Number of Distinct Detects	3				Number of Distinct Non-Detects		1
98					Minimum Detect	0.032				Minimum Non-Detect		0.0068
99					Maximum Detect	0.34				Maximum Non-Detect		0.0068
100					Variance Detects	0.0241				Percent Non-Detects		40%
101					Mean Detects	0.197				SD Detects		0.155
102					Median Detects	0.22				CV Detects		0.787
103					Skewness Detects	-0.643				Kurtosis Detects		N/A
104					Mean of Logged Detects	-2.012				SD of Logged Detects		1.258

	A	B	C	D	E	F	G	H	I	J	K	L
105												
106	Warning: Data set has only 3 Detected Values.											
107	This is not enough to compute meaningful or reliable statistics and estimates.											
108												
109												
110	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
111	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
112	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
113	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
114												
115	Normal GOF Test on Detects Only											
116					Shapiro Wilk Test Statistic	0.984	Shapiro Wilk GOF Test					
117					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level					
118					Lilliefors Test Statistic	0.225	Lilliefors GOF Test					
119					5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level					
120	Detected Data appear Normal at 5% Significance Level											
121												
122	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
123					Mean	0.121			Standard Error of Mean			0.0742
124					SD	0.135			95% KM (BCA) UCL			N/A
125					95% KM (t) UCL	0.279			95% KM (Percentile Bootstrap) UCL			N/A
126					95% KM (z) UCL	0.243			95% KM Bootstrap t UCL			N/A
127					90% KM Chebyshev UCL	0.344			95% KM Chebyshev UCL			0.445
128					97.5% KM Chebyshev UCL	0.585			99% KM Chebyshev UCL			0.859
129												
130	Gamma GOF Tests on Detected Observations Only											
131	Not Enough Data to Perform GOF Test											
132												
133	Gamma Statistics on Detected Data Only											
134					k hat (MLE)	1.43			k star (bias corrected MLE)			N/A
135					Theta hat (MLE)	0.138			Theta star (bias corrected MLE)			N/A
136					nu hat (MLE)	8.579			nu star (bias corrected)			N/A
137					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A
138												
139	Gamma Kaplan-Meier (KM) Statistics											
140					k hat (KM)	0.799			nu hat (KM)			7.993
141									Adjusted Level of Significance (β)			0.0086
142					Approximate Chi Square Value (7.99, α)	2.731			Adjusted Chi Square Value (7.99, β)			1.578
143					95% Gamma Approximate KM-UCL (use when n>=50)	0.354			95% Gamma Adjusted KM-UCL (use when n<50)			0.613
144												
145	Lognormal GOF Test on Detected Observations Only											
146					Shapiro Wilk Test Statistic	0.883	Shapiro Wilk GOF Test					
147					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level					
148					Lilliefors Test Statistic	0.32	Lilliefors GOF Test					
149					5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level					
150	Detected Data appear Lognormal at 5% Significance Level											
151												
152	Lognormal ROS Statistics Using Imputed Non-Detects											
153					Mean in Original Scale	0.12			Mean in Log Scale			-3.449
154					SD in Original Scale	0.152			SD in Log Scale			2.202
155					95% t UCL (assumes normality of ROS data)	0.265			95% Percentile Bootstrap UCL			0.224
156					95% BCA Bootstrap UCL	0.248			95% Bootstrap t UCL			1.193

	A	B	C	D	E	F	G	H	I	J	K	L
157					95% H-UCL (Log ROS)	30604						
158												
159					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
160					KM Mean (logged)	-3.203					95% H-UCL (KM -Log)	110.4
161					KM SD (logged)	1.662					95% Critical H Value (KM-Log)	7.852
162					KM Standard Error of Mean (logged)	0.91						
163												
164					DL/2 Statistics							
165					DL/2 Normal					DL/2 Log-Transformed		
166					Mean in Original Scale	0.12					Mean in Log Scale	-3.481
167					SD in Original Scale	0.153					SD in Log Scale	2.199
168					95% t UCL (Assumes normality)	0.265					95% H-Stat UCL	28533
169					DL/2 is not a recommended method, provided for comparisons and historical reasons							
170												
171					Nonparametric Distribution Free UCL Statistics							
172					Detected Data appear Normal Distributed at 5% Significance Level							
173												
174					Suggested UCL to Use							
175					95% KM (t) UCL	0.279					95% KM (Percentile Bootstrap) UCL	N/A
176					Warning: One or more Recommended UCL(s) not available!							
177												
178					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
179					Recommendations are based upon data size, data distribution, and skewness.							
180					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
181					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
182												
183												
184	Value (benzo[b]fluoranthene)											
185												
186					General Statistics							
187					Total Number of Observations	5					Number of Distinct Observations	5
188											Number of Missing Observations	0
189					Minimum	0.031					Mean	0.195
190					Maximum	0.48					Median	0.046
191					SD	0.217					Std. Error of Mean	0.0972
192					Coefficient of Variation	1.113					Skewness	0.725
193												
194					Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use							
195					guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.							
196					For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).							
197					Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0							
198												
199					Normal GOF Test							
200					Shapiro Wilk Test Statistic	0.767					Shapiro Wilk GOF Test	
201					5% Shapiro Wilk Critical Value	0.762					Data appear Normal at 5% Significance Level	
202					Lilliefors Test Statistic	0.354					Lilliefors GOF Test	
203					5% Lilliefors Critical Value	0.396					Data appear Normal at 5% Significance Level	
204					Data appear Normal at 5% Significance Level							
205												
206					Assuming Normal Distribution							
207					95% Normal UCL						95% UCLs (Adjusted for Skewness)	
208					95% Student's-t UCL	0.402					95% Adjusted-CLT UCL (Chen-1995)	0.389

	A	B	C	D	E	F	G	H	I	J	K	L
209										95% Modified-t UCL (Johnson-1978)		0.408
210												
211						Gamma GOF Test						
212					A-D Test Statistic	0.687	Anderson-Darling Gamma GOF Test					
213					5% A-D Critical Value	0.695	Detected data appear Gamma Distributed at 5% Significance Level					
214					K-S Test Statistic	0.362	Kolmogrov-Smirnoff Gamma GOF Test					
215					5% K-S Critical Value	0.365	Detected data appear Gamma Distributed at 5% Significance Level					
216					Detected data appear Gamma Distributed at 5% Significance Level							
217												
218						Gamma Statistics						
219					k hat (MLE)	0.88			k star (bias corrected MLE)			0.485
220					Theta hat (MLE)	0.222			Theta star (bias corrected MLE)			0.402
221					nu hat (MLE)	8.802			nu star (bias corrected)			4.854
222					MLE Mean (bias corrected)	0.195			MLE Sd (bias corrected)			0.28
223									Approximate Chi Square Value (0.05)			1.085
224					Adjusted Level of Significance	0.0086			Adjusted Chi Square Value			0.496
225												
226						Assuming Gamma Distribution						
227					95% Approximate Gamma UCL (use when n>=50))	0.873			95% Adjusted Gamma UCL (use when n<50)			1.911
228												
229						Lognormal GOF Test						
230					Shapiro Wilk Test Statistic	0.791	Shapiro Wilk Lognormal GOF Test					
231					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
232					Lilliefors Test Statistic	0.321	Lilliefors Lognormal GOF Test					
233					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
234					Data appear Lognormal at 5% Significance Level							
235												
236						Lognormal Statistics						
237					Minimum of Logged Data	-3.474			Mean of logged Data			-2.3
238					Maximum of Logged Data	-0.734			SD of logged Data			1.333
239												
240						Assuming Lognormal Distribution						
241					95% H-UCL	16.98			90% Chebyshev (MVUE) UCL			0.505
242					95% Chebyshev (MVUE) UCL	0.647			97.5% Chebyshev (MVUE) UCL			0.845
243					99% Chebyshev (MVUE) UCL	1.233						
244												
245						Nonparametric Distribution Free UCL Statistics						
246						Data appear to follow a Discernible Distribution at 5% Significance Level						
247												
248						Nonparametric Distribution Free UCLs						
249					95% CLT UCL	0.355			95% Jackknife UCL			0.402
250					95% Standard Bootstrap UCL	0.339			95% Bootstrap-t UCL			5.32
251					95% Hall's Bootstrap UCL	5.676			95% Percentile Bootstrap UCL			0.352
252					95% BCA Bootstrap UCL	0.353						
253					90% Chebyshev(Mean, Sd) UCL	0.487			95% Chebyshev(Mean, Sd) UCL			0.619
254					97.5% Chebyshev(Mean, Sd) UCL	0.802			99% Chebyshev(Mean, Sd) UCL			1.162
255												
256						Suggested UCL to Use						
257					95% Student's-t UCL	0.402						
258												
259	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
260	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											

	A	B	C	D	E	F	G	H	I	J	K	L
261	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
262	For additional insight the user may want to consult a statistician.											
263												
264												
265	Value (cobalt)											
266												
267	General Statistics											
268					Total Number of Observations	5			Number of Distinct Observations			5
269									Number of Missing Observations			0
270					Minimum	13.8			Mean			23.78
271					Maximum	37.3			Median			20.5
272					SD	10.73			Std. Error of Mean			4.799
273					Coefficient of Variation	0.451			Skewness			0.464
274												
275	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
276	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
277	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
278	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
279												
280	Normal GOF Test											
281					Shapiro Wilk Test Statistic	0.871			Shapiro Wilk GOF Test			
282					5% Shapiro Wilk Critical Value	0.762			Data appear Normal at 5% Significance Level			
283					Lilliefors Test Statistic	0.22			Lilliefors GOF Test			
284					5% Lilliefors Critical Value	0.396			Data appear Normal at 5% Significance Level			
285	Data appear Normal at 5% Significance Level											
286												
287	Assuming Normal Distribution											
288			95% Normal UCL						95% UCLs (Adjusted for Skewness)			
289					95% Student's-t UCL	34.01			95% Adjusted-CLT UCL (Chen-1995)			32.74
290									95% Modified-t UCL (Johnson-1978)			34.18
291												
292	Gamma GOF Test											
293					A-D Test Statistic	0.41			Anderson-Darling Gamma GOF Test			
294					5% A-D Critical Value	0.68			Detected data appear Gamma Distributed at 5% Significance Level			
295					K-S Test Statistic	0.241			Kolmogrov-Smirnoff Gamma GOF Test			
296					5% K-S Critical Value	0.358			Detected data appear Gamma Distributed at 5% Significance Level			
297	Detected data appear Gamma Distributed at 5% Significance Level											
298												
299	Gamma Statistics											
300					k hat (MLE)	6.178			k star (bias corrected MLE)			2.604
301					Theta hat (MLE)	3.849			Theta star (bias corrected MLE)			9.13
302					nu hat (MLE)	61.78			nu star (bias corrected)			26.04
303					MLE Mean (bias corrected)	23.78			MLE Sd (bias corrected)			14.74
304									Approximate Chi Square Value (0.05)			15.41
305					Adjusted Level of Significance	0.0086			Adjusted Chi Square Value			11.99
306												
307	Assuming Gamma Distribution											
308					95% Approximate Gamma UCL (use when n>=50))	40.18			95% Adjusted Gamma UCL (use when n<50)			51.66
309												
310	Lognormal GOF Test											
311					Shapiro Wilk Test Statistic	0.882			Shapiro Wilk Lognormal GOF Test			
312					5% Shapiro Wilk Critical Value	0.762			Data appear Lognormal at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
313					Lilliefors Test Statistic	0.216	**Lilliefors Lognormal GOF Test**					
314					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
315	**Data appear Lognormal at 5% Significance Level**											
316												
317	**Lognormal Statistics**											
318					Minimum of Logged Data	2.625				Mean of logged Data		3.086
319					Maximum of Logged Data	3.619				SD of logged Data		0.457
320												
321	**Assuming Lognormal Distribution**											
322					95% H-UCL	46.18				90% Chebyshev (MVUE) UCL		38.21
323					95% Chebyshev (MVUE) UCL	44.76				97.5% Chebyshev (MVUE) UCL		53.84
324					99% Chebyshev (MVUE) UCL	71.69						
325												
326	**Nonparametric Distribution Free UCL Statistics**											
327	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
328												
329	**Nonparametric Distribution Free UCLs**											
330					95% CLT UCL	31.67				95% Jackknife UCL		34.01
331					95% Standard Bootstrap UCL	30.9				95% Bootstrap-t UCL		45.4
332					95% Hall's Bootstrap UCL	42.69				95% Percentile Bootstrap UCL		30.94
333					95% BCA Bootstrap UCL	31.7						
334					90% Chebyshev(Mean, Sd) UCL	38.18				95% Chebyshev(Mean, Sd) UCL		44.7
335					97.5% Chebyshev(Mean, Sd) UCL	53.75				99% Chebyshev(Mean, Sd) UCL		71.53
336												
337	**Suggested UCL to Use**											
338					95% Student's-t UCL	34.01						
339												
340	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
341	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
342	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
343	For additional insight the user may want to consult a statistician.											
344												
345												
346	**Value (copper)**											
347												
348	**General Statistics**											
349					Total Number of Observations	5				Number of Distinct Observations		5
350										Number of Missing Observations		0
351					Minimum	47.8				Mean		197.6
352					Maximum	358				Median		135
353					SD	136				Std. Error of Mean		60.84
354					Coefficient of Variation	0.689				Skewness		0.358
355												
356	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
357	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
358	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
359	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
360												
361	**Normal GOF Test**											
362					Shapiro Wilk Test Statistic	0.879	**Shapiro Wilk GOF Test**					
363					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
364					Lilliefors Test Statistic	0.277	**Lilliefors GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
365					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
366	**Data appear Normal at 5% Significance Level**											
367												
368	**Assuming Normal Distribution**											
369	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
370					95% Student's-t UCL	327.3	95% Adjusted-CLT UCL (Chen-1995)					308
371							95% Modified-t UCL (Johnson-1978)					328.9
372												
373	**Gamma GOF Test**											
374					A-D Test Statistic	0.35	**Anderson-Darling Gamma GOF Test**					
375					5% A-D Critical Value	0.684	Detected data appear Gamma Distributed at 5% Significance Level					
376					K-S Test Statistic	0.248	**Kolmogrov-Smirnoff Gamma GOF Test**					
377					5% K-S Critical Value	0.36	Detected data appear Gamma Distributed at 5% Significance Level					
378	**Detected data appear Gamma Distributed at 5% Significance Level**											
379												
380	**Gamma Statistics**											
381					k hat (MLE)	2.254	k star (bias corrected MLE)					1.035
382					Theta hat (MLE)	87.64	Theta star (bias corrected MLE)					190.9
383					nu hat (MLE)	22.54	nu star (bias corrected)					10.35
384					MLE Mean (bias corrected)	197.6	MLE Sd (bias corrected)					194.2
385							Approximate Chi Square Value (0.05)					4.162
386					Adjusted Level of Significance	0.0086	Adjusted Chi Square Value					2.634
387												
388	**Assuming Gamma Distribution**											
389					95% Approximate Gamma UCL (use when n>=50))	491.3	95% Adjusted Gamma UCL (use when n<50)					776.3
390												
391	**Lognormal GOF Test**											
392					Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk Lognormal GOF Test**					
393					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
394					Lilliefors Test Statistic	0.214	**Lilliefors Lognormal GOF Test**					
395					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
396	**Data appear Lognormal at 5% Significance Level**											
397												
398	**Lognormal Statistics**											
399					Minimum of Logged Data	3.867	Mean of logged Data					5.048
400					Maximum of Logged Data	5.881	SD of logged Data					0.823
401												
402	**Assuming Lognormal Distribution**											
403					95% H-UCL	1208	90% Chebyshev (MVUE) UCL					418.9
404					95% Chebyshev (MVUE) UCL	517.1	97.5% Chebyshev (MVUE) UCL					653.5
405					99% Chebyshev (MVUE) UCL	921.5						
406												
407	**Nonparametric Distribution Free UCL Statistics**											
408	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
409												
410	**Nonparametric Distribution Free UCLs**											
411					95% CLT UCL	297.6	95% Jackknife UCL					327.3
412					95% Standard Bootstrap UCL	286.1	95% Bootstrap-t UCL					519.7
413					95% Hall's Bootstrap UCL	1983	95% Percentile Bootstrap UCL					297.6
414					95% BCA Bootstrap UCL	293.6						
415					90% Chebyshev(Mean, Sd) UCL	380.1	95% Chebyshev(Mean, Sd) UCL					462.8
416					97.5% Chebyshev(Mean, Sd) UCL	577.5	99% Chebyshev(Mean, Sd) UCL					802.9

	A	B	C	D	E	F	G	H	I	J	K	L
417												
418						Suggested UCL to Use						
419					95% Student's-t UCL	327.3						
420												
421					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
422					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
423					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
424					For additional insight the user may want to consult a statistician.							
425												
426	Value (dibenz(a,h)anthracene)											
427												
428						General Statistics						
429					Total Number of Observations	5			Number of Distinct Observations			4
430					Number of Detects	2			Number of Non-Detects			3
431					Number of Distinct Detects	2			Number of Distinct Non-Detects			2
432					Minimum Detect	0.034			Minimum Non-Detect			0.0044
433					Maximum Detect	0.054			Maximum Non-Detect			0.0047
434					Variance Detects	2.0000E-4			Percent Non-Detects			60%
435					Mean Detects	0.044			SD Detects			0.0141
436					Median Detects	0.044			CV Detects			0.321
437					Skewness Detects	N/A			Kurtosis Detects			N/A
438					Mean of Logged Detects	-3.15			SD of Logged Detects			0.327
439												
440						Warning: Data set has only 2 Detected Values.						
441						This is not enough to compute meaningful or reliable statistics and estimates.						
442												
443												
444						Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use						
445						guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.						
446						For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).						
447						Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0						
448												
449						Normal GOF Test on Detects Only						
450						Not Enough Data to Perform GOF Test						
451												
452						Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
453					Mean	0.0202			Standard Error of Mean			0.0129
454					SD	0.0204			95% KM (BCA) UCL			N/A
455					95% KM (t) UCL	0.0478			95% KM (Percentile Bootstrap) UCL			N/A
456					95% KM (z) UCL	0.0415			95% KM Bootstrap t UCL			N/A
457					90% KM Chebyshev UCL	0.059			95% KM Chebyshev UCL			0.0765
458					97.5% KM Chebyshev UCL	0.101			99% KM Chebyshev UCL			0.149
459												
460						Gamma GOF Tests on Detected Observations Only						
461						Not Enough Data to Perform GOF Test						
462												
463						Gamma Statistics on Detected Data Only						
464					k hat (MLE)	19.02			k star (bias corrected MLE)			N/A
465					Theta hat (MLE)	0.00231			Theta star (bias corrected MLE)			N/A
466					nu hat (MLE)	76.08			nu star (bias corrected)			N/A
467					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A
468												

	A	B	C	D	E	F	G	H	I	J	K	L
469	Gamma Kaplan-Meier (KM) Statistics											
470					k hat (KM)	0.984					nu hat (KM)	9.839
471											Adjusted Level of Significance (β)	0.0086
472					Approximate Chi Square Value (9.84, α)	3.841					Adjusted Chi Square Value (9.84, β)	2.392
473					95% Gamma Approximate KM-UCL (use when n>=50)	0.0518					95% Gamma Adjusted KM-UCL (use when n<50)	0.0833
474												
475	Lognormal GOF Test on Detected Observations Only											
476	Not Enough Data to Perform GOF Test											
477												
478	Lognormal ROS Statistics Using Imputed Non-Detects											
479					Mean in Original Scale	0.0245					Mean in Log Scale	-3.95
480					SD in Original Scale	0.0192					SD in Log Scale	0.774
481					95% t UCL (assumes normality of ROS data)	0.0429					95% Percentile Bootstrap UCL	0.0375
482					95% BCA Bootstrap UCL	0.0383					95% Bootstrap t UCL	0.113
483					95% H-UCL (Log ROS)	0.12						
484												
485	DL/2 Statistics											
486		DL/2 Normal						DL/2 Log-Transformed				
487					Mean in Original Scale	0.019					Mean in Log Scale	-4.918
488					SD in Original Scale	0.0239					SD in Log Scale	1.623
489					95% t UCL (Assumes normality)	0.0418					95% H-Stat UCL	13.8
490	DL/2 is not a recommended method, provided for comparisons and historical reasons											
491												
492	Nonparametric Distribution Free UCL Statistics											
493	Data do not follow a Discernible Distribution at 5% Significance Level											
494												
495	Suggested UCL to Use											
496					95% KM (t) UCL	0.0478					95% KM (% Bootstrap) UCL	N/A
497	Warning: One or more Recommended UCL(s) not available!											
498												
499	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
500	Recommendations are based upon data size, data distribution, and skewness.											
501	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
502	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
503												
504	Value (indeno[1,2,3-cd]pyrene)											
505												
506	General Statistics											
507					Total Number of Observations	5					Number of Distinct Observations	5
508					Number of Detects	4					Number of Non-Detects	1
509					Number of Distinct Detects	4					Number of Distinct Non-Detects	1
510					Minimum Detect	0.012					Minimum Non-Detect	0.0059
511					Maximum Detect	0.22					Maximum Non-Detect	0.0059
512					Variance Detects	0.0108					Percent Non-Detects	20%
513					Mean Detects	0.107					SD Detects	0.104
514					Median Detects	0.098					CV Detects	0.97
515					Skewness Detects	0.181					Kurtosis Detects	-4.792
516					Mean of Logged Detects	-2.84					SD of Logged Detects	1.421
517												
518	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
519	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
520	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											

	A	B	C	D	E	F	G	H	I	J	K	L
521	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
522												
523	Normal GOF Test on Detects Only											
524					Shapiro Wilk Test Statistic	0.864	Shapiro Wilk GOF Test					
525					5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level					
526					Lilliefors Test Statistic	0.282	Lilliefors GOF Test					
527					5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level					
528	Detected Data appear Normal at 5% Significance Level											
529												
530	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
531					Mean	0.0868	Standard Error of Mean					0.0465
532					SD	0.09	95% KM (BCA) UCL					N/A
533					95% KM (t) UCL	0.186	95% KM (Percentile Bootstrap) UCL					N/A
534					95% KM (z) UCL	0.163	95% KM Bootstrap t UCL					N/A
535					90% KM Chebyshev UCL	0.226	95% KM Chebyshev UCL					0.289
536					97.5% KM Chebyshev UCL	0.377	99% KM Chebyshev UCL					0.549
537												
538	Gamma GOF Tests on Detected Observations Only											
539					A-D Test Statistic	0.421	Anderson-Darling GOF Test					
540					5% A-D Critical Value	0.667	Detected data appear Gamma Distributed at 5% Significance Level					
541					K-S Test Statistic	0.295	Kolmogrov-Smirnoff GOF					
542					5% K-S Critical Value	0.403	Detected data appear Gamma Distributed at 5% Significance Level					
543	Detected data appear Gamma Distributed at 5% Significance Level											
544												
545	Gamma Statistics on Detected Data Only											
546					k hat (MLE)	0.959	k star (bias corrected MLE)					0.406
547					Theta hat (MLE)	0.112	Theta star (bias corrected MLE)					0.263
548					nu hat (MLE)	7.674	nu star (bias corrected)					3.252
549					MLE Mean (bias corrected)	0.107	MLE Sd (bias corrected)					0.168
550												
551	Gamma Kaplan-Meier (KM) Statistics											
552					k hat (KM)	0.93	nu hat (KM)					9.297
553					Approximate Chi Square Value (9.30, α)	3.507	Adjusted Chi Square Value (9.30, β)					2.142
554					95% Gamma Approximate KM-UCL (use when n>=50)	0.23	95% Gamma Adjusted KM-UCL (use when n<50)					0.377
555												
556	Gamma ROS Statistics using Imputed Non-Detects											
557	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
558	GROS may not be used when kstar of detected data is small such as < 0.1											
559	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
560	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
561					Minimum	0.01	Mean					0.0876
562					Maximum	0.22	Median					0.026
563					SD	0.0998	CV					1.139
564					k hat (MLE)	0.785	k star (bias corrected MLE)					0.447
565					Theta hat (MLE)	0.112	Theta star (bias corrected MLE)					0.196
566					nu hat (MLE)	7.851	nu star (bias corrected)					4.474
567					MLE Mean (bias corrected)	0.0876	MLE Sd (bias corrected)					0.131
568							Adjusted Level of Significance (β)					0.0086
569					Approximate Chi Square Value (4.47, α)	0.917	Adjusted Chi Square Value (4.47, β)					0.401
570					95% Gamma Approximate UCL (use when n>=50)	0.427	95% Gamma Adjusted UCL (use when n<50)					N/A
571												
572	Lognormal GOF Test on Detected Observations Only											

	A	B	C	D	E	F	G	H	I	J	K	L
573					Shapiro Wilk Test Statistic	0.883	Shapiro Wilk GOF Test					
574					5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level					
575					Lilliefors Test Statistic	0.274	Lilliefors GOF Test					
576					5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level					
577	Detected Data appear Lognormal at 5% Significance Level											
578												
579	Lognormal ROS Statistics Using Imputed Non-Detects											
580					Mean in Original Scale	0.0859				Mean in Log Scale		-3.572
581					SD in Original Scale	0.102				SD in Log Scale		2.048
582					95% t UCL (assumes normality of ROS data)	0.183				95% Percentile Bootstrap UCL		0.151
583					95% BCA Bootstrap UCL	0.158				95% Bootstrap t UCL		0.7
584					95% H-UCL (Log ROS)	4266						
585												
586	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
587					KM Mean (logged)	-3.298				95% H-UCL (KM -Log)		13.64
588					KM SD (logged)	1.433				95% Critical H Value (KM-Log)		6.818
589					KM Standard Error of Mean (logged)	0.74						
590												
591	DL/2 Statistics											
592		DL/2 Normal					DL/2 Log-Transformed					
593					Mean in Original Scale	0.0862				Mean in Log Scale		-3.437
594					SD in Original Scale	0.101				SD in Log Scale		1.816
595					95% t UCL (Assumes normality)	0.183				95% H-Stat UCL		394.2
596	DL/2 is not a recommended method, provided for comparisons and historical reasons											
597												
598	Nonparametric Distribution Free UCL Statistics											
599	Detected Data appear Normal Distributed at 5% Significance Level											
600												
601	Suggested UCL to Use											
602					95% KM (t) UCL	0.186				95% KM (Percentile Bootstrap) UCL		N/A
603	Warning: One or more Recommended UCL(s) not available!											
604												
605	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
606	Recommendations are based upon data size, data distribution, and skewness.											
607	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
608	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
609												
610												
611	Value (nickel)											
612												
613	General Statistics											
614					Total Number of Observations	5				Number of Distinct Observations		5
615										Number of Missing Observations		0
616					Minimum	26.5				Mean		115.8
617					Maximum	219				Median		85.2
618					SD	78.55				Std. Error of Mean		35.13
619					Coefficient of Variation	0.678				Skewness		0.417
620												
621	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
622	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
623	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
624	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											

	A	B	C	D	E	F	G	H	I	J	K	L
625												
626						Normal GOF Test						
627					Shapiro Wilk Test Statistic	0.936		Shapiro Wilk GOF Test				
628					5% Shapiro Wilk Critical Value	0.762		Data appear Normal at 5% Significance Level				
629					Lilliefors Test Statistic	0.251		Lilliefors GOF Test				
630					5% Lilliefors Critical Value	0.396		Data appear Normal at 5% Significance Level				
631						Data appear Normal at 5% Significance Level						
632												
633						Assuming Normal Distribution						
634					95% Normal UCL			95% UCLs (Adjusted for Skewness)				
635					95% Student's-t UCL	190.7		95% Adjusted-CLT UCL (Chen-1995)				180.6
636								95% Modified-t UCL (Johnson-1978)				191.8
637												
638						Gamma GOF Test						
639					A-D Test Statistic	0.259		Anderson-Darling Gamma GOF Test				
640					5% A-D Critical Value	0.684		Detected data appear Gamma Distributed at 5% Significance Level				
641					K-S Test Statistic	0.209		Kolmogrov-Smirnoff Gamma GOF Test				
642					5% K-S Critical Value	0.36		Detected data appear Gamma Distributed at 5% Significance Level				
643						Detected data appear Gamma Distributed at 5% Significance Level						
644												
645						Gamma Statistics						
646					k hat (MLE)	2.269		k star (bias corrected MLE)				1.041
647					Theta hat (MLE)	51.03		Theta star (bias corrected MLE)				111.2
648					nu hat (MLE)	22.69		nu star (bias corrected)				10.41
649					MLE Mean (bias corrected)	115.8		MLE Sd (bias corrected)				113.5
650								Approximate Chi Square Value (0.05)				4.199
651					Adjusted Level of Significance	0.0086		Adjusted Chi Square Value				2.662
652												
653						Assuming Gamma Distribution						
654					95% Approximate Gamma UCL (use when n>=50))	287		95% Adjusted Gamma UCL (use when n<50)				452.7
655												
656						Lognormal GOF Test						
657					Shapiro Wilk Test Statistic	0.939		Shapiro Wilk Lognormal GOF Test				
658					5% Shapiro Wilk Critical Value	0.762		Data appear Lognormal at 5% Significance Level				
659					Lilliefors Test Statistic	0.201		Lilliefors Lognormal GOF Test				
660					5% Lilliefors Critical Value	0.396		Data appear Lognormal at 5% Significance Level				
661						Data appear Lognormal at 5% Significance Level						
662												
663						Lognormal Statistics						
664					Minimum of Logged Data	3.277		Mean of logged Data				4.515
665					Maximum of Logged Data	5.389		SD of logged Data				0.831
666												
667						Assuming Lognormal Distribution						
668					95% H-UCL	734.6		90% Chebyshev (MVUE) UCL				248.1
669					95% Chebyshev (MVUE) UCL	306.6		97.5% Chebyshev (MVUE) UCL				387.7
670					99% Chebyshev (MVUE) UCL	547.1						
671												
672						Nonparametric Distribution Free UCL Statistics						
673						Data appear to follow a Discernible Distribution at 5% Significance Level						
674												
675						Nonparametric Distribution Free UCLs						
676					95% CLT UCL	173.6		95% Jackknife UCL				190.7

	A	B	C	D	E	F	G	H	I	J	K	L
677					95% Standard Bootstrap UCL	168.3					95% Bootstrap-t UCL	266.1
678					95% Hall's Bootstrap UCL	892.2					95% Percentile Bootstrap UCL	171.5
679					95% BCA Bootstrap UCL	171.5						
680					90% Chebyshev(Mean, Sd) UCL	221.2					95% Chebyshev(Mean, Sd) UCL	268.9
681					97.5% Chebyshev(Mean, Sd) UCL	335.2					99% Chebyshev(Mean, Sd) UCL	465.3
682												
683						**Suggested UCL to Use**						
684					95% Student's-t UCL	190.7						
685												
686	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
687	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
688	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
689	For additional insight the user may want to consult a statistician.											
690												

	A	B	C	D	E	F	G	H	I	J	K	L
1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3			User Selected Options									
4			Date/Time of Computation		6/6/2016 10:19:35 AM							
5			From File		ExWaste Input.xls							
6			Full Precision		OFF							
7			Confidence Coefficient		95%							
8			Number of Bootstrap Operations		2000							
9												
10												
11	**Arsenic**											
12												
13	**General Statistics**											
14			Total Number of Observations			5		Number of Distinct Observations				4
15								Number of Missing Observations				0
16			Minimum			4.4		Mean				6.58
17			Maximum			8.6		Median				5.7
18			SD			1.914		Std. Error of Mean				0.856
19			Coefficient of Variation			0.291		Skewness				0.268
20												
21	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
22	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
23	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
24	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
25												
26	**Normal GOF Test**											
27			Shapiro Wilk Test Statistic			0.844		**Shapiro Wilk GOF Test**				
28			5% Shapiro Wilk Critical Value			0.762		Data appear Normal at 5% Significance Level				
29			Lilliefors Test Statistic			0.277		**Lilliefors GOF Test**				
30			5% Lilliefors Critical Value			0.396		Data appear Normal at 5% Significance Level				
31	**Data appear Normal at 5% Significance Level**											
32												
33	**Assuming Normal Distribution**											
34			**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**				
35			95% Student's-t UCL			8.404		95% Adjusted-CLT UCL (Chen-1995)				8.097
36								95% Modified-t UCL (Johnson-1978)				8.422
37												
38	**Gamma GOF Test**											
39			A-D Test Statistic			0.485		**Anderson-Darling Gamma GOF Test**				
40			5% A-D Critical Value			0.679		Detected data appear Gamma Distributed at 5% Significance Level				
41			K-S Test Statistic			0.277		**Kolmogrov-Smirnoff Gamma GOF Test**				
42			5% K-S Critical Value			0.357		Detected data appear Gamma Distributed at 5% Significance Level				
43	**Detected data appear Gamma Distributed at 5% Significance Level**											
44												
45	**Gamma Statistics**											
46			k hat (MLE)			14.72		k star (bias corrected MLE)				6.02
47			Theta hat (MLE)			0.447		Theta star (bias corrected MLE)				1.093
48			nu hat (MLE)			147.2		nu star (bias corrected)				60.2
49			MLE Mean (bias corrected)			6.58		MLE Sd (bias corrected)				2.682
50								Approximate Chi Square Value (0.05)				43.35
51			Adjusted Level of Significance			0.0086		Adjusted Chi Square Value				37.19
52												

	A	B	C	D	E	F	G	H	I	J	K	L
53	**Assuming Gamma Distribution**											
54	95% Approximate Gamma UCL (use when n>=50))					9.136	95% Adjusted Gamma UCL (use when n<50)					10.65
55												
56	**Lognormal GOF Test**											
57	Shapiro Wilk Test Statistic					0.871	**Shapiro Wilk Lognormal GOF Test**					
58	5% Shapiro Wilk Critical Value					0.762	Data appear Lognormal at 5% Significance Level					
59	Lilliefors Test Statistic					0.248	**Lilliefors Lognormal GOF Test**					
60	5% Lilliefors Critical Value					0.396	Data appear Lognormal at 5% Significance Level					
61	**Data appear Lognormal at 5% Significance Level**											
62												
63	**Lognormal Statistics**											
64	Minimum of Logged Data					1.482	Mean of logged Data					1.85
65	Maximum of Logged Data					2.152	SD of logged Data					0.294
66												
67	**Assuming Lognormal Distribution**											
68	95% H-UCL					9.433	90% Chebyshev (MVUE) UCL					9.169
69	95% Chebyshev (MVUE) UCL					10.34	97.5% Chebyshev (MVUE) UCL					11.97
70	99% Chebyshev (MVUE) UCL					15.17						
71												
72	**Nonparametric Distribution Free UCL Statistics**											
73	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
74												
75	**Nonparametric Distribution Free UCLs**											
76	95% CLT UCL					7.988	95% Jackknife UCL					8.404
77	95% Standard Bootstrap UCL					N/A	95% Bootstrap-t UCL					N/A
78	95% Hall's Bootstrap UCL					N/A	95% Percentile Bootstrap UCL					N/A
79	95% BCA Bootstrap UCL					N/A						
80	90% Chebyshev(Mean, Sd) UCL					9.147	95% Chebyshev(Mean, Sd) UCL					10.31
81	97.5% Chebyshev(Mean, Sd) UCL					11.92	99% Chebyshev(Mean, Sd) UCL					15.1
82												
83	**Suggested UCL to Use**											
84	95% Student's-t UCL					8.404						
85												
86	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
87	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
88	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
89	For additional insight the user may want to consult a statistician.											
90												
91												
92	**Iron**											
93												
94	**General Statistics**											
95	Total Number of Observations					5	Number of Distinct Observations					5
96							Number of Missing Observations					0
97	Minimum					13300	Mean					22540
98	Maximum					28100	Median					25400
99	SD					5915	Std. Error of Mean					2645
100	Coefficient of Variation					0.262	Skewness					-1.158
101												
102	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
103	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
104	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											

	A	B	C	D	E	F	G	H	I	J	K	L
105	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
106												
107	Normal GOF Test											
108					Shapiro Wilk Test Statistic	0.891	Shapiro Wilk GOF Test					
109					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
110					Lilliefors Test Statistic	0.286	Lilliefors GOF Test					
111					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
112	Data appear Normal at 5% Significance Level											
113												
114	Assuming Normal Distribution											
115	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
116					95% Student's-t UCL	28179				95% Adjusted-CLT UCL (Chen-1995)		25428
117										95% Modified-t UCL (Johnson-1978)		27951
118												
119	Gamma GOF Test											
120					A-D Test Statistic	0.47	Anderson-Darling Gamma GOF Test					
121					5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level					
122					K-S Test Statistic	0.312	Kolmogrov-Smirnoff Gamma GOF Test					
123					5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level					
124	Detected data appear Gamma Distributed at 5% Significance Level											
125												
126	Gamma Statistics											
127					k hat (MLE)	15.22				k star (bias corrected MLE)		6.223
128					Theta hat (MLE)	1480				Theta star (bias corrected MLE)		3622
129					nu hat (MLE)	152.2				nu star (bias corrected)		62.23
130					MLE Mean (bias corrected)	22540				MLE Sd (bias corrected)		9035
131										Approximate Chi Square Value (0.05)		45.09
132					Adjusted Level of Significance	0.0086				Adjusted Chi Square Value		38.79
133												
134	Assuming Gamma Distribution											
135					95% Approximate Gamma UCL (use when n>=50))	31111				95% Adjusted Gamma UCL (use when n<50)		36160
136												
137	Lognormal GOF Test											
138					Shapiro Wilk Test Statistic	0.845	Shapiro Wilk Lognormal GOF Test					
139					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
140					Lilliefors Test Statistic	0.293	Lilliefors Lognormal GOF Test					
141					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
142	Data appear Lognormal at 5% Significance Level											
143												
144	Lognormal Statistics											
145					Minimum of Logged Data	9.496				Mean of logged Data		9.99
146					Maximum of Logged Data	10.24				SD of logged Data		0.302
147												
148	Assuming Lognormal Distribution											
149					95% H-UCL	32823				90% Chebyshev (MVUE) UCL		31742
150					95% Chebyshev (MVUE) UCL	35879				97.5% Chebyshev (MVUE) UCL		41621
151					99% Chebyshev (MVUE) UCL	52899						
152												
153	Nonparametric Distribution Free UCL Statistics											
154	Data appear to follow a Discernible Distribution at 5% Significance Level											
155												
156	Nonparametric Distribution Free UCLs											

	A	B	C	D	E	F	G	H	I	J	K	L
157					95% CLT UCL	26891				95% Jackknife UCL		28179
158					95% Standard Bootstrap UCL	26471				95% Bootstrap-t UCL		26954
159					95% Hall's Bootstrap UCL	25494				95% Percentile Bootstrap UCL		26060
160					95% BCA Bootstrap UCL	25500						
161					90% Chebyshev(Mean, Sd) UCL	30475				95% Chebyshev(Mean, Sd) UCL		34070
162					97.5% Chebyshev(Mean, Sd) UCL	39059				99% Chebyshev(Mean, Sd) UCL		48858
163												
164					**Suggested UCL to Use**							
165					95% Student's-t UCL	28179						
166												
167					**Recommended UCL exceeds the maximum observation**							
168												
169					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
170					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
171					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
172					For additional insight the user may want to consult a statistician.							
173												
174					**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**							
175					**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**							
176												
177												
178	**Manganese**											
179												
180					**General Statistics**							
181					Total Number of Observations	5				Number of Distinct Observations		5
182										Number of Missing Observations		0
183					Minimum	300				Mean		557.4
184					Maximum	1100				Median		482
185					SD	316				Std. Error of Mean		141.3
186					Coefficient of Variation	0.567				Skewness		1.802
187												
188					**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**							
189					**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**							
190					**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**							
191					**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**							
192												
193					**Normal GOF Test**							
194					Shapiro Wilk Test Statistic	0.807				**Shapiro Wilk GOF Test**		
195					5% Shapiro Wilk Critical Value	0.762				Data appear Normal at 5% Significance Level		
196					Lilliefors Test Statistic	0.338				**Lilliefors GOF Test**		
197					5% Lilliefors Critical Value	0.396				Data appear Normal at 5% Significance Level		
198					**Data appear Normal at 5% Significance Level**							
199												
200					**Assuming Normal Distribution**							
201					**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**		
202					95% Student's-t UCL	858.7				95% Adjusted-CLT UCL (Chen-1995)		911.5
203										95% Modified-t UCL (Johnson-1978)		877.7
204												
205					**Gamma GOF Test**							
206					A-D Test Statistic	0.407				**Anderson-Darling Gamma GOF Test**		
207					5% A-D Critical Value	0.681				Detected data appear Gamma Distributed at 5% Significance Level		
208					K-S Test Statistic	0.288				**Kolmogrov-Smirnoff Gamma GOF Test**		

	A	B	C	D	E	F	G	H	I	J	K	L
209					5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level					
210	**Detected data appear Gamma Distributed at 5% Significance Level**											
211												
212	**Gamma Statistics**											
213					k hat (MLE)	4.882			k star (bias corrected MLE)			2.086
214					Theta hat (MLE)	114.2			Theta star (bias corrected MLE)			267.2
215					nu hat (MLE)	48.82			nu star (bias corrected)			20.86
216					MLE Mean (bias corrected)	557.4			MLE Sd (bias corrected)			385.9
217									Approximate Chi Square Value (0.05)			11.49
218					Adjusted Level of Significance	0.0086			Adjusted Chi Square Value			8.61
219												
220	**Assuming Gamma Distribution**											
221				95% Approximate Gamma UCL (use when n>=50))		1012			95% Adjusted Gamma UCL (use when n<50)			1350
222												
223	**Lognormal GOF Test**											
224					Shapiro Wilk Test Statistic	0.923			**Shapiro Wilk Lognormal GOF Test**			
225					5% Shapiro Wilk Critical Value	0.762			Data appear Lognormal at 5% Significance Level			
226					Lilliefors Test Statistic	0.26			**Lilliefors Lognormal GOF Test**			
227					5% Lilliefors Critical Value	0.396			Data appear Lognormal at 5% Significance Level			
228	**Data appear Lognormal at 5% Significance Level**											
229												
230	**Lognormal Statistics**											
231					Minimum of Logged Data	5.704			Mean of logged Data			6.217
232					Maximum of Logged Data	7.003			SD of logged Data			0.491
233												
234	**Assuming Lognormal Distribution**											
235					95% H-UCL	1158			90% Chebyshev (MVUE) UCL			911.5
236					95% Chebyshev (MVUE) UCL	1075			97.5% Chebyshev (MVUE) UCL			1301
237					99% Chebyshev (MVUE) UCL	1746						
238												
239	**Nonparametric Distribution Free UCL Statistics**											
240	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
241												
242	**Nonparametric Distribution Free UCLs**											
243					95% CLT UCL	789.9			95% Jackknife UCL			858.7
244					95% Standard Bootstrap UCL	768.8			95% Bootstrap-t UCL			1293
245					95% Hall's Bootstrap UCL	1852			95% Percentile Bootstrap UCL			795.6
246					95% BCA Bootstrap UCL	832						
247					90% Chebyshev(Mean, Sd) UCL	981.4			95% Chebyshev(Mean, Sd) UCL			1173
248					97.5% Chebyshev(Mean, Sd) UCL	1440			99% Chebyshev(Mean, Sd) UCL			1964
249												
250	**Suggested UCL to Use**											
251					95% Student's-t UCL	858.7						
252												
253	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
254	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
255	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
256	For additional insight the user may want to consult a statistician.											
257												

FORMER FWEC FACILITY - SHOT BLAST AREA - ALL SOIL

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:52:15 PM
From File	ProUCL Input Files_g.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (benzo[a]pyrene)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
Number of Detects	9	Number of Non-Detects	1
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	0.019	Minimum Non-Detect	0.0046
Maximum Detect	1.7	Maximum Non-Detect	0.0046
Variance Detects	0.297	Percent Non-Detects	10%
Mean Detects	0.4	SD Detects	0.545
Median Detects	0.21	CV Detects	1.362
Skewness Detects	2.026	Kurtosis Detects	4.3
Mean of Logged Detects	-1.805	SD of Logged Detects	1.521

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.737	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.361	Standard Error of Mean	0.168
SD	0.502	95% KM (BCA) UCL	0.638
95% KM (t) UCL	0.669	95% KM (Percentile Bootstrap) UCL	0.66
95% KM (z) UCL	0.638	95% KM Bootstrap t UCL	1.07
90% KM Chebyshev UCL	0.866	95% KM Chebyshev UCL	1.095
97.5% KM Chebyshev UCL	1.412	99% KM Chebyshev UCL	2.036

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.293	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.757	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.291	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.682	k star (bias corrected MLE)	0.529
Theta hat (MLE)	0.587	Theta star (bias corrected MLE)	0.757
nu hat (MLE)	12.28	nu star (bias corrected)	9.518
MLE Mean (bias corrected)	0.4	MLE Sd (bias corrected)	0.551

	A	B	C	D	E	F	G	H	I	J	K	L
53	Gamma Kaplan-Meier (KM) Statistics											
54					k hat (KM)	0.516					nu hat (KM)	10.33
55					Approximate Chi Square Value (10.33, α)	4.147					Adjusted Chi Square Value (10.33, β)	3.493
56					95% Gamma Approximate KM-UCL (use when n>=50)	0.898					95% Gamma Adjusted KM-UCL (use when n<50)	1.067
57												
58	Gamma ROS Statistics using Imputed Non-Detects											
59	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
60	GROS may not be used when kstar of detected data is small such as < 0.1											
61	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
62	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
63					Minimum	0.01					Mean	0.361
64					Maximum	1.7					Median	0.16
65					SD	0.529					CV	1.464
66					k hat (MLE)	0.582					k star (bias corrected MLE)	0.474
67					Theta hat (MLE)	0.621					Theta star (bias corrected MLE)	0.762
68					nu hat (MLE)	11.64					nu star (bias corrected)	9.48
69					MLE Mean (bias corrected)	0.361					MLE Sd (bias corrected)	0.525
70											Adjusted Level of Significance (β)	0.0267
71					Approximate Chi Square Value (9.48, α)	3.619					Adjusted Chi Square Value (9.48, β)	3.017
72					95% Gamma Approximate UCL (use when n>=50)	0.946					95% Gamma Adjusted UCL (use when n<50)	1.135
73												
74	Lognormal GOF Test on Detected Observations Only											
75					Shapiro Wilk Test Statistic	0.96					Shapiro Wilk GOF Test	
76					5% Shapiro Wilk Critical Value	0.829					Detected Data appear Lognormal at 5% Significance Level	
77					Lilliefors Test Statistic	0.161					Lilliefors GOF Test	
78					5% Lilliefors Critical Value	0.295					Detected Data appear Lognormal at 5% Significance Level	
79	Detected Data appear Lognormal at 5% Significance Level											
80												
81	Lognormal ROS Statistics Using Imputed Non-Detects											
82					Mean in Original Scale	0.361					Mean in Log Scale	-2.182
83					SD in Original Scale	0.529					SD in Log Scale	1.867
84					95% t UCL (assumes normality of ROS data)	0.667					95% Percentile Bootstrap UCL	0.643
85					95% BCA Bootstrap UCL	0.756					95% Bootstrap t UCL	1.104
86					95% H-UCL (Log ROS)	15.14						
87												
88	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
89					KM Mean (logged)	-2.162					95% H-UCL (KM -Log)	8.053
90					KM SD (logged)	1.733					95% Critical H Value (KM-Log)	4.755
91					KM Standard Error of Mean (logged)	0.581						
92												
93	DL/2 Statistics											
94					DL/2 Normal						DL/2 Log-Transformed	
95					Mean in Original Scale	0.361					Mean in Log Scale	-2.232
96					SD in Original Scale	0.529					SD in Log Scale	1.97
97					95% t UCL (Assumes normality)	0.667					95% H-Stat UCL	24.65
98	DL/2 is not a recommended method, provided for comparisons and historical reasons											
99												
100	Nonparametric Distribution Free UCL Statistics											
101	Detected Data appear Gamma Distributed at 5% Significance Level											
102												
103	Suggested UCL to Use											
104					95% KM (Chebyshev) UCL	1.095					95% GROS Adjusted Gamma UCL	1.135

	A	B	C	D	E	F	G	H	I	J	K	L
105					95% Adjusted Gamma KM-UCL	1.067						
106												
107	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
108	Recommendations are based upon data size, data distribution, and skewness.											
109	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
110	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
111												
112	Value (benzo[a]anthracene)											
113												
114	General Statistics											
115					Total Number of Observations	10			Number of Distinct Observations			9
116					Number of Detects	7			Number of Non-Detects			3
117					Number of Distinct Detects	7			Number of Distinct Non-Detects			2
118					Minimum Detect	0.043			Minimum Non-Detect			0.0068
119					Maximum Detect	1.9			Maximum Non-Detect			0.0069
120					Variance Detects	0.427			Percent Non-Detects			30%
121					Mean Detects	0.569			SD Detects			0.654
122					Median Detects	0.23			CV Detects			1.149
123					Skewness Detects	1.717			Kurtosis Detects			3.007
124					Mean of Logged Detects	-1.177			SD of Logged Detects			1.274
125												
126	Normal GOF Test on Detects Only											
127					Shapiro Wilk Test Statistic	0.799			Shapiro Wilk GOF Test			
128					5% Shapiro Wilk Critical Value	0.803			Detected Data Not Normal at 5% Significance Level			
129					Lilliefors Test Statistic	0.269			Lilliefors GOF Test			
130					5% Lilliefors Critical Value	0.335			Detected Data appear Normal at 5% Significance Level			
131	Detected Data appear Approximate Normal at 5% Significance Level											
132												
133	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
134					Mean	0.4			Standard Error of Mean			0.194
135					SD	0.568			95% KM (BCA) UCL			0.763
136					95% KM (t) UCL	0.756			95% KM (Percentile Bootstrap) UCL			0.736
137					95% KM (z) UCL	0.719			95% KM Bootstrap t UCL			1.111
138					90% KM Chebyshev UCL	0.982			95% KM Chebyshev UCL			1.246
139					97.5% KM Chebyshev UCL	1.612			99% KM Chebyshev UCL			2.331
140												
141	Gamma GOF Tests on Detected Observations Only											
142					A-D Test Statistic	0.253			Anderson-Darling GOF Test			
143					5% A-D Critical Value	0.729			Detected data appear Gamma Distributed at 5% Significance Level			
144					K-S Test Statistic	0.228			Kolmogrov-Smirnoff GOF			
145					5% K-S Critical Value	0.32			Detected data appear Gamma Distributed at 5% Significance Level			
146	Detected data appear Gamma Distributed at 5% Significance Level											
147												
148	Gamma Statistics on Detected Data Only											
149					k hat (MLE)	0.948			k star (bias corrected MLE)			0.637
150					Theta hat (MLE)	0.6			Theta star (bias corrected MLE)			0.894
151					nu hat (MLE)	13.27			nu star (bias corrected)			8.915
152					MLE Mean (bias corrected)	0.569			MLE Sd (bias corrected)			0.713
153												
154	Gamma Kaplan-Meier (KM) Statistics											
155					k hat (KM)	0.497			nu hat (KM)			9.933
156					Approximate Chi Square Value (9.93, α)	3.9			Adjusted Chi Square Value (9.93, β)			3.27

	A	B	C	D	E	F	G	H	I	J	K	L
157	95% Gamma Approximate KM-UCL (use when n>=50)					1.02	95% Gamma Adjusted KM-UCL (use when n<50)					1.216
158												
159	**Gamma ROS Statistics using Imputed Non-Detects**											
160	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
161	GROS may not be used when kstar of detected data is small such as < 0.1											
162	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
163	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
164	Minimum					0.01	Mean					0.401
165	Maximum					1.9	Median					0.165
166	SD					0.598	CV					1.49
167	k hat (MLE)					0.493	k star (bias corrected MLE)					0.412
168	Theta hat (MLE)					0.815	Theta star (bias corrected MLE)					0.975
169	nu hat (MLE)					9.853	nu star (bias corrected)					8.23
170	MLE Mean (bias corrected)					0.401	MLE Sd (bias corrected)					0.626
171							Adjusted Level of Significance (β)					0.0267
172	Approximate Chi Square Value (8.23, α)					2.869	Adjusted Chi Square Value (8.23, β)					2.348
173	95% Gamma Approximate UCL (use when n>=50)					1.151	95% Gamma Adjusted UCL (use when n<50)					1.407
174												
175	**Lognormal GOF Test on Detected Observations Only**											
176	Shapiro Wilk Test Statistic					0.978	**Shapiro Wilk GOF Test**					
177	5% Shapiro Wilk Critical Value					0.803	Detected Data appear Lognormal at 5% Significance Level					
178	Lilliefors Test Statistic					0.162	**Lilliefors GOF Test**					
179	5% Lilliefors Critical Value					0.335	Detected Data appear Lognormal at 5% Significance Level					
180	**Detected Data appear Lognormal at 5% Significance Level**											
181												
182	**Lognormal ROS Statistics Using Imputed Non-Detects**											
183	Mean in Original Scale					0.402	Mean in Log Scale					-2.151
184	SD in Original Scale					0.597	SD in Log Scale					1.896
185	95% t UCL (assumes normality of ROS data)					0.749	95% Percentile Bootstrap UCL					0.722
186	95% BCA Bootstrap UCL					0.824	95% Bootstrap t UCL					1.153
187	95% H-UCL (Log ROS)					18.15						
188												
189	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
190	KM Mean (logged)					-2.321	95% H-UCL (KM -Log)					27.54
191	KM SD (logged)					2.007	95% Critical H Value (KM-Log)					5.414
192	KM Standard Error of Mean (logged)					0.686						
193												
194	**DL/2 Statistics**											
195	**DL/2 Normal**						**DL/2 Log-Transformed**					
196	Mean in Original Scale					0.399	Mean in Log Scale					-2.528
197	SD in Original Scale					0.6	SD in Log Scale					2.411
198	95% t UCL (Assumes normality)					0.747	95% H-Stat UCL					250.2
199	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
200												
201	**Nonparametric Distribution Free UCL Statistics**											
202	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
203												
204	**Suggested UCL to Use**											
205	95% KM (t) UCL					0.756	95% KM (Percentile Bootstrap) UCL					0.736
206												
207	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
208	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L
209	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
210	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
211												
212	Value (benzo[b]fluoranthene)											
213												
214	General Statistics											
215	Total Number of Observations					10	Number of Distinct Observations					10
216	Number of Detects					9	Number of Non-Detects					1
217	Number of Distinct Detects					9	Number of Distinct Non-Detects					1
218	Minimum Detect					0.033	Minimum Non-Detect					0.0055
219	Maximum Detect					2	Maximum Non-Detect					0.0055
220	Variance Detects					0.401	Percent Non-Detects					10%
221	Mean Detects					0.48	SD Detects					0.633
222	Median Detects					0.26	CV Detects					1.32
223	Skewness Detects					2.064	Kurtosis Detects					4.568
224	Mean of Logged Detects					-1.537	SD of Logged Detects					1.431
225												
226	Normal GOF Test on Detects Only											
227	Shapiro Wilk Test Statistic					0.74	Shapiro Wilk GOF Test					
228	5% Shapiro Wilk Critical Value					0.829	Detected Data Not Normal at 5% Significance Level					
229	Lilliefors Test Statistic					0.272	Lilliefors GOF Test					
230	5% Lilliefors Critical Value					0.295	Detected Data appear Normal at 5% Significance Level					
231	Detected Data appear Approximate Normal at 5% Significance Level											
232												
233	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
234	Mean					0.432	Standard Error of Mean					0.196
235	SD					0.584	95% KM (BCA) UCL					0.759
236	95% KM (t) UCL					0.791	95% KM (Percentile Bootstrap) UCL					0.755
237	95% KM (z) UCL					0.754	95% KM Bootstrap t UCL					1.207
238	90% KM Chebyshev UCL					1.02	95% KM Chebyshev UCL					1.286
239	97.5% KM Chebyshev UCL					1.655	99% KM Chebyshev UCL					2.381
240												
241	Gamma GOF Tests on Detected Observations Only											
242	A-D Test Statistic					0.299	Anderson-Darling GOF Test					
243	5% A-D Critical Value					0.752	Detected data appear Gamma Distributed at 5% Significance Level					
244	K-S Test Statistic					0.174	Kolmogrov-Smirnoff GOF					
245	5% K-S Critical Value					0.289	Detected data appear Gamma Distributed at 5% Significance Level					
246	Detected data appear Gamma Distributed at 5% Significance Level											
247												
248	Gamma Statistics on Detected Data Only											
249	k hat (MLE)					0.746	k star (bias corrected MLE)					0.572
250	Theta hat (MLE)					0.643	Theta star (bias corrected MLE)					0.839
251	nu hat (MLE)					13.43	nu star (bias corrected)					10.29
252	MLE Mean (bias corrected)					0.48	MLE Sd (bias corrected)					0.634
253												
254	Gamma Kaplan-Meier (KM) Statistics											
255	k hat (KM)					0.548	nu hat (KM)					10.96
256	Approximate Chi Square Value (10.96, α)					4.552	Adjusted Chi Square Value (10.96, β)					3.86
257	95% Gamma Approximate KM-UCL (use when n>=50)					1.041	95% Gamma Adjusted KM-UCL (use when n<50)					1.228
258												
259	Gamma ROS Statistics using Imputed Non-Detects											
260	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											

	A	B	C	D	E	F	G	H	I	J	K	L
261	GROS may not be used when kstar of detected data is small such as < 0.1											
262	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
263	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
264					Minimum	0.01					Mean	0.433
265					Maximum	2					Median	0.21
266					SD	0.615					CV	1.421
267					k hat (MLE)	0.612					k star (bias corrected MLE)	0.495
268					Theta hat (MLE)	0.707					Theta star (bias corrected MLE)	0.874
269					nu hat (MLE)	12.24					nu star (bias corrected)	9.903
270					MLE Mean (bias corrected)	0.433					MLE Sd (bias corrected)	0.615
271											Adjusted Level of Significance (β)	0.0267
272					Approximate Chi Square Value (9.90, α)	3.881					Adjusted Chi Square Value (9.90, β)	3.253
273					95% Gamma Approximate UCL (use when n>=50)	1.104					95% Gamma Adjusted UCL (use when n<50)	1.317
274												
275	**Lognormal GOF Test on Detected Observations Only**											
276					Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**					
277					5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level					
278					Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**					
279					5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level					
280	**Detected Data appear Lognormal at 5% Significance Level**											
281												
282	**Lognormal ROS Statistics Using Imputed Non-Detects**											
283					Mean in Original Scale	0.432					Mean in Log Scale	-1.891
284					SD in Original Scale	0.615					SD in Log Scale	1.753
285					95% t UCL (assumes normality of ROS data)	0.789					95% Percentile Bootstrap UCL	0.741
286					95% BCA Bootstrap UCL	0.883					95% Bootstrap t UCL	1.272
287					95% H-UCL (Log ROS)	11.62						
288												
289	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
290					KM Mean (logged)	-1.904					95% H-UCL (KM -Log)	8.447
291					KM SD (logged)	1.688					95% Critical H Value (KM-Log)	4.646
292					KM Standard Error of Mean (logged)	0.566						
293												
294	**DL/2 Statistics**											
295				**DL/2 Normal**			**DL/2 Log-Transformed**					
296					Mean in Original Scale	0.432					Mean in Log Scale	-1.973
297					SD in Original Scale	0.616					SD in Log Scale	1.929
298					95% t UCL (Assumes normality)	0.789					95% H-Stat UCL	25.68
299	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
300												
301	**Nonparametric Distribution Free UCL Statistics**											
302	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
303												
304	**Suggested UCL to Use**											
305					95% KM (t) UCL	0.791					95% KM (Percentile Bootstrap) UCL	0.755
306												
307	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
308	Recommendations are based upon data size, data distribution, and skewness.											
309	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
310	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
311												
312												

	A	B	C	D	E	F	G	H	I	J	K	L
313	Value (cobalt)											
314												
315						General Statistics						
316					Total Number of Observations	10				Number of Distinct Observations		10
317										Number of Missing Observations		0
318					Minimum	4.7				Mean		13.11
319					Maximum	42.6				Median		8.05
320					SD	12.24				Std. Error of Mean		3.87
321					Coefficient of Variation	0.934				Skewness		2.049
322												
323						Normal GOF Test						
324					Shapiro Wilk Test Statistic	0.662				Shapiro Wilk GOF Test		
325					5% Shapiro Wilk Critical Value	0.842				Data Not Normal at 5% Significance Level		
326					Lilliefors Test Statistic	0.391				Lilliefors GOF Test		
327					5% Lilliefors Critical Value	0.28				Data Not Normal at 5% Significance Level		
328						Data Not Normal at 5% Significance Level						
329												
330						Assuming Normal Distribution						
331					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
332					95% Student's-t UCL	20.2				95% Adjusted-CLT UCL (Chen-1995)		22.15
333										95% Modified-t UCL (Johnson-1978)		20.62
334												
335						Gamma GOF Test						
336					A-D Test Statistic	1.168				Anderson-Darling Gamma GOF Test		
337					5% A-D Critical Value	0.735				Data Not Gamma Distributed at 5% Significance Level		
338					K-S Test Statistic	0.337				Kolmogrov-Smirnoff Gamma GOF Test		
339					5% K-S Critical Value	0.27				Data Not Gamma Distributed at 5% Significance Level		
340						Data Not Gamma Distributed at 5% Significance Level						
341												
342						Gamma Statistics						
343					k hat (MLE)	2.043				k star (bias corrected MLE)		1.496
344					Theta hat (MLE)	6.418				Theta star (bias corrected MLE)		8.76
345					nu hat (MLE)	40.85				nu star (bias corrected)		29.93
346					MLE Mean (bias corrected)	13.11				MLE Sd (bias corrected)		10.72
347										Approximate Chi Square Value (0.05)		18.44
348					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		16.89
349												
350						Assuming Gamma Distribution						
351					95% Approximate Gamma UCL (use when n>=50))	21.28				95% Adjusted Gamma UCL (use when n<50)		23.24
352												
353						Lognormal GOF Test						
354					Shapiro Wilk Test Statistic	0.825				Shapiro Wilk Lognormal GOF Test		
355					5% Shapiro Wilk Critical Value	0.842				Data Not Lognormal at 5% Significance Level		
356					Lilliefors Test Statistic	0.287				Lilliefors Lognormal GOF Test		
357					5% Lilliefors Critical Value	0.28				Data Not Lognormal at 5% Significance Level		
358						Data Not Lognormal at 5% Significance Level						
359												
360						Lognormal Statistics						
361					Minimum of Logged Data	1.548				Mean of logged Data		2.309
362					Maximum of Logged Data	3.752				SD of logged Data		0.691
363												
364						Assuming Lognormal Distribution						

	A	B	C	D	E	F	G	H	I	J	K	L
365					95% H-UCL	22.8				90% Chebyshev (MVUE) UCL		20.81
366				95% Chebyshev (MVUE) UCL		24.61				97.5% Chebyshev (MVUE) UCL		29.88
367				99% Chebyshev (MVUE) UCL		40.24						
368												
369					Nonparametric Distribution Free UCL Statistics							
370					Data do not follow a Discernible Distribution (0.05)							
371												
372					Nonparametric Distribution Free UCLs							
373					95% CLT UCL	19.48				95% Jackknife UCL		20.2
374				95% Standard Bootstrap UCL		19.28				95% Bootstrap-t UCL		54.57
375				95% Hall's Bootstrap UCL		63.15				95% Percentile Bootstrap UCL		20.14
376				95% BCA Bootstrap UCL		22.03						
377				90% Chebyshev(Mean, Sd) UCL		24.72				95% Chebyshev(Mean, Sd) UCL		29.98
378				97.5% Chebyshev(Mean, Sd) UCL		37.28				99% Chebyshev(Mean, Sd) UCL		51.62
379												
380					Suggested UCL to Use							
381				95% Chebyshev (Mean, Sd) UCL		29.98						
382												
383					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
384					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
385					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
386					For additional insight the user may want to consult a statistician.							
387												
388												
389	Value (copper)											
390												
391					General Statistics							
392				Total Number of Observations		10				Number of Distinct Observations		10
393										Number of Missing Observations		0
394					Minimum	9.6				Mean		102.7
395					Maximum	469				Median		43.95
396					SD	150.8				Std. Error of Mean		47.69
397					Coefficient of Variation	1.468				Skewness		2.095
398												
399					Normal GOF Test							
400					Shapiro Wilk Test Statistic	0.636				Shapiro Wilk GOF Test		
401					5% Shapiro Wilk Critical Value	0.842				Data Not Normal at 5% Significance Level		
402					Lilliefors Test Statistic	0.413				Lilliefors GOF Test		
403					5% Lilliefors Critical Value	0.28				Data Not Normal at 5% Significance Level		
404					Data Not Normal at 5% Significance Level							
405												
406					Assuming Normal Distribution							
407					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
408					95% Student's-t UCL	190.1				95% Adjusted-CLT UCL (Chen-1995)		214.9
409										95% Modified-t UCL (Johnson-1978)		195.4
410												
411					Gamma GOF Test							
412					A-D Test Statistic	0.889				Anderson-Darling Gamma GOF Test		
413					5% A-D Critical Value	0.755				Data Not Gamma Distributed at 5% Significance Level		
414					K-S Test Statistic	0.324				Kolmogrov-Smirnoff Gamma GOF Test		
415					5% K-S Critical Value	0.276				Data Not Gamma Distributed at 5% Significance Level		
416					Data Not Gamma Distributed at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
417												
418						Gamma Statistics						
419					k hat (MLE)	0.802				k star (bias corrected MLE)		0.628
420					Theta hat (MLE)	128.1				Theta star (bias corrected MLE)		163.6
421					nu hat (MLE)	16.04				nu star (bias corrected)		12.56
422					MLE Mean (bias corrected)	102.7				MLE Sd (bias corrected)		129.6
423										Approximate Chi Square Value (0.05)		5.598
424					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		4.815
425												
426						Assuming Gamma Distribution						
427				95% Approximate Gamma UCL (use when n>=50))		230.5				95% Adjusted Gamma UCL (use when n<50)		267.9
428												
429						Lognormal GOF Test						
430					Shapiro Wilk Test Statistic	0.914				Shapiro Wilk Lognormal GOF Test		
431					5% Shapiro Wilk Critical Value	0.842				Data appear Lognormal at 5% Significance Level		
432					Lilliefors Test Statistic	0.236				Lilliefors Lognormal GOF Test		
433					5% Lilliefors Critical Value	0.28				Data appear Lognormal at 5% Significance Level		
434						Data appear Lognormal at 5% Significance Level						
435												
436						Lognormal Statistics						
437					Minimum of Logged Data	2.262				Mean of logged Data		3.892
438					Maximum of Logged Data	6.151				SD of logged Data		1.208
439												
440						Assuming Lognormal Distribution						
441					95% H-UCL	424.5				90% Chebyshev (MVUE) UCL		201.9
442					95% Chebyshev (MVUE) UCL	252				97.5% Chebyshev (MVUE) UCL		321.5
443					99% Chebyshev (MVUE) UCL	458						
444												
445						Nonparametric Distribution Free UCL Statistics						
446						Data appear to follow a Discernible Distribution at 5% Significance Level						
447												
448						Nonparametric Distribution Free UCLs						
449					95% CLT UCL	181.2				95% Jackknife UCL		190.1
450					95% Standard Bootstrap UCL	178.9				95% Bootstrap-t UCL		722.2
451					95% Hall's Bootstrap UCL	800.9				95% Percentile Bootstrap UCL		188
452					95% BCA Bootstrap UCL	214						
453					90% Chebyshev(Mean, Sd) UCL	245.8				95% Chebyshev(Mean, Sd) UCL		310.6
454					97.5% Chebyshev(Mean, Sd) UCL	400.6				99% Chebyshev(Mean, Sd) UCL		577.2
455												
456						Suggested UCL to Use						
457					95% Chebyshev (Mean, Sd) UCL	310.6						
458												
459						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
460						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
461						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
462						For additional insight the user may want to consult a statistician.						
463												
464	Value (dibenz(a,h)anthracene)											
465												
466						General Statistics						
467					Total Number of Observations	10				Number of Distinct Observations		9
468					Number of Detects	6				Number of Non-Detects		4

	A	B	C	D	E	F	G	H	I	J	K	L
469					Number of Distinct Detects	6				Number of Distinct Non-Detects		3
470					Minimum Detect	0.01				Minimum Non-Detect		0.0043
471					Maximum Detect	0.33				Maximum Non-Detect		0.0045
472					Variance Detects	0.0154				Percent Non-Detects		40%
473					Mean Detects	0.119				SD Detects		0.124
474					Median Detects	0.0775				CV Detects		1.043
475					Skewness Detects	1.127				Kurtosis Detects		0.494
476					Mean of Logged Detects	-2.737				SD of Logged Detects		1.324
477												
478					**Normal GOF Test on Detects Only**							
479					Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**					
480					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level					
481					Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**					
482					5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level					
483					**Detected Data appear Normal at 5% Significance Level**							
484												
485					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
486					Mean	0.073				Standard Error of Mean		0.036
487					SD	0.104				95% KM (BCA) UCL		0.138
488					95% KM (t) UCL	0.139				95% KM (Percentile Bootstrap) UCL		0.135
489					95% KM (z) UCL	0.132				95% KM Bootstrap t UCL		0.213
490					90% KM Chebyshev UCL	0.181				95% KM Chebyshev UCL		0.23
491					97.5% KM Chebyshev UCL	0.298				99% KM Chebyshev UCL		0.432
492												
493					**Gamma GOF Tests on Detected Observations Only**							
494					A-D Test Statistic	0.257	**Anderson-Darling GOF Test**					
495					5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level					
496					K-S Test Statistic	0.235	**Kolmogrov-Smirnoff GOF**					
497					5% K-S Critical Value	0.341	Detected data appear Gamma Distributed at 5% Significance Level					
498					**Detected data appear Gamma Distributed at 5% Significance Level**							
499												
500					**Gamma Statistics on Detected Data Only**							
501					k hat (MLE)	0.956				k star (bias corrected MLE)		0.589
502					Theta hat (MLE)	0.124				Theta star (bias corrected MLE)		0.202
503					nu hat (MLE)	11.47				nu star (bias corrected)		7.069
504					MLE Mean (bias corrected)	0.119				MLE Sd (bias corrected)		0.155
505												
506					**Gamma Kaplan-Meier (KM) Statistics**							
507					k hat (KM)	0.492				nu hat (KM)		9.85
508					Approximate Chi Square Value (9.85, α)	3.848				Adjusted Chi Square Value (9.85, β)		3.223
509					95% Gamma Approximate KM-UCL (use when n>=50)	0.187				95% Gamma Adjusted KM-UCL (use when n<50)		0.223
510												
511					**Gamma ROS Statistics using Imputed Non-Detects**							
512					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
513					GROS may not be used when kstar of detected data is small such as < 0.1							
514					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
515					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
516					Minimum	0.01				Mean		0.0753
517					Maximum	0.33				Median		0.019
518					SD	0.108				CV		1.436
519					k hat (MLE)	0.676				k star (bias corrected MLE)		0.54
520					Theta hat (MLE)	0.111				Theta star (bias corrected MLE)		0.139

	A	B	C	D	E	F	G	H	I	J	K	L
521					nu hat (MLE)	13.52				nu star (bias corrected)		10.8
522					MLE Mean (bias corrected)	0.0753				MLE Sd (bias corrected)		0.102
523										Adjusted Level of Significance (β)		0.0267
524					Approximate Chi Square Value (10.80, α)	4.448				Adjusted Chi Square Value (10.80, β)		3.766
525					95% Gamma Approximate UCL (use when n>=50)	0.183				95% Gamma Adjusted UCL (use when n<50)		0.216
526												
527					**Lognormal GOF Test on Detected Observations Only**							
528					Shapiro Wilk Test Statistic	0.956			**Shapiro Wilk GOF Test**			
529					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Lognormal at 5% Significance Level			
530					Lilliefors Test Statistic	0.179			**Lilliefors GOF Test**			
531					5% Lilliefors Critical Value	0.362			Detected Data appear Lognormal at 5% Significance Level			
532					**Detected Data appear Lognormal at 5% Significance Level**							
533												
534					**Lognormal ROS Statistics Using Imputed Non-Detects**							
535					Mean in Original Scale	0.0721				Mean in Log Scale		-4.173
536					SD in Original Scale	0.11				SD in Log Scale		2.12
537					95% t UCL (assumes normality of ROS data)	0.136				95% Percentile Bootstrap UCL		0.129
538					95% BCA Bootstrap UCL	0.149				95% Bootstrap t UCL		0.218
539					95% H-UCL (Log ROS)	8.092						
540												
541					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
542					KM Mean (logged)	-3.822				95% H-UCL (KM -Log)		0.938
543					KM SD (logged)	1.625				95% Critical H Value (KM-Log)		4.499
544					KM Standard Error of Mean (logged)	0.563						
545												
546					**DL/2 Statistics**							
547					**DL/2 Normal**				**DL/2 Log-Transformed**			
548					Mean in Original Scale	0.0722				Mean in Log Scale		-4.09
549					SD in Original Scale	0.11				SD in Log Scale		2.006
550					95% t UCL (Assumes normality)	0.136				95% H-Stat UCL		4.666
551					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
552												
553					**Nonparametric Distribution Free UCL Statistics**							
554					**Detected Data appear Normal Distributed at 5% Significance Level**							
555												
556					**Suggested UCL to Use**							
557					95% KM (t) UCL	0.139				95% KM (Percentile Bootstrap) UCL		0.135
558												
559					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
560					Recommendations are based upon data size, data distribution, and skewness.							
561					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
562					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
563												
564	**Value (indeno[1,2,3-cd]pyrene)**											
565												
566					**General Statistics**							
567					Total Number of Observations	10				Number of Distinct Observations		9
568					Number of Detects	8				Number of Non-Detects		2
569					Number of Distinct Detects	8				Number of Distinct Non-Detects		1
570					Minimum Detect	0.041				Minimum Non-Detect		0.0059
571					Maximum Detect	1.1				Maximum Non-Detect		0.0059
572					Variance Detects	0.143				Percent Non-Detects		20%

	A	B	C	D	E	F	G	H	I	J	K	L
573					Mean Detects	0.353					SD Detects	0.378
574					Median Detects	0.22					CV Detects	1.07
575					Skewness Detects	1.367					Kurtosis Detects	1.075
576					Mean of Logged Detects	-1.611					SD of Logged Detects	1.205
577												
578					**Normal GOF Test on Detects Only**							
579					Shapiro Wilk Test Statistic	0.83	**Shapiro Wilk GOF Test**					
580					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level					
581					Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**					
582					5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level					
583					**Detected Data appear Normal at 5% Significance Level**							
584												
585					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
586					Mean	0.284					Standard Error of Mean	0.117
587					SD	0.345					95% KM (BCA) UCL	0.513
588					95% KM (t) UCL	0.498					95% KM (Percentile Bootstrap) UCL	0.48
589					95% KM (z) UCL	0.476					95% KM Bootstrap t UCL	0.755
590					90% KM Chebyshev UCL	0.634					95% KM Chebyshev UCL	0.793
591					97.5% KM Chebyshev UCL	1.013					99% KM Chebyshev UCL	1.445
592												
593					**Gamma GOF Tests on Detected Observations Only**							
594					A-D Test Statistic	0.258	**Anderson-Darling GOF Test**					
595					5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level					
596					K-S Test Statistic	0.17	**Kolmogrov-Smirnoff GOF**					
597					5% K-S Critical Value	0.301	Detected data appear Gamma Distributed at 5% Significance Level					
598					**Detected data appear Gamma Distributed at 5% Significance Level**							
599												
600					**Gamma Statistics on Detected Data Only**							
601					k hat (MLE)	1.012					k star (bias corrected MLE)	0.716
602					Theta hat (MLE)	0.349					Theta star (bias corrected MLE)	0.493
603					nu hat (MLE)	16.19					nu star (bias corrected)	11.45
604					MLE Mean (bias corrected)	0.353					MLE Sd (bias corrected)	0.417
605												
606					**Gamma Kaplan-Meier (KM) Statistics**							
607					k hat (KM)	0.675					nu hat (KM)	13.5
608					Approximate Chi Square Value (13.50, α)	6.23					Adjusted Chi Square Value (13.50, β)	5.395
609					95% Gamma Approximate KM-UCL (use when n>=50)	0.615					95% Gamma Adjusted KM-UCL (use when n<50)	0.71
610												
611					**Gamma ROS Statistics using Imputed Non-Detects**							
612					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
613					GROS may not be used when kstar of detected data is small such as < 0.1							
614					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
615					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
616					Minimum	0.01					Mean	0.285
617					Maximum	1.1					Median	0.136
618					SD	0.363					CV	1.277
619					k hat (MLE)	0.642					k star (bias corrected MLE)	0.516
620					Theta hat (MLE)	0.443					Theta star (bias corrected MLE)	0.551
621					nu hat (MLE)	12.84					nu star (bias corrected)	10.32
622					MLE Mean (bias corrected)	0.285					MLE Sd (bias corrected)	0.396
623											Adjusted Level of Significance (β)	0.0267
624					Approximate Chi Square Value (10.32, α)	4.146					Adjusted Chi Square Value (10.32, β)	3.492

	A	B	C	D	E	F	G	H	I	J	K	L
625	95% Gamma Approximate UCL (use when n>=50)					0.709	95% Gamma Adjusted UCL (use when n<50)					0.841
626												
627	**Lognormal GOF Test on Detected Observations Only**											
628	Shapiro Wilk Test Statistic					0.951	**Shapiro Wilk GOF Test**					
629	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Lognormal at 5% Significance Level					
630	Lilliefors Test Statistic					0.145	**Lilliefors GOF Test**					
631	5% Lilliefors Critical Value					0.313	Detected Data appear Lognormal at 5% Significance Level					
632	**Detected Data appear Lognormal at 5% Significance Level**											
633												
634	**Lognormal ROS Statistics Using Imputed Non-Detects**											
635	Mean in Original Scale					0.285	Mean in Log Scale					-2.21
636	SD in Original Scale					0.363	SD in Log Scale					1.661
637	95% t UCL (assumes normality of ROS data)					0.495	95% Percentile Bootstrap UCL					0.477
638	95% BCA Bootstrap UCL					0.51	95% Bootstrap t UCL					0.724
639	95% H-UCL (Log ROS)					5.5						
640												
641	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
642	KM Mean (logged)					-2.315	95% H-UCL (KM -Log)					6.894
643	KM SD (logged)					1.733	95% Critical H Value (KM-Log)					4.753
644	KM Standard Error of Mean (logged)					0.586						
645												
646	**DL/2 Statistics**											
647	**DL/2 Normal**						**DL/2 Log-Transformed**					
648	Mean in Original Scale					0.283	Mean in Log Scale					-2.454
649	SD in Original Scale					0.364	SD in Log Scale					2.071
650	95% t UCL (Assumes normality)					0.494	95% H-Stat UCL					34.26
651	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
652												
653	**Nonparametric Distribution Free UCL Statistics**											
654	**Detected Data appear Normal Distributed at 5% Significance Level**											
655												
656	**Suggested UCL to Use**											
657	95% KM (t) UCL					0.498	95% KM (Percentile Bootstrap) UCL					0.48
658												
659	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
660	Recommendations are based upon data size, data distribution, and skewness.											
661	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
662	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
663												
664												
665	**Value (lead)**											
666												
667	**General Statistics**											
668	Total Number of Observations					10	Number of Distinct Observations					10
669							Number of Missing Observations					0
670	Minimum					9.6	Mean					103.9
671	Maximum					419	Median					30.85
672	SD					132	Std. Error of Mean					41.74
673	Coefficient of Variation					1.27	Skewness					1.779
674												
675	**Normal GOF Test**											
676	Shapiro Wilk Test Statistic					0.753	**Shapiro Wilk GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
677					5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level					
678					Lilliefors Test Statistic	0.293	**Lilliefors GOF Test**					
679					5% Lilliefors Critical Value	0.28	Data Not Normal at 5% Significance Level					
680	**Data Not Normal at 5% Significance Level**											
681												
682	**Assuming Normal Distribution**											
683	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
684					95% Student's-t UCL	180.4	95% Adjusted-CLT UCL (Chen-1995)					197.7
685							95% Modified-t UCL (Johnson-1978)					184.3
686												
687	**Gamma GOF Test**											
688					A-D Test Statistic	0.574	**Anderson-Darling Gamma GOF Test**					
689					5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level					
690					K-S Test Statistic	0.25	**Kolmogrov-Smirnoff Gamma GOF Test**					
691					5% K-S Critical Value	0.276	Detected data appear Gamma Distributed at 5% Significance Level					
692	**Detected data appear Gamma Distributed at 5% Significance Level**											
693												
694	**Gamma Statistics**											
695					k hat (MLE)	0.8	k star (bias corrected MLE)					0.627
696					Theta hat (MLE)	129.9	Theta star (bias corrected MLE)					165.9
697					nu hat (MLE)	16	nu star (bias corrected)					12.53
698					MLE Mean (bias corrected)	103.9	MLE Sd (bias corrected)					131.3
699							Approximate Chi Square Value (0.05)					5.578
700					Adjusted Level of Significance	0.0267	Adjusted Chi Square Value					4.797
701												
702	**Assuming Gamma Distribution**											
703			95% Approximate Gamma UCL (use when n>=50)			233.4	95% Adjusted Gamma UCL (use when n<50)					271.4
704												
705	**Lognormal GOF Test**											
706					Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk Lognormal GOF Test**					
707					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
708					Lilliefors Test Statistic	0.206	**Lilliefors Lognormal GOF Test**					
709					5% Lilliefors Critical Value	0.28	Data appear Lognormal at 5% Significance Level					
710	**Data appear Lognormal at 5% Significance Level**											
711												
712	**Lognormal Statistics**											
713					Minimum of Logged Data	2.262	Mean of logged Data					3.901
714					Maximum of Logged Data	6.038	SD of logged Data					1.306
715												
716	**Assuming Lognormal Distribution**											
717					95% H-UCL	596.5	90% Chebyshev (MVUE) UCL					234.9
718					95% Chebyshev (MVUE) UCL	295.2	97.5% Chebyshev (MVUE) UCL					378.9
719					99% Chebyshev (MVUE) UCL	543.4						
720												
721	**Nonparametric Distribution Free UCL Statistics**											
722	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
723												
724	**Nonparametric Distribution Free UCLs**											
725					95% CLT UCL	172.6	95% Jackknife UCL					180.4
726					95% Standard Bootstrap UCL	169.2	95% Bootstrap-t UCL					249.1
727					95% Hall's Bootstrap UCL	417.1	95% Percentile Bootstrap UCL					169.8
728					95% BCA Bootstrap UCL	192.8						

	A	B	C	D	E	F	G	H	I	J	K	L
729					90% Chebyshev(Mean, Sd) UCL	229.1				95% Chebyshev(Mean, Sd) UCL		285.8
730					97.5% Chebyshev(Mean, Sd) UCL	364.6				99% Chebyshev(Mean, Sd) UCL		519.2
731												
732						**Suggested UCL to Use**						
733					95% Adjusted Gamma UCL	271.4						
734												
735					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
736					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
737					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
738					For additional insight the user may want to consult a statistician.							
739												
740												
741	**Value (nickel)**											
742												
743						**General Statistics**						
744					Total Number of Observations	10				Number of Distinct Observations		10
745										Number of Missing Observations		0
746					Minimum	9.5				Mean		69.75
747					Maximum	301				Median		30.45
748					SD	98.99				Std. Error of Mean		31.3
749					Coefficient of Variation	1.419				Skewness		1.967
750												
751						**Normal GOF Test**						
752					Shapiro Wilk Test Statistic	0.641				**Shapiro Wilk GOF Test**		
753					5% Shapiro Wilk Critical Value	0.842				Data Not Normal at 5% Significance Level		
754					Lilliefors Test Statistic	0.408				**Lilliefors GOF Test**		
755					5% Lilliefors Critical Value	0.28				Data Not Normal at 5% Significance Level		
756						**Data Not Normal at 5% Significance Level**						
757												
758						**Assuming Normal Distribution**						
759					**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**		
760					95% Student's-t UCL	127.1				95% Adjusted-CLT UCL (Chen-1995)		142
761										95% Modified-t UCL (Johnson-1978)		130.4
762												
763						**Gamma GOF Test**						
764					A-D Test Statistic	0.956				**Anderson-Darling Gamma GOF Test**		
765					5% A-D Critical Value	0.754				Data Not Gamma Distributed at 5% Significance Level		
766					K-S Test Statistic	0.316				**Kolmogrov-Smirnoff Gamma GOF Test**		
767					5% K-S Critical Value	0.275				Data Not Gamma Distributed at 5% Significance Level		
768						**Data Not Gamma Distributed at 5% Significance Level**						
769												
770						**Gamma Statistics**						
771					k hat (MLE)	0.847				k star (bias corrected MLE)		0.659
772					Theta hat (MLE)	82.38				Theta star (bias corrected MLE)		105.8
773					nu hat (MLE)	16.93				nu star (bias corrected)		13.19
774					MLE Mean (bias corrected)	69.75				MLE Sd (bias corrected)		85.9
775										Approximate Chi Square Value (0.05)		6.019
776					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		5.201
777												
778						**Assuming Gamma Distribution**						
779					95% Approximate Gamma UCL (use when n>=50))	152.8				95% Adjusted Gamma UCL (use when n<50)		176.8
780												

	A	B	C	D	E	F	G	H	I	J	K	L
781	**Lognormal GOF Test**											
782					Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk Lognormal GOF Test**					
783					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
784					Lilliefors Test Statistic	0.23	**Lilliefors Lognormal GOF Test**					
785					5% Lilliefors Critical Value	0.28	Data appear Lognormal at 5% Significance Level					
786	**Data appear Lognormal at 5% Significance Level**											
787												
788	**Lognormal Statistics**											
789					Minimum of Logged Data	2.251				Mean of logged Data		3.549
790					Maximum of Logged Data	5.707				SD of logged Data		1.157
791												
792	**Assuming Lognormal Distribution**											
793					95% H-UCL	255.5				90% Chebyshev (MVUE) UCL		133.1
794					95% Chebyshev (MVUE) UCL	165.4				97.5% Chebyshev (MVUE) UCL		210.3
795					99% Chebyshev (MVUE) UCL	298.5						
796												
797	**Nonparametric Distribution Free UCL Statistics**											
798	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
799												
800	**Nonparametric Distribution Free UCLs**											
801					95% CLT UCL	121.2				95% Jackknife UCL		127.1
802					95% Standard Bootstrap UCL	117.4				95% Bootstrap-t UCL		469
803					95% Hall's Bootstrap UCL	497.5				95% Percentile Bootstrap UCL		122.6
804					95% BCA Bootstrap UCL	135.7						
805					90% Chebyshev(Mean, Sd) UCL	163.7				95% Chebyshev(Mean, Sd) UCL		206.2
806					97.5% Chebyshev(Mean, Sd) UCL	265.2				99% Chebyshev(Mean, Sd) UCL		381.2
807												
808	**Suggested UCL to Use**											
809					95% Chebyshev (Mean, Sd) UCL	206.2						
810												
811	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
812	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
813	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
814	For additional insight the user may want to consult a statistician.											
815												

	A	B	C	D	E	F	G	H	I	J	K	L
1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3	User Selected Options											
4	Date/Time of Computation			6/6/2016 9:44:03 AM								
5	From File			ShotBlast Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	**Aluminum**											
12												
13	**General Statistics**											
14	Total Number of Observations					10	Number of Distinct Observations					10
15							Number of Missing Observations					0
16	Minimum					3860	Mean					5304
17	Maximum					8400	Median					4980
18	SD					1549	Std. Error of Mean					490
19	Coefficient of Variation					0.292	Skewness					1.023
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic					0.859	**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk Critical Value					0.842	Data appear Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.257	**Lilliefors GOF Test**					
25	5% Lilliefors Critical Value					0.28	Data appear Normal at 5% Significance Level					
26	**Data appear Normal at 5% Significance Level**											
27												
28	**Assuming Normal Distribution**											
29	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
30	95% Student's-t UCL					6202	95% Adjusted-CLT UCL (Chen-1995)					6279
31							95% Modified-t UCL (Johnson-1978)					6229
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic					0.559	**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value					0.725	Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.23	**Kolmogrov-Smirnoff Gamma GOF Test**					
37	5% K-S Critical Value					0.266	Detected data appear Gamma Distributed at 5% Significance Level					
38	**Detected data appear Gamma Distributed at 5% Significance Level**											
39												
40	**Gamma Statistics**											
41	k hat (MLE)					14.42	k star (bias corrected MLE)					10.16
42	Theta hat (MLE)					367.8	Theta star (bias corrected MLE)					522
43	nu hat (MLE)					288.4	nu star (bias corrected)					203.2
44	MLE Mean (bias corrected)					5304	MLE Sd (bias corrected)					1664
45							Approximate Chi Square Value (0.05)					171.2
46	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					166.1
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))					6295	95% Adjusted Gamma UCL (use when n<50)					6488
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic					0.889	**Shapiro Wilk Lognormal GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
53					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.212	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.28	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	8.258				Mean of logged Data		8.541
60					Maximum of Logged Data	9.036				SD of logged Data		0.273
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	6349				90% Chebyshev (MVUE) UCL		6676
64					95% Chebyshev (MVUE) UCL	7301				97.5% Chebyshev (MVUE) UCL		8169
65					99% Chebyshev (MVUE) UCL	9874						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	6110				95% Jackknife UCL		6202
72					95% Standard Bootstrap UCL	6037				95% Bootstrap-t UCL		6551
73					95% Hall's Bootstrap UCL	6195				95% Percentile Bootstrap UCL		6093
74					95% BCA Bootstrap UCL	6256						
75					90% Chebyshev(Mean, Sd) UCL	6774				95% Chebyshev(Mean, Sd) UCL		7440
76					97.5% Chebyshev(Mean, Sd) UCL	8364				99% Chebyshev(Mean, Sd) UCL		10179
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	6202						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												
86												
87	**Arsenic**											
88												
89	**General Statistics**											
90					Total Number of Observations	10				Number of Distinct Observations		8
91										Number of Missing Observations		0
92					Minimum	4.5				Mean		6.06
93					Maximum	8.2				Median		5.7
94					SD	1.042				Std. Error of Mean		0.329
95					Coefficient of Variation	0.172				Skewness		0.783
96												
97	**Normal GOF Test**											
98					Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**					
99					5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level					
100					Lilliefors Test Statistic	0.235	**Lilliefors GOF Test**					
101					5% Lilliefors Critical Value	0.28	Data appear Normal at 5% Significance Level					
102	**Data appear Normal at 5% Significance Level**											
103												
104	**Assuming Normal Distribution**											

	A	B	C	D	E	F	G	H	I	J	K	L
105	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
106					95% Student's-t UCL	6.664				95% Adjusted-CLT UCL (Chen-1995)		6.689
107										95% Modified-t UCL (Johnson-1978)		6.677
108												
109	**Gamma GOF Test**											
110					A-D Test Statistic	0.334	**Anderson-Darling Gamma GOF Test**					
111					5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level					
112					K-S Test Statistic	0.228	**Kolmogrov-Smirnoff Gamma GOF Test**					
113					5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level					
114	**Detected data appear Gamma Distributed at 5% Significance Level**											
115												
116	**Gamma Statistics**											
117					k hat (MLE)	39.21				k star (bias corrected MLE)		27.51
118					Theta hat (MLE)	0.155				Theta star (bias corrected MLE)		0.22
119					nu hat (MLE)	784.1				nu star (bias corrected)		550.2
120					MLE Mean (bias corrected)	6.06				MLE Sd (bias corrected)		1.155
121										Approximate Chi Square Value (0.05)		496.8
122					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		488
123												
124	**Assuming Gamma Distribution**											
125					95% Approximate Gamma UCL (use when n>=50))	6.711				95% Adjusted Gamma UCL (use when n<50)		6.833
126												
127	**Lognormal GOF Test**											
128					Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**					
129					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.214	**Lilliefors Lognormal GOF Test**					
131					5% Lilliefors Critical Value	0.28	Data appear Lognormal at 5% Significance Level					
132	**Data appear Lognormal at 5% Significance Level**											
133												
134	**Lognormal Statistics**											
135					Minimum of Logged Data	1.504				Mean of logged Data		1.789
136					Maximum of Logged Data	2.104				SD of logged Data		0.168
137												
138	**Assuming Lognormal Distribution**											
139					95% H-UCL	6.729				90% Chebyshev (MVUE) UCL		7.024
140					95% Chebyshev (MVUE) UCL	7.461				97.5% Chebyshev (MVUE) UCL		8.068
141					99% Chebyshev (MVUE) UCL	9.26						
142												
143	**Nonparametric Distribution Free UCL Statistics**											
144	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
145												
146	**Nonparametric Distribution Free UCLs**											
147					95% CLT UCL	6.602				95% Jackknife UCL		6.664
148					95% Standard Bootstrap UCL	6.573				95% Bootstrap-t UCL		6.803
149					95% Hall's Bootstrap UCL	6.963				95% Percentile Bootstrap UCL		6.61
150					95% BCA Bootstrap UCL	6.63						
151					90% Chebyshev(Mean, Sd) UCL	7.048				95% Chebyshev(Mean, Sd) UCL		7.496
152					97.5% Chebyshev(Mean, Sd) UCL	8.117				99% Chebyshev(Mean, Sd) UCL		9.337
153												
154	**Suggested UCL to Use**											
155					95% Student's-t UCL	6.664						
156												

	A	B	C	D	E	F	G	H	I	J	K	L
157	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
158	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
159	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
160	For additional insight the user may want to consult a statistician.											
161												
162												
163	Cr VI											
164												
165	General Statistics											
166					Total Number of Observations	3			Number of Distinct Observations			3
167									Number of Missing Observations			0
168					Minimum	0.184			Mean			0.487
169					Maximum	0.945			Median			0.332
170					SD	0.403			Std. Error of Mean			0.233
171					Coefficient of Variation	0.829			Skewness			1.474
172												
173	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
174	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
175	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
176	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
177												
178	Normal GOF Test											
179					Shapiro Wilk Test Statistic	0.889			Shapiro Wilk GOF Test			
180					5% Shapiro Wilk Critical Value	0.767			Data appear Normal at 5% Significance Level			
181					Lilliefors Test Statistic	0.316			Lilliefors GOF Test			
182					5% Lilliefors Critical Value	0.512			Data appear Normal at 5% Significance Level			
183	Data appear Normal at 5% Significance Level											
184												
185	Assuming Normal Distribution											
186			95% Normal UCL						95% UCLs (Adjusted for Skewness)			
187					95% Student's-t UCL	1.167			95% Adjusted-CLT UCL (Chen-1995)			1.082
188									95% Modified-t UCL (Johnson-1978)			1.2
189												
190	Gamma GOF Test											
191	Not Enough Data to Perform GOF Test											
192												
193	Gamma Statistics											
194					k hat (MLE)	2.316			k star (bias corrected MLE)			N/A
195					Theta hat (MLE)	0.21			Theta star (bias corrected MLE)			N/A
196					nu hat (MLE)	13.89			nu star (bias corrected)			N/A
197					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A
198									Approximate Chi Square Value (0.05)			N/A
199					Adjusted Level of Significance	N/A			Adjusted Chi Square Value			N/A
200												
201	Assuming Gamma Distribution											
202					95% Approximate Gamma UCL (use when n>=50))	N/A			95% Adjusted Gamma UCL (use when n<50)			N/A
203												
204	Lognormal GOF Test											
205					Shapiro Wilk Test Statistic	0.975			Shapiro Wilk Lognormal GOF Test			
206					5% Shapiro Wilk Critical Value	0.767			Data appear Lognormal at 5% Significance Level			
207					Lilliefors Test Statistic	0.239			Lilliefors Lognormal GOF Test			
208					5% Lilliefors Critical Value	0.512			Data appear Lognormal at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
209	Data appear Lognormal at 5% Significance Level											
210												
211	Lognormal Statistics											
212					Minimum of Logged Data	-1.693				Mean of logged Data		-0.951
213					Maximum of Logged Data	-0.0566				SD of logged Data		0.829
214												
215	Assuming Lognormal Distribution											
216					95% H-UCL	306.1				90% Chebyshev (MVUE) UCL		1.116
217					95% Chebyshev (MVUE) UCL	1.404				97.5% Chebyshev (MVUE) UCL		1.804
218					99% Chebyshev (MVUE) UCL	2.59						
219												
220	Nonparametric Distribution Free UCL Statistics											
221	Data appear to follow a Discernible Distribution at 5% Significance Level											
222												
223	Nonparametric Distribution Free UCLs											
224					95% CLT UCL	0.87				95% Jackknife UCL		1.167
225					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
226					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
227					95% BCA Bootstrap UCL	N/A						
228					90% Chebyshev(Mean, Sd) UCL	1.186				95% Chebyshev(Mean, Sd) UCL		1.502
229					97.5% Chebyshev(Mean, Sd) UCL	1.942				99% Chebyshev(Mean, Sd) UCL		2.805
230												
231	Suggested UCL to Use											
232					95% Student's-t UCL	1.167						
233												
234	Recommended UCL exceeds the maximum observation											
235												
236	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
237	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
238	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
239	For additional insight the user may want to consult a statistician.											
240												
241												
242	Iron											
243												
244	General Statistics											
245					Total Number of Observations	10				Number of Distinct Observations		10
246										Number of Missing Observations		0
247					Minimum	12000				Mean		20160
248					Maximum	33400				Median		18650
249					SD	6182				Std. Error of Mean		1955
250					Coefficient of Variation	0.307				Skewness		1.126
251												
252	Normal GOF Test											
253					Shapiro Wilk Test Statistic	0.911				Shapiro Wilk GOF Test		
254					5% Shapiro Wilk Critical Value	0.842				Data appear Normal at 5% Significance Level		
255					Lilliefors Test Statistic	0.189				Lilliefors GOF Test		
256					5% Lilliefors Critical Value	0.28				Data appear Normal at 5% Significance Level		
257	Data appear Normal at 5% Significance Level											
258												
259	Assuming Normal Distribution											
260	95% Normal UCL						95% UCLs (Adjusted for Skewness)					

	A	B	C	D	E	F	G	H	I	J	K	L
261					95% Student's-t UCL	23743				95% Adjusted-CLT UCL (Chen-1995)		24119
262										95% Modified-t UCL (Johnson-1978)		23859
263												
264						Gamma GOF Test						
265					A-D Test Statistic	0.316				Anderson-Darling Gamma GOF Test		
266					5% A-D Critical Value	0.725				Detected data appear Gamma Distributed at 5% Significance Level		
267					K-S Test Statistic	0.162				Kolmogrov-Smirnoff Gamma GOF Test		
268					5% K-S Critical Value	0.266				Detected data appear Gamma Distributed at 5% Significance Level		
269						Detected data appear Gamma Distributed at 5% Significance Level						
270												
271						Gamma Statistics						
272					k hat (MLE)	12.99				k star (bias corrected MLE)		9.161
273					Theta hat (MLE)	1552				Theta star (bias corrected MLE)		2201
274					nu hat (MLE)	259.8				nu star (bias corrected)		183.2
275					MLE Mean (bias corrected)	20160				MLE Sd (bias corrected)		6661
276										Approximate Chi Square Value (0.05)		152.9
277					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		148.1
278												
279						Assuming Gamma Distribution						
280					95% Approximate Gamma UCL (use when n>=50))	24156				95% Adjusted Gamma UCL (use when n<50)		24941
281												
282						Lognormal GOF Test						
283					Shapiro Wilk Test Statistic	0.965				Shapiro Wilk Lognormal GOF Test		
284					5% Shapiro Wilk Critical Value	0.842				Data appear Lognormal at 5% Significance Level		
285					Lilliefors Test Statistic	0.161				Lilliefors Lognormal GOF Test		
286					5% Lilliefors Critical Value	0.28				Data appear Lognormal at 5% Significance Level		
287						Data appear Lognormal at 5% Significance Level						
288												
289						Lognormal Statistics						
290					Minimum of Logged Data	9.393				Mean of logged Data		9.872
291					Maximum of Logged Data	10.42				SD of logged Data		0.29
292												
293						Assuming Lognormal Distribution						
294					95% H-UCL	24458				90% Chebyshev (MVUE) UCL		25713
295					95% Chebyshev (MVUE) UCL	28239				97.5% Chebyshev (MVUE) UCL		31746
296					99% Chebyshev (MVUE) UCL	38634						
297												
298						Nonparametric Distribution Free UCL Statistics						
299						Data appear to follow a Discernible Distribution at 5% Significance Level						
300												
301						Nonparametric Distribution Free UCLs						
302					95% CLT UCL	23375				95% Jackknife UCL		23743
303					95% Standard Bootstrap UCL	23283				95% Bootstrap-t UCL		25422
304					95% Hall's Bootstrap UCL	32642				95% Percentile Bootstrap UCL		23450
305					95% BCA Bootstrap UCL	23920						
306					90% Chebyshev(Mean, Sd) UCL	26024				95% Chebyshev(Mean, Sd) UCL		28681
307					97.5% Chebyshev(Mean, Sd) UCL	32368				99% Chebyshev(Mean, Sd) UCL		39610
308												
309						Suggested UCL to Use						
310					95% Student's-t UCL	23743						
311												
312	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Manganese

General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	294	Mean	408.5
Maximum	695	Median	358
SD	135.7	Std. Error of Mean	42.92
Coefficient of Variation	0.332	Skewness	1.536

Normal GOF Test

Shapiro Wilk Test Statistic	0.776	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.314	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	487.2	95% Adjusted-CLT UCL (Chen-1995)	501.4
		95% Modified-t UCL (Johnson-1978)	490.7

Gamma GOF Test

A-D Test Statistic	0.869	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.725	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.3	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.267	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.2	k star (bias corrected MLE)	8.609
Theta hat (MLE)	33.48	Theta star (bias corrected MLE)	47.45
nu hat (MLE)	244.1	nu star (bias corrected)	172.2
MLE Mean (bias corrected)	408.5	MLE Sd (bias corrected)	139.2
		Approximate Chi Square Value (0.05)	142.8
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	138.2

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	492.4	95% Adjusted Gamma UCL (use when n<50)	509

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.282	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.28	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

	A	B	C	D	E	F	G	H	I	J	K	L
365	**Lognormal Statistics**											
366					Minimum of Logged Data	5.684				Mean of logged Data		5.971
367					Maximum of Logged Data	6.544				SD of logged Data		0.29
368												
369	**Assuming Lognormal Distribution**											
370					95% H-UCL	494.5				90% Chebyshev (MVUE) UCL		519.9
371					95% Chebyshev (MVUE) UCL	571				97.5% Chebyshev (MVUE) UCL		642
372					99% Chebyshev (MVUE) UCL	781.4						
373												
374	**Nonparametric Distribution Free UCL Statistics**											
375	**Data do not follow a Discernible Distribution (0.05)**											
376												
377	**Nonparametric Distribution Free UCLs**											
378					95% CLT UCL	479.1				95% Jackknife UCL		487.2
379					95% Standard Bootstrap UCL	473.6				95% Bootstrap-t UCL		615.1
380					95% Hall's Bootstrap UCL	869.5				95% Percentile Bootstrap UCL		478.3
381					95% BCA Bootstrap UCL	493.2						
382					90% Chebyshev(Mean, Sd) UCL	537.3				95% Chebyshev(Mean, Sd) UCL		595.6
383					97.5% Chebyshev(Mean, Sd) UCL	676.5				99% Chebyshev(Mean, Sd) UCL		835.6
384												
385	**Suggested UCL to Use**											
386					95% Student's-t UCL	487.2				or 95% Modified-t UCL		490.7
387												
388	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
389	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
390	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
391	For additional insight the user may want to consult a statistician.											
392												

FORMER FWEC FACILITY - GROUNDWATER

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/4/2014 9:44:54 AM
From File	FFF-GW ProUCL Input2_mnl.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Cyanide

General Statistics

Total Number of Observations	16	Number of Distinct Observations	7
Number of Detects	7	Number of Non-Detects	9
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.006	Minimum Non-Detect	0.004
Maximum Detect	0.0068	Maximum Non-Detect	0.004
Variance Detects	9.3333E-8	Percent Non-Detects	56.25%
Mean Detects	0.0064	SD Detects	3.0551E-4
Median Detects	0.0063	CV Detects	0.0477
Skewness Detects	0.0491	Kurtosis Detects	-1.693
Mean of Logged Detects	-5.052	SD of Logged Detects	0.0477

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.00505	Standard Error of Mean	3.2544E-4
SD	0.00121	95% KM (BCA) UCL	0.00554
95% KM (t) UCL	0.00562	95% KM (Percentile Bootstrap) UCL	0.00551
95% KM (z) UCL	0.00559	95% KM Bootstrap t UCL	0.0055
90% KM Chebyshev UCL	0.00603	95% KM Chebyshev UCL	0.00647
97.5% KM Chebyshev UCL	0.00708	99% KM Chebyshev UCL	0.00829

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.319	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.205	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	512	k star (bias corrected MLE)	292.6
Theta hat (MLE)	1.2501E-5	Theta star (bias corrected MLE)	2.1869E-5
nu hat (MLE)	7168	nu star (bias corrected)	4097
MLE Mean (bias corrected)	0.0064	MLE Sd (bias corrected)	3.7412E-4

	A	B	C	D	E	F	G	H	I	J	K	L
53	Gamma Kaplan-Meier (KM) Statistics											
54	k hat (KM)					17.56	nu hat (KM)					561.8
55	Approximate Chi Square Value (561.85, α)					507.9	Adjusted Chi Square Value (561.85, β)					502
56	95% Gamma Approximate KM-UCL (use when n>=50)					0.00559	95% Gamma Adjusted KM-UCL (use when n<50)					0.00565
57												
58	Gamma ROS Statistics using Imputed Non-Detects											
59	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
60	GROS may not be used when kstar of detected data is small such as < 0.1											
61	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
62	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
63	Minimum					0.006	Mean					0.00843
64	Maximum					0.01	Median					0.01
65	SD					0.00185	CV					0.22
66	k hat (MLE)					20.74	k star (bias corrected MLE)					16.9
67	Theta hat (MLE)					4.0613E-4	Theta star (bias corrected MLE)					4.9862E-4
68	nu hat (MLE)					663.8	nu star (bias corrected)					540.7
69	MLE Mean (bias corrected)					0.00843	MLE Sd (bias corrected)					0.00205
70							Adjusted Level of Significance (β)					0.0335
71	Approximate Chi Square Value (540.69, α)					487.8	Adjusted Chi Square Value (540.69, β)					482
72	95% Gamma Approximate UCL (use when n>=50)					0.00934	95% Gamma Adjusted UCL (use when n<50)					0.00945
73												
74	Lognormal GOF Test on Detected Observations Only											
75	Shapiro Wilk Test Statistic					0.933	Shapiro Wilk GOF Test					
76	5% Shapiro Wilk Critical Value					0.803	Detected Data appear Lognormal at 5% Significance Level					
77	Lilliefors Test Statistic					0.193	Lilliefors GOF Test					
78	5% Lilliefors Critical Value					0.335	Detected Data appear Lognormal at 5% Significance Level					
79	Detected Data appear Lognormal at 5% Significance Level											
80												
81	Lognormal ROS Statistics Using Imputed Non-Detects											
82	Mean in Original Scale					0.0059	Mean in Log Scale					-5.138
83	SD in Original Scale					5.4161E-4	SD in Log Scale					0.0918
84	95% t UCL (assumes normality of ROS data)					0.00613	95% Percentile Bootstrap UCL					0.00612
85	95% BCA Bootstrap UCL					0.00611	95% Bootstrap t UCL					0.00615
86	95% H-UCL (Log ROS)					N/A						
87												
88	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
89	KM Mean (logged)					-5.316	95% H-UCL (KM -Log)					0.00564
90	KM SD (logged)					0.235	95% Critical H Value (KM-Log)					1.823
91	KM Standard Error of Mean (logged)					0.0633						
92												
93	DL/2 Statistics											
94	DL/2 Normal						DL/2 Log-Transformed					
95	Mean in Original Scale					0.00393	Mean in Log Scale					-5.706
96	SD in Original Scale					0.00226	SD in Log Scale					0.596
97	95% t UCL (Assumes normality)					0.00492	95% H-Stat UCL					0.00554
98	DL/2 is not a recommended method, provided for comparisons and historical reasons											
99												
100	Nonparametric Distribution Free UCL Statistics											
101	Detected Data appear Normal Distributed at 5% Significance Level											
102												
103	Suggested UCL to Use											
104	95% KM (t) UCL					0.00562	95% KM (Percentile Bootstrap) UCL					0.00551

	A	B	C	D	E	F	G	H	I	J	K	L
105												
106	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
107	Recommendations are based upon data size, data distribution, and skewness.											
108	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
109	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
110												
111	**Barium**											
112												
113	**General Statistics**											
114	Total Number of Observations					23	Number of Distinct Observations					22
115							Number of Missing Observations					0
116	Minimum					0.01	Mean					0.0975
117	Maximum					0.627	Median					0.0509
118	SD					0.138	Std. Error of Mean					0.0287
119	Coefficient of Variation					1.41	Skewness					3.255
120												
121	**Normal GOF Test**											
122	Shapiro Wilk Test Statistic					0.523	**Shapiro Wilk GOF Test**					
123	5% Shapiro Wilk Critical Value					0.914	Data Not Normal at 5% Significance Level					
124	Lilliefors Test Statistic					0.377	**Lilliefors GOF Test**					
125	5% Lilliefors Critical Value					0.185	Data Not Normal at 5% Significance Level					
126	**Data Not Normal at 5% Significance Level**											
127												
128	**Assuming Normal Distribution**											
129	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
130	95% Student's-t UCL					0.147	95% Adjusted-CLT UCL (Chen-1995)					0.165
131							95% Modified-t UCL (Johnson-1978)					0.15
132												
133	**Gamma GOF Test**											
134	A-D Test Statistic					1.763	**Anderson-Darling Gamma GOF Test**					
135	5% A-D Critical Value					0.765	Data Not Gamma Distributed at 5% Significance Level					
136	K-S Test Statistic					0.244	**Kolmogrov-Smirnoff Gamma GOF Test**					
137	5% K-S Critical Value					0.186	Data Not Gamma Distributed at 5% Significance Level					
138	**Data Not Gamma Distributed at 5% Significance Level**											
139												
140	**Gamma Statistics**											
141	k hat (MLE)					1.218	k star (bias corrected MLE)					1.088
142	Theta hat (MLE)					0.0801	Theta star (bias corrected MLE)					0.0897
143	nu hat (MLE)					56.01	nu star (bias corrected)					50.04
144	MLE Mean (bias corrected)					0.0975	MLE Sd (bias corrected)					0.0935
145							Approximate Chi Square Value (0.05)					34.79
146	Adjusted Level of Significance					0.0389	Adjusted Chi Square Value					33.87
147												
148	**Assuming Gamma Distribution**											
149	95% Approximate Gamma UCL (use when n>=50))					0.14	95% Adjusted Gamma UCL (use when n<50)					0.144
150												
151	**Lognormal GOF Test**											
152	Shapiro Wilk Test Statistic					0.918	**Shapiro Wilk Lognormal GOF Test**					
153	5% Shapiro Wilk Critical Value					0.914	Data appear Lognormal at 5% Significance Level					
154	Lilliefors Test Statistic					0.166	**Lilliefors Lognormal GOF Test**					
155	5% Lilliefors Critical Value					0.185	Data appear Lognormal at 5% Significance Level					
156	**Data appear Lognormal at 5% Significance Level**											

	A	B	C	D	E	F	G	H	I	J	K	L
157												
158						Lognormal Statistics						
159					Minimum of Logged Data	-4.605				Mean of logged Data		-2.792
160					Maximum of Logged Data	-0.467				SD of logged Data		0.877
161												
162						Assuming Lognormal Distribution						
163					95% H-UCL	0.14				90% Chebyshev (MVUE) UCL		0.141
164					95% Chebyshev (MVUE) UCL	0.166				97.5% Chebyshev (MVUE) UCL		0.199
165					99% Chebyshev (MVUE) UCL	0.265						
166												
167						Nonparametric Distribution Free UCL Statistics						
168						Data appear to follow a Discernible Distribution at 5% Significance Level						
169												
170						Nonparametric Distribution Free UCLs						
171					95% CLT UCL	0.145				95% Jackknife UCL		0.147
172					95% Standard Bootstrap UCL	0.142				95% Bootstrap-t UCL		0.282
173					95% Hall's Bootstrap UCL	0.392				95% Percentile Bootstrap UCL		0.149
174					95% BCA Bootstrap UCL	0.175						
175					90% Chebyshev(Mean, Sd) UCL	0.184				95% Chebyshev(Mean, Sd) UCL		0.223
176					97.5% Chebyshev(Mean, Sd) UCL	0.277				99% Chebyshev(Mean, Sd) UCL		0.383
177												
178						Suggested UCL to Use						
179					95% H-UCL	0.14						
180												
181					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
182					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
183					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
184					For additional insight the user may want to consult a statistician.							
185												
186						ProUCL computes and outputs H-statistic based UCLs for historical reasons only.						
187						H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.						
188						It is therefore recommended to avoid the use of H-statistic based 95% UCLs.						
189						Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.						
190												
191	Cadmium											
192												
193						General Statistics						
194					Total Number of Observations	23				Number of Distinct Observations		2
195					Number of Detects	1				Number of Non-Detects		22
196					Number of Distinct Detects	1				Number of Distinct Non-Detects		1
197												
198						Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!						
199						It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).						
200												
201						The data set for variable Cadmium was not processed!						
202												
203												
204	Cobalt											
205												
206						General Statistics						
207					Total Number of Observations	23				Number of Distinct Observations		2
208					Number of Detects	2				Number of Non-Detects		21

	A	B	C	D	E	F	G	H	I	J	K	L
209					Number of Distinct Detects	2					Number of Distinct Non-Detects	1
210					Minimum Detect	0.0043					Minimum Non-Detect	0.0043
211					Maximum Detect	0.0117					Maximum Non-Detect	0.0043
212					Variance Detects	2.7380E-5					Percent Non-Detects	91.3%
213					Mean Detects	0.008					SD Detects	0.00523
214					Median Detects	0.008					CV Detects	0.654
215					Skewness Detects	N/A					Kurtosis Detects	N/A
216					Mean of Logged Detects	-4.949					SD of Logged Detects	0.708
217												
218					Warning: Data set has only 2 Detected Values.							
219					This is not enough to compute meaningful or reliable statistics and estimates.							
220												
221												
222					Normal GOF Test on Detects Only							
223					Not Enough Data to Perform GOF Test							
224												
225					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
226					Mean	0.00462					Standard Error of Mean	4.4501E-4
227					SD	0.00151					95% KM (BCA) UCL	N/A
228					95% KM (t) UCL	0.00539					95% KM (Percentile Bootstrap) UCL	N/A
229					95% KM (z) UCL	0.00535					95% KM Bootstrap t UCL	N/A
230					90% KM Chebyshev UCL	0.00596					95% KM Chebyshev UCL	0.00656
231					97.5% KM Chebyshev UCL	0.0074					99% KM Chebyshev UCL	0.00905
232												
233					Gamma GOF Tests on Detected Observations Only							
234					Not Enough Data to Perform GOF Test							
235												
236					Gamma Statistics on Detected Data Only							
237					k hat (MLE)	4.315					k star (bias corrected MLE)	N/A
238					Theta hat (MLE)	0.00185					Theta star (bias corrected MLE)	N/A
239					nu hat (MLE)	17.26					nu star (bias corrected)	N/A
240					MLE Mean (bias corrected)	N/A					MLE Sd (bias corrected)	N/A
241												
242					Gamma Kaplan-Meier (KM) Statistics							
243					k hat (KM)	9.38					nu hat (KM)	431.5
244											Adjusted Level of Significance (β)	0.0389
245					Approximate Chi Square Value (431.46, α)	384.3					Adjusted Chi Square Value (431.46, β)	381.1
246					95% Gamma Approximate KM-UCL (use when n>=50)	0.00519					95% Gamma Adjusted KM-UCL (use when n<50)	0.00523
247												
248					Lognormal GOF Test on Detected Observations Only							
249					Not Enough Data to Perform GOF Test							
250												
251					Lognormal ROS Statistics Using Imputed Non-Detects							
252					Mean in Original Scale	8.2663E-4					Mean in Log Scale	-10.28
253					SD in Original Scale	0.00254					SD in Log Scale	2.867
254					95% t UCL (assumes normality of ROS data)	0.00173					95% Percentile Bootstrap UCL	0.00178
255					95% BCA Bootstrap UCL	0.0024					95% Bootstrap t UCL	0.00815
256					95% H-UCL (Log ROS)	0.0619						
257												
258					DL/2 Statistics							
259					DL/2 Normal						DL/2 Log-Transformed	
260					Mean in Original Scale	0.00266					Mean in Log Scale	-6.038

	A	B	C	D	E	F	G	H	I	J	K	L
261					SD in Original Scale	0.00202					SD in Log Scale	0.376
262					95% t UCL (Assumes normality)	0.00338					95% H-Stat UCL	0.00297
263					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
264												
265					**Nonparametric Distribution Free UCL Statistics**							
266					**Data do not follow a Discernible Distribution at 5% Significance Level**							
267												
268					**Suggested UCL to Use**							
269					95% KM (t) UCL	0.00539					95% KM (% Bootstrap) UCL	N/A
270					**Warning: One or more Recommended UCL(s) not available!**							
271												
272					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
273					Recommendations are based upon data size, data distribution, and skewness.							
274					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
275					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
276												
277	**Iron**											
278												
279					**General Statistics**							
280					Total Number of Observations	23					Number of Distinct Observations	16
281					Number of Detects	15					Number of Non-Detects	8
282					Number of Distinct Detects	15					Number of Distinct Non-Detects	1
283					Minimum Detect	0.0766					Minimum Non-Detect	0.0736
284					Maximum Detect	53.4					Maximum Non-Detect	0.0736
285					Variance Detects	235.2					Percent Non-Detects	34.78%
286					Mean Detects	6.602					SD Detects	15.34
287					Median Detects	0.303					CV Detects	2.323
288					Skewness Detects	2.656					Kurtosis Detects	6.632
289					Mean of Logged Detects	-0.416					SD of Logged Detects	2.123
290												
291					**Normal GOF Test on Detects Only**							
292					Shapiro Wilk Test Statistic	0.498					**Shapiro Wilk GOF Test**	
293					5% Shapiro Wilk Critical Value	0.881					Detected Data Not Normal at 5% Significance Level	
294					Lilliefors Test Statistic	0.411					**Lilliefors GOF Test**	
295					5% Lilliefors Critical Value	0.229					Detected Data Not Normal at 5% Significance Level	
296					**Detected Data Not Normal at 5% Significance Level**							
297												
298					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
299					Mean	4.331					Standard Error of Mean	2.668
300					SD	12.36					95% KM (BCA) UCL	8.95
301					95% KM (t) UCL	8.913					95% KM (Percentile Bootstrap) UCL	9.096
302					95% KM (z) UCL	8.72					95% KM Bootstrap t UCL	34.16
303					90% KM Chebyshev UCL	12.34					95% KM Chebyshev UCL	15.96
304					97.5% KM Chebyshev UCL	21					99% KM Chebyshev UCL	30.88
305												
306					**Gamma GOF Tests on Detected Observations Only**							
307					A-D Test Statistic	1.733					**Anderson-Darling GOF Test**	
308					5% A-D Critical Value	0.836					Detected Data Not Gamma Distributed at 5% Significance Level	
309					K-S Test Statistic	0.287					**Kolmogrov-Smirnoff GOF**	
310					5% K-S Critical Value	0.24					Detected Data Not Gamma Distributed at 5% Significance Level	
311					**Detected Data Not Gamma Distributed at 5% Significance Level**							
312												

	A	B	C	D	E	F	G	H	I	J	K	L
313	**Gamma Statistics on Detected Data Only**											
314					k hat (MLE)	0.299				k star (bias corrected MLE)		0.284
315					Theta hat (MLE)	22.05				Theta star (bias corrected MLE)		23.25
316					nu hat (MLE)	8.983				nu star (bias corrected)		8.52
317					MLE Mean (bias corrected)	6.602				MLE Sd (bias corrected)		12.39
318												
319	**Gamma Kaplan-Meier (KM) Statistics**											
320					k hat (KM)	0.123				nu hat (KM)		5.646
321					Approximate Chi Square Value (5.65, α)	1.462				Adjusted Chi Square Value (5.65, β)		1.314
322					95% Gamma Approximate KM-UCL (use when n>=50)	16.73				95% Gamma Adjusted KM-UCL (use when n<50)		18.61
323												
324	**Gamma ROS Statistics using Imputed Non-Detects**											
325	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
326	GROS may not be used when kstar of detected data is small such as < 0.1											
327	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
328	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
329					Minimum	0.01				Mean		4.309
330					Maximum	53.4				Median		0.117
331					SD	12.65				CV		2.935
332					k hat (MLE)	0.218				k star (bias corrected MLE)		0.218
333					Theta hat (MLE)	19.78				Theta star (bias corrected MLE)		19.73
334					nu hat (MLE)	10.02				nu star (bias corrected)		10.05
335					MLE Mean (bias corrected)	4.309				MLE Sd (bias corrected)		9.221
336										Adjusted Level of Significance (β)		0.0389
337					Approximate Chi Square Value (10.05, α)	3.97				Adjusted Chi Square Value (10.05, β)		3.697
338					95% Gamma Approximate UCL (use when n>=50)	10.9				95% Gamma Adjusted UCL (use when n<50)		11.71
339												
340	**Lognormal GOF Test on Detected Observations Only**											
341					Shapiro Wilk Test Statistic	0.858				**Shapiro Wilk GOF Test**		
342					5% Shapiro Wilk Critical Value	0.881				Detected Data Not Lognormal at 5% Significance Level		
343					Lilliefors Test Statistic	0.188				**Lilliefors GOF Test**		
344					5% Lilliefors Critical Value	0.229				Detected Data appear Lognormal at 5% Significance Level		
345	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
346												
347	**Lognormal ROS Statistics Using Imputed Non-Detects**											
348					Mean in Original Scale	4.308				Mean in Log Scale		-2.279
349					SD in Original Scale	12.65				SD in Log Scale		3.221
350					95% t UCL (assumes normality of ROS data)	8.837				95% Percentile Bootstrap UCL		8.901
351					95% BCA Bootstrap UCL	11				95% Bootstrap t UCL		34.5
352					95% H-UCL (Log ROS)	1257						
353												
354	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
355					KM Mean (logged)	-1.179				95% H-UCL (KM -Log)		11.03
356					KM SD (logged)	1.958				95% Critical H Value (KM-Log)		3.982
357					KM Standard Error of Mean (logged)	0.423						
358												
359	**DL/2 Statistics**											
360				**DL/2 Normal**						**DL/2 Log-Transformed**		
361					Mean in Original Scale	4.318				Mean in Log Scale		-1.42
362					SD in Original Scale	12.65				SD in Log Scale		2.201
363					95% t UCL (Assumes normality)	8.846				95% H-Stat UCL		21.32
364	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											

	A	B	C	D	E	F	G	H	I	J	K	L
365												
366	**Nonparametric Distribution Free UCL Statistics**											
367	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**											
368												
369	**Suggested UCL to Use**											
370					99% KM (Chebyshev) UCL	30.88						
371												
372	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
373	Recommendations are based upon data size, data distribution, and skewness.											
374	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
375	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
376												
377	**Manganese**											
378												
379	**General Statistics**											
380					Total Number of Observations	23			Number of Distinct Observations			18
381					Number of Detects	18			Number of Non-Detects			5
382					Number of Distinct Detects	17			Number of Distinct Non-Detects			1
383					Minimum Detect	0.0051			Minimum Non-Detect			0.0043
384					Maximum Detect	7.61			Maximum Non-Detect			0.0043
385					Variance Detects	3.653			Percent Non-Detects			21.74%
386					Mean Detects	0.838			SD Detects			1.911
387					Median Detects	0.0691			CV Detects			2.281
388					Skewness Detects	3.032			Kurtosis Detects			9.832
389					Mean of Logged Detects	-2.543			SD of Logged Detects			2.367
390												
391	**Normal GOF Test on Detects Only**											
392					Shapiro Wilk Test Statistic	0.507			**Shapiro Wilk GOF Test**			
393					5% Shapiro Wilk Critical Value	0.897			Detected Data Not Normal at 5% Significance Level			
394					Lilliefors Test Statistic	0.394			**Lilliefors GOF Test**			
395					5% Lilliefors Critical Value	0.209			Detected Data Not Normal at 5% Significance Level			
396	**Detected Data Not Normal at 5% Significance Level**											
397												
398	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
399					Mean	0.657			Standard Error of Mean			0.36
400					SD	1.679			95% KM (BCA) UCL			1.291
401					95% KM (t) UCL	1.275			95% KM (Percentile Bootstrap) UCL			1.284
402					95% KM (z) UCL	1.249			95% KM Bootstrap t UCL			2.163
403					90% KM Chebyshev UCL	1.737			95% KM Chebyshev UCL			2.227
404					97.5% KM Chebyshev UCL	2.906			99% KM Chebyshev UCL			4.241
405												
406	**Gamma GOF Tests on Detected Observations Only**											
407					A-D Test Statistic	1.273			**Anderson-Darling GOF Test**			
408					5% A-D Critical Value	0.846			Detected Data Not Gamma Distributed at 5% Significance Level			
409					K-S Test Statistic	0.229			**Kolmogrov-Smirnoff GOF**			
410					5% K-S Critical Value	0.221			Detected Data Not Gamma Distributed at 5% Significance Level			
411	**Detected Data Not Gamma Distributed at 5% Significance Level**											
412												
413	**Gamma Statistics on Detected Data Only**											
414					k hat (MLE)	0.293			k star (bias corrected MLE)			0.281
415					Theta hat (MLE)	2.862			Theta star (bias corrected MLE)			2.982
416					nu hat (MLE)	10.54			nu star (bias corrected)			10.11

	A	B	C	D	E	F	G	H	I	J	K	L
417					MLE Mean (bias corrected)	0.838				MLE Sd (bias corrected)		1.581
418												
419					Gamma Kaplan-Meier (KM) Statistics							
420					k hat (KM)	0.153				nu hat (KM)		7.037
421					Approximate Chi Square Value (7.04, α)	2.191				Adjusted Chi Square Value (7.04, β)		2
422					95% Gamma Approximate KM-UCL (use when n>=50)	2.109				95% Gamma Adjusted KM-UCL (use when n<50)		2.31
423												
424					Gamma ROS Statistics using Imputed Non-Detects							
425					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
426					GROS may not be used when kstar of detected data is small such as < 0.1							
427					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
428					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
429					Minimum	0.0051				Mean		0.658
430					Maximum	7.61				Median		0.021
431					SD	1.716				CV		2.609
432					k hat (MLE)	0.272				k star (bias corrected MLE)		0.266
433					Theta hat (MLE)	2.415				Theta star (bias corrected MLE)		2.475
434					nu hat (MLE)	12.53				nu star (bias corrected)		12.23
435					MLE Mean (bias corrected)	0.658				MLE Sd (bias corrected)		1.276
436										Adjusted Level of Significance (β)		0.0389
437					Approximate Chi Square Value (12.23, α)	5.377				Adjusted Chi Square Value (12.23, β)		5.05
438					95% Gamma Approximate UCL (use when n>=50)	1.496				95% Gamma Adjusted UCL (use when n<50)		1.593
439												
440					Lognormal GOF Test on Detected Observations Only							
441					Shapiro Wilk Test Statistic	0.915				Shapiro Wilk GOF Test		
442					5% Shapiro Wilk Critical Value	0.897				Detected Data appear Lognormal at 5% Significance Level		
443					Lilliefors Test Statistic	0.154				Lilliefors GOF Test		
444					5% Lilliefors Critical Value	0.209				Detected Data appear Lognormal at 5% Significance Level		
445					Detected Data appear Lognormal at 5% Significance Level							
446												
447					Lognormal ROS Statistics Using Imputed Non-Detects							
448					Mean in Original Scale	0.656				Mean in Log Scale		-3.769
449					SD in Original Scale	1.717				SD in Log Scale		3.202
450					95% t UCL (assumes normality of ROS data)	1.27				95% Percentile Bootstrap UCL		1.284
451					95% BCA Bootstrap UCL	1.651				95% Bootstrap t UCL		2.158
452					95% H-UCL (Log ROS)	253.5						
453												
454					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
455					KM Mean (logged)	-3.174				95% H-UCL (KM -Log)		7.1
456					KM SD (logged)	2.362				95% Critical H Value (KM-Log)		4.66
457					KM Standard Error of Mean (logged)	0.507						
458												
459					DL/2 Statistics							
460					DL/2 Normal					DL/2 Log-Transformed		
461					Mean in Original Scale	0.656				Mean in Log Scale		-3.325
462					SD in Original Scale	1.717				SD in Log Scale		2.575
463					95% t UCL (Assumes normality)	1.271				95% H-Stat UCL		15.67
464					DL/2 is not a recommended method, provided for comparisons and historical reasons							
465												
466					Nonparametric Distribution Free UCL Statistics							
467					Detected Data appear Lognormal Distributed at 5% Significance Level							
468												

	A	B	C	D	E	F	G	H	I	J	K	L
469						Suggested UCL to Use						
470					99% KM (Chebyshev) UCL	4.241						
471												
472					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
473					Recommendations are based upon data size, data distribution, and skewness.							
474					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
475					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
476												
477	Mercury											
478												
479						General Statistics						
480					Total Number of Observations	23			Number of Distinct Observations		2	
481					Number of Detects	1			Number of Non-Detects		22	
482					Number of Distinct Detects	1			Number of Distinct Non-Detects		1	
483												
484					Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!							
485					It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).							
486												
487					The data set for variable Mercury was not processed!							
488												
489												
490	1,1,2-Trichloroethane											
491												
492						General Statistics						
493					Total Number of Observations	81			Number of Distinct Observations		5	
494					Number of Detects	1			Number of Non-Detects		80	
495					Number of Distinct Detects	1			Number of Distinct Non-Detects		4	
496												
497					Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!							
498					It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).							
499												
500					The data set for variable 1,1,2-Trichloroethane was not processed!							
501												
502												
503	1,1-Dichloroethane											
504												
505						General Statistics						
506					Total Number of Observations	81			Number of Distinct Observations		23	
507					Number of Detects	21			Number of Non-Detects		60	
508					Number of Distinct Detects	20			Number of Distinct Non-Detects		4	
509					Minimum Detect	0.13			Minimum Non-Detect		0.13	
510					Maximum Detect	29			Maximum Non-Detect		3.3	
511					Variance Detects	52.48			Percent Non-Detects		74.07%	
512					Mean Detects	4.311			SD Detects		7.244	
513					Median Detects	1.1			CV Detects		1.68	
514					Skewness Detects	2.679			Kurtosis Detects		7.157	
515					Mean of Logged Detects	0.475			SD of Logged Detects		1.42	
516												
517						Normal GOF Test on Detects Only						
518					Shapiro Wilk Test Statistic	0.596			Shapiro Wilk GOF Test			
519					5% Shapiro Wilk Critical Value	0.908			Detected Data Not Normal at 5% Significance Level			
520					Lilliefors Test Statistic	0.299			Lilliefors GOF Test			

	A	B	C	D	E	F	G	H	I	J	K	L
521					5% Lilliefors Critical Value	0.193	Detected Data Not Normal at 5% Significance Level					
522	**Detected Data Not Normal at 5% Significance Level**											
523												
524	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
525					Mean	1.219				Standard Error of Mean		0.46
526					SD	4.039				95% KM (BCA) UCL		2.127
527					95% KM (t) UCL	1.984				95% KM (Percentile Bootstrap) UCL		2.035
528					95% KM (z) UCL	1.975				95% KM Bootstrap t UCL		3.144
529					90% KM Chebyshev UCL	2.598				95% KM Chebyshev UCL		3.223
530					97.5% KM Chebyshev UCL	4.091				99% KM Chebyshev UCL		5.794
531												
532	**Gamma GOF Tests on Detected Observations Only**											
533					A-D Test Statistic	1.003	**Anderson-Darling GOF Test**					
534					5% A-D Critical Value	0.794	Detected Data Not Gamma Distributed at 5% Significance Level					
535					K-S Test Statistic	0.192	**Kolmogrov-Smirnoff GOF**					
536					5% K-S Critical Value	0.199	Detected data appear Gamma Distributed at 5% Significance Level					
537	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
538												
539	**Gamma Statistics on Detected Data Only**											
540					k hat (MLE)	0.623				k star (bias corrected MLE)		0.566
541					Theta hat (MLE)	6.921				Theta star (bias corrected MLE)		7.622
542					nu hat (MLE)	26.16				nu star (bias corrected)		23.76
543					MLE Mean (bias corrected)	4.311				MLE Sd (bias corrected)		5.732
544												
545	**Gamma Kaplan-Meier (KM) Statistics**											
546					k hat (KM)	0.0911				nu hat (KM)		14.75
547					Approximate Chi Square Value (14.75, α)	7.09				Adjusted Chi Square Value (14.75, β)		6.994
548					95% Gamma Approximate KM-UCL (use when n>=50)	2.536				95% Gamma Adjusted KM-UCL (use when n<50)		2.571
549	Gamma (KM) may not be used when k hat (KM) is < 0.1											
550												
551	**Gamma ROS Statistics using Imputed Non-Detects**											
552	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
553	GROS may not be used when kstar of detected data is small such as < 0.1											
554	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
555	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
556					Minimum	0.01				Mean		1.125
557					Maximum	29				Median		0.01
558					SD	4.089				CV		3.634
559					k hat (MLE)	0.214				k star (bias corrected MLE)		0.214
560					Theta hat (MLE)	5.263				Theta star (bias corrected MLE)		5.255
561					nu hat (MLE)	34.64				nu star (bias corrected)		34.69
562					MLE Mean (bias corrected)	1.125				MLE Sd (bias corrected)		2.432
563										Adjusted Level of Significance (β)		0.047
564					Approximate Chi Square Value (34.69, α)	22.21				Adjusted Chi Square Value (34.69, β)		22.03
565					95% Gamma Approximate UCL (use when n>=50)	1.757				95% Gamma Adjusted UCL (use when n<50)		1.771
566												
567	**Lognormal GOF Test on Detected Observations Only**											
568					Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**					
569					5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level					
570					Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**					
571					5% Lilliefors Critical Value	0.193	Detected Data appear Lognormal at 5% Significance Level					
572	**Detected Data appear Lognormal at 5% Significance Level**											

	A	B	C	D	E	F	G	H	I	J	K	L
573												
574	**Lognormal ROS Statistics Using Imputed Non-Detects**											
575					Mean in Original Scale	1.148				Mean in Log Scale		-3.17
576					SD in Original Scale	4.083				SD in Log Scale		2.859
577				95% t UCL (assumes normality of ROS data)		1.903				95% Percentile Bootstrap UCL		1.96
578					95% BCA Bootstrap UCL	2.232				95% Bootstrap t UCL		3.155
579					95% H-UCL (Log ROS)	10.47						
580												
581	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
582					KM Mean (logged)	-1.375				95% H-UCL (KM -Log)		0.866
583					KM SD (logged)	1.31				95% Critical H Value (KM-Log)		2.547
584					KM Standard Error of Mean (logged)	0.15						
585												
586	**DL/2 Statistics**											
587				**DL/2 Normal**					**DL/2 Log-Transformed**			
588					Mean in Original Scale	1.206				Mean in Log Scale		-1.765
589					SD in Original Scale	4.071				SD in Log Scale		1.608
590					95% t UCL (Assumes normality)	1.959				95% H-Stat UCL		1.046
591	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
592												
593	**Nonparametric Distribution Free UCL Statistics**											
594	**Detected Data appear Approximate Gamma Distributed at 5% Significance Level**											
595												
596	**Suggested UCL to Use**											
597					95% KM (t) UCL	1.984				95% GROS Approximate Gamma UCL		1.757
598					95% Approximate Gamma KM-UCL	2.536						
599												
600	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
601	Recommendations are based upon data size, data distribution, and skewness.											
602	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
603	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
604												
605	**1,1-Dichloroethene**											
606												
607	**General Statistics**											
608					Total Number of Observations	81				Number of Distinct Observations		21
609					Number of Detects	19				Number of Non-Detects		62
610					Number of Distinct Detects	17				Number of Distinct Non-Detects		4
611					Minimum Detect	0.13				Minimum Non-Detect		0.09
612					Maximum Detect	56				Maximum Non-Detect		2.3
613					Variance Detects	252.3				Percent Non-Detects		76.54%
614					Mean Detects	8.461				SD Detects		15.88
615					Median Detects	2.1				CV Detects		1.877
616					Skewness Detects	2.628				Kurtosis Detects		5.989
617					Mean of Logged Detects	0.981				SD of Logged Detects		1.539
618												
619	**Normal GOF Test on Detects Only**											
620					Shapiro Wilk Test Statistic	0.531				**Shapiro Wilk GOF Test**		
621					5% Shapiro Wilk Critical Value	0.901				Detected Data Not Normal at 5% Significance Level		
622					Lilliefors Test Statistic	0.331				**Lilliefors GOF Test**		
623					5% Lilliefors Critical Value	0.203				Detected Data Not Normal at 5% Significance Level		
624	**Detected Data Not Normal at 5% Significance Level**											

	A	B	C	D	E	F	G	H	I	J	K	L
625												
626	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
627					Mean	2.056				Standard Error of Mean		0.946
628					SD	8.285				95% KM (BCA) UCL		3.839
629					95% KM (t) UCL	3.63				95% KM (Percentile Bootstrap) UCL		3.681
630					95% KM (z) UCL	3.612				95% KM Bootstrap t UCL		8.281
631					90% KM Chebyshev UCL	4.893				95% KM Chebyshev UCL		6.179
632					97.5% KM Chebyshev UCL	7.962				99% KM Chebyshev UCL		11.47
633												
634	**Gamma GOF Tests on Detected Observations Only**											
635					A-D Test Statistic	1.206	**Anderson-Darling GOF Test**					
636					5% A-D Critical Value	0.799	Detected Data Not Gamma Distributed at 5% Significance Level					
637					K-S Test Statistic	0.245	**Kolmogrov-Smirnoff GOF**					
638					5% K-S Critical Value	0.209	Detected Data Not Gamma Distributed at 5% Significance Level					
639	**Detected Data Not Gamma Distributed at 5% Significance Level**											
640												
641	**Gamma Statistics on Detected Data Only**											
642					k hat (MLE)	0.543				k star (bias corrected MLE)		0.493
643					Theta hat (MLE)	15.57				Theta star (bias corrected MLE)		17.17
644					nu hat (MLE)	20.65				nu star (bias corrected)		18.72
645					MLE Mean (bias corrected)	8.461				MLE Sd (bias corrected)		12.05
646												
647	**Gamma Kaplan-Meier (KM) Statistics**											
648					k hat (KM)	0.0616				nu hat (KM)		9.979
649					Approximate Chi Square Value (9.98, α)	3.929				Adjusted Chi Square Value (9.98, β)		3.86
650					95% Gamma Approximate KM-UCL (use when n>=50)	5.223				95% Gamma Adjusted KM-UCL (use when n<50)		5.316
651	Gamma (KM) may not be used when k hat (KM) is < 0.1											
652												
653	**Gamma ROS Statistics using Imputed Non-Detects**											
654	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
655	GROS may not be used when kstar of detected data is small such as < 0.1											
656	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
657	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
658					Minimum	0.01				Mean		1.992
659					Maximum	56				Median		0.01
660					SD	8.351				CV		4.192
661					k hat (MLE)	0.187				k star (bias corrected MLE)		0.188
662					Theta hat (MLE)	10.67				Theta star (bias corrected MLE)		10.6
663					nu hat (MLE)	30.25				nu star (bias corrected)		30.46
664					MLE Mean (bias corrected)	1.992				MLE Sd (bias corrected)		4.595
665										Adjusted Level of Significance (β)		0.047
666					Approximate Chi Square Value (30.46, α)	18.85				Adjusted Chi Square Value (30.46, β)		18.69
667					95% Gamma Approximate UCL (use when n>=50)	3.218				95% Gamma Adjusted UCL (use when n<50)		3.247
668												
669	**Lognormal GOF Test on Detected Observations Only**											
670					Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**					
671					5% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 5% Significance Level					
672					Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**					
673					5% Lilliefors Critical Value	0.203	Detected Data appear Lognormal at 5% Significance Level					
674	**Detected Data appear Lognormal at 5% Significance Level**											
675												
676	**Lognormal ROS Statistics Using Imputed Non-Detects**											

	A	B	C	D	E	F	G	H	I	J	K	L
677					Mean in Original Scale	2.022					Mean in Log Scale	-3.301
678					SD in Original Scale	8.344					SD in Log Scale	3.198
679				95% t UCL (assumes normality of ROS data)		3.565					95% Percentile Bootstrap UCL	3.62
680					95% BCA Bootstrap UCL	4.193					95% Bootstrap t UCL	8.19
681					95% H-UCL (Log ROS)	35.9						
682												
683					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
684					KM Mean (logged)	-1.606					95% H-UCL (KM -Log)	1.234
685					KM SD (logged)	1.61					95% Critical H Value (KM-Log)	2.885
686					KM Standard Error of Mean (logged)	0.184						
687												
688					DL/2 Statistics							
689				DL/2 Normal					DL/2 Log-Transformed			
690					Mean in Original Scale	2.047					Mean in Log Scale	-2.007
691					SD in Original Scale	8.339					SD in Log Scale	1.899
692					95% t UCL (Assumes normality)	3.589					95% H-Stat UCL	1.622
693					DL/2 is not a recommended method, provided for comparisons and historical reasons							
694												
695					Nonparametric Distribution Free UCL Statistics							
696					Detected Data appear Lognormal Distributed at 5% Significance Level							
697												
698					Suggested UCL to Use							
699					95% KM (Chebyshev) UCL	6.179						
700												
701					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
702					Recommendations are based upon data size, data distribution, and skewness.							
703					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
704					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
705												
706	1,2-Dichloroethane											
707												
708					General Statistics							
709					Total Number of Observations	0					Number of Distinct Observations	0
710											Number of Missing Observations	81
711					Minimum	N/A					Mean	N/A
712					Maximum	N/A					Median	N/A
713												
714					Warning: This data set only has 0 observations!							
715					Data set is too small to compute reliable and meaningful statistics and estimates!							
716					The data set for variable 1,2-Dichloroethane was not processed!							
717												
718					It is suggested to collect at least 8 to 10 observations before using these statistical methods!							
719					If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.							
720												
721	1,4-Dioxane											
722												
723					General Statistics							
724					Total Number of Observations	54					Number of Distinct Observations	12
725					Number of Detects	11					Number of Non-Detects	43
726					Number of Distinct Detects	10					Number of Distinct Non-Detects	2
727					Minimum Detect	0.74					Minimum Non-Detect	0.31
728					Maximum Detect	45					Maximum Non-Detect	0.5

	A	B	C	D	E	F	G	H	I	J	K	L
729					Variance Detects	275.6					Percent Non-Detects	79.63%
730					Mean Detects	14.14					SD Detects	16.6
731					Median Detects	6.7					CV Detects	1.174
732					Skewness Detects	1.092					Kurtosis Detects	-0.529
733					Mean of Logged Detects	1.816					SD of Logged Detects	1.476
734												
735					**Normal GOF Test on Detects Only**							
736					Shapiro Wilk Test Statistic	0.774			**Shapiro Wilk GOF Test**			
737					5% Shapiro Wilk Critical Value	0.85			Detected Data Not Normal at 5% Significance Level			
738					Lilliefors Test Statistic	0.298			**Lilliefors GOF Test**			
739					5% Lilliefors Critical Value	0.267			Detected Data Not Normal at 5% Significance Level			
740					**Detected Data Not Normal at 5% Significance Level**							
741												
742					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
743					Mean	3.127					Standard Error of Mean	1.293
744					SD	9.059					95% KM (BCA) UCL	5.361
745					95% KM (t) UCL	5.292					95% KM (Percentile Bootstrap) UCL	5.213
746					95% KM (z) UCL	5.254					95% KM Bootstrap t UCL	6.713
747					90% KM Chebyshev UCL	7.006					95% KM Chebyshev UCL	8.763
748					97.5% KM Chebyshev UCL	11.2					99% KM Chebyshev UCL	15.99
749												
750					**Gamma GOF Tests on Detected Observations Only**							
751					A-D Test Statistic	0.519			**Anderson-Darling GOF Test**			
752					5% A-D Critical Value	0.765			Detected data appear Gamma Distributed at 5% Significance Level			
753					K-S Test Statistic	0.198			**Kolmogrov-Smirnoff GOF**			
754					5% K-S Critical Value	0.265			Detected data appear Gamma Distributed at 5% Significance Level			
755					**Detected data appear Gamma Distributed at 5% Significance Level**							
756												
757					**Gamma Statistics on Detected Data Only**							
758					k hat (MLE)	0.723					k star (bias corrected MLE)	0.586
759					Theta hat (MLE)	19.57					Theta star (bias corrected MLE)	24.12
760					nu hat (MLE)	15.9					nu star (bias corrected)	12.9
761					MLE Mean (bias corrected)	14.14					MLE Sd (bias corrected)	18.47
762												
763					**Gamma Kaplan-Meier (KM) Statistics**							
764					k hat (KM)	0.119					nu hat (KM)	12.87
765					Approximate Chi Square Value (12.87, α)	5.805					Adjusted Chi Square Value (12.87, β)	5.674
766					95% Gamma Approximate KM-UCL (use when n>=50)	6.933					95% Gamma Adjusted KM-UCL (use when n<50)	7.092
767												
768					**Gamma ROS Statistics using Imputed Non-Detects**							
769					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
770					GROS may not be used when kstar of detected data is small such as < 0.1							
771					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
772					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
773					Minimum	0.01					Mean	2.888
774					Maximum	45					Median	0.01
775					SD	9.22					CV	3.192
776					k hat (MLE)	0.173					k star (bias corrected MLE)	0.175
777					Theta hat (MLE)	16.72					Theta star (bias corrected MLE)	16.46
778					nu hat (MLE)	18.65					nu star (bias corrected)	18.95
779					MLE Mean (bias corrected)	2.888					MLE Sd (bias corrected)	6.895
780											Adjusted Level of Significance (β)	0.0456

	A	B	C	D	E	F	G	H	I	J	K	L
781	Approximate Chi Square Value (18.95, α)					10.08	Adjusted Chi Square Value (18.95, β)					9.904
782	95% Gamma Approximate UCL (use when n>=50)					5.429	95% Gamma Adjusted UCL (use when n<50)					5.527
783												
784	**Lognormal GOF Test on Detected Observations Only**											
785	Shapiro Wilk Test Statistic					0.913	**Shapiro Wilk GOF Test**					
786	5% Shapiro Wilk Critical Value					0.85	Detected Data appear Lognormal at 5% Significance Level					
787	Lilliefors Test Statistic					0.194	**Lilliefors GOF Test**					
788	5% Lilliefors Critical Value					0.267	Detected Data appear Lognormal at 5% Significance Level					
789	**Detected Data appear Lognormal at 5% Significance Level**											
790												
791	**Lognormal ROS Statistics Using Imputed Non-Detects**											
792	Mean in Original Scale					2.956	Mean in Log Scale					-3.064
793	SD in Original Scale					9.2	SD in Log Scale					3.441
794	95% t UCL (assumes normality of ROS data)					5.052	95% Percentile Bootstrap UCL					5.089
795	95% BCA Bootstrap UCL					5.838	95% Bootstrap t UCL					6.515
796	95% H-UCL (Log ROS)					275.9						
797												
798	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
799	KM Mean (logged)					-0.563	95% H-UCL (KM -Log)					2.433
800	KM SD (logged)					1.361	95% Critical H Value (KM-Log)					2.814
801	KM Standard Error of Mean (logged)					0.194						
802												
803	**DL/2 Statistics**											
804	**DL/2 Normal**						**DL/2 Log-Transformed**					
805	Mean in Original Scale					3.007	Mean in Log Scale					-1.097
806	SD in Original Scale					9.182	SD in Log Scale					1.622
807	95% t UCL (Assumes normality)					5.099	95% H-Stat UCL					2.507
808	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
809												
810	**Nonparametric Distribution Free UCL Statistics**											
811	**Detected Data appear Gamma Distributed at 5% Significance Level**											
812												
813	**Suggested UCL to Use**											
814	95% KM (t) UCL					5.292	95% GROS Approximate Gamma UCL					5.429
815	95% Approximate Gamma KM-UCL					6.933						
816												
817	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
818	Recommendations are based upon data size, data distribution, and skewness.											
819	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
820	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
821												
822	**Benzene**											
823												
824	**General Statistics**											
825	Total Number of Observations					81	Number of Distinct Observations					19
826	Number of Detects					18	Number of Non-Detects					63
827	Number of Distinct Detects					15	Number of Distinct Non-Detects					4
828	Minimum Detect					0.11	Minimum Non-Detect					0.08
829	Maximum Detect					0.45	Maximum Non-Detect					2
830	Variance Detects					0.00929	Percent Non-Detects					77.78%
831	Mean Detects					0.222	SD Detects					0.0964
832	Median Detects					0.21	CV Detects					0.435

	A	B	C	D	E	F	G	H	I	J	K	L
833					Skewness Detects	1.299					Kurtosis Detects	1.345
834					Mean of Logged Detects	-1.585					SD of Logged Detects	0.398
835												
836					Normal GOF Test on Detects Only							
837					Shapiro Wilk Test Statistic	0.868			Shapiro Wilk GOF Test			
838					5% Shapiro Wilk Critical Value	0.897			Detected Data Not Normal at 5% Significance Level			
839					Lilliefors Test Statistic	0.202			Lilliefors GOF Test			
840					5% Lilliefors Critical Value	0.209			Detected Data appear Normal at 5% Significance Level			
841					Detected Data appear Approximate Normal at 5% Significance Level							
842												
843					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
844					Mean	0.114			Standard Error of Mean			0.00891
845					SD	0.0754			95% KM (BCA) UCL			0.13
846					95% KM (t) UCL	0.129			95% KM (Percentile Bootstrap) UCL			0.128
847					95% KM (z) UCL	0.129			95% KM Bootstrap t UCL			0.133
848					90% KM Chebyshev UCL	0.141			95% KM Chebyshev UCL			0.153
849					97.5% KM Chebyshev UCL	0.17			99% KM Chebyshev UCL			0.203
850												
851					Gamma GOF Tests on Detected Observations Only							
852					A-D Test Statistic	0.399			Anderson-Darling GOF Test			
853					5% A-D Critical Value	0.742			Detected data appear Gamma Distributed at 5% Significance Level			
854					K-S Test Statistic	0.146			Kolmogrov-Smirnoff GOF			
855					5% K-S Critical Value	0.204			Detected data appear Gamma Distributed at 5% Significance Level			
856					Detected data appear Gamma Distributed at 5% Significance Level							
857												
858					Gamma Statistics on Detected Data Only							
859					k hat (MLE)	6.54			k star (bias corrected MLE)			5.487
860					Theta hat (MLE)	0.0339			Theta star (bias corrected MLE)			0.0404
861					nu hat (MLE)	235.4			nu star (bias corrected)			197.5
862					MLE Mean (bias corrected)	0.222			MLE Sd (bias corrected)			0.0946
863												
864					Gamma Kaplan-Meier (KM) Statistics							
865					k hat (KM)	2.286			nu hat (KM)			370.3
866					Approximate Chi Square Value (370.35, α)	326.7			Adjusted Chi Square Value (370.35, β)			326
867					95% Gamma Approximate KM-UCL (use when n>=50)	0.129			95% Gamma Adjusted KM-UCL (use when n<50)			0.129
868												
869					Gamma ROS Statistics using Imputed Non-Detects							
870					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
871					GROS may not be used when kstar of detected data is small such as < 0.1							
872					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
873					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
874					Minimum	0.01			Mean			0.0688
875					Maximum	0.45			Median			0.01
876					SD	0.0967			CV			1.405
877					k hat (MLE)	0.698			k star (bias corrected MLE)			0.68
878					Theta hat (MLE)	0.0986			Theta star (bias corrected MLE)			0.101
879					nu hat (MLE)	113			nu star (bias corrected)			110.2
880					MLE Mean (bias corrected)	0.0688			MLE Sd (bias corrected)			0.0835
881									Adjusted Level of Significance (β)			0.047
882					Approximate Chi Square Value (110.20, α)	86.97			Adjusted Chi Square Value (110.20, β)			86.59
883					95% Gamma Approximate UCL (use when n>=50)	0.0872			95% Gamma Adjusted UCL (use when n<50)			0.0876
884												

	A	B	C	D	E	F	G	H	I	J	K	L
885	Lognormal GOF Test on Detected Observations Only											
886					Shapiro Wilk Test Statistic	0.96	Shapiro Wilk GOF Test					
887					5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level					
888					Lilliefors Test Statistic	0.124	Lilliefors GOF Test					
889					5% Lilliefors Critical Value	0.209	Detected Data appear Lognormal at 5% Significance Level					
890	Detected Data appear Lognormal at 5% Significance Level											
891												
892	Lognormal ROS Statistics Using Imputed Non-Detects											
893					Mean in Original Scale	0.0959	Mean in Log Scale					-2.657
894					SD in Original Scale	0.0853	SD in Log Scale					0.795
895					95% t UCL (assumes normality of ROS data)	0.112	95% Percentile Bootstrap UCL					0.111
896					95% BCA Bootstrap UCL	0.112	95% Bootstrap t UCL					0.114
897					95% H-UCL (Log ROS)	0.115						
898												
899	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
900					KM Mean (logged)	-2.299	95% H-UCL (KM -Log)					0.121
901					KM SD (logged)	0.443	95% Critical H Value (KM-Log)					1.81
902					KM Standard Error of Mean (logged)	0.0527						
903												
904	DL/2 Statistics											
905			DL/2 Normal				DL/2 Log-Transformed					
906					Mean in Original Scale	0.109	Mean in Log Scale					-2.68
907					SD in Original Scale	0.144	SD in Log Scale					0.855
908					95% t UCL (Assumes normality)	0.136	95% H-Stat UCL					0.121
909	DL/2 is not a recommended method, provided for comparisons and historical reasons											
910												
911	Nonparametric Distribution Free UCL Statistics											
912	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
913												
914	Suggested UCL to Use											
915					95% KM (t) UCL	0.129	95% KM (Percentile Bootstrap) UCL					0.128
916												
917	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
918	Recommendations are based upon data size, data distribution, and skewness.											
919	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
920	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
921												
922	Chloroform											
923												
924	General Statistics											
925					Total Number of Observations	81	Number of Distinct Observations					9
926					Number of Detects	5	Number of Non-Detects					76
927					Number of Distinct Detects	5	Number of Distinct Non-Detects					4
928					Minimum Detect	0.16	Minimum Non-Detect					0.08
929					Maximum Detect	0.27	Maximum Non-Detect					2
930					Variance Detects	0.00235	Percent Non-Detects					93.83%
931					Mean Detects	0.21	SD Detects					0.0485
932					Median Detects	0.2	CV Detects					0.231
933					Skewness Detects	0.329	Kurtosis Detects					-2.491
934					Mean of Logged Detects	-1.582	SD of Logged Detects					0.23
935												
936	Normal GOF Test on Detects Only											

	A	B	C	D	E	F	G	H	I	J	K	L
937					Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**					
938					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level					
939					Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**					
940					5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level					
941	**Detected Data appear Normal at 5% Significance Level**											
942												
943	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
944					Mean	0.0888			Standard Error of Mean			0.00449
945					SD	0.0345			95% KM (BCA) UCL			0.0972
946					95% KM (t) UCL	0.0963			95% KM (Percentile Bootstrap) UCL			0.0959
947					95% KM (z) UCL	0.0962			95% KM Bootstrap t UCL			0.0924
948					90% KM Chebyshev UCL	0.102			95% KM Chebyshev UCL			0.108
949					97.5% KM Chebyshev UCL	0.117			99% KM Chebyshev UCL			0.133
950												
951	**Gamma GOF Tests on Detected Observations Only**											
952					A-D Test Statistic	0.336	**Anderson-Darling GOF Test**					
953					5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level					
954					K-S Test Statistic	0.227	**Kolmogrov-Smirnoff GOF**					
955					5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level					
956	**Detected data appear Gamma Distributed at 5% Significance Level**											
957												
958	**Gamma Statistics on Detected Data Only**											
959					k hat (MLE)	23.67			k star (bias corrected MLE)			9.601
960					Theta hat (MLE)	0.00887			Theta star (bias corrected MLE)			0.0219
961					nu hat (MLE)	236.7			nu star (bias corrected)			96.01
962					MLE Mean (bias corrected)	0.21			MLE Sd (bias corrected)			0.0678
963												
964	**Gamma Kaplan-Meier (KM) Statistics**											
965					k hat (KM)	6.614			nu hat (KM)			1071
966					Approximate Chi Square Value (N/A, α)	996.5			Adjusted Chi Square Value (N/A, β)			995.2
967					95% Gamma Approximate KM-UCL (use when n>=50)	0.0955			95% Gamma Adjusted KM-UCL (use when n<50)			0.0956
968												
969	**Gamma ROS Statistics using Imputed Non-Detects**											
970	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
971	GROS may not be used when kstar of detected data is small such as < 0.1											
972	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
973	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
974					Minimum	0.01			Mean			0.0324
975					Maximum	0.27			Median			0.01
976					SD	0.0536			CV			1.656
977					k hat (MLE)	0.871			k star (bias corrected MLE)			0.847
978					Theta hat (MLE)	0.0372			Theta star (bias corrected MLE)			0.0382
979					nu hat (MLE)	141.2			nu star (bias corrected)			137.3
980					MLE Mean (bias corrected)	0.0324			MLE Sd (bias corrected)			0.0352
981									Adjusted Level of Significance (β)			0.047
982					Approximate Chi Square Value (137.27, α)	111.2			Adjusted Chi Square Value (137.27, β)			110.8
983					95% Gamma Approximate UCL (use when n>=50)	0.04			95% Gamma Adjusted UCL (use when n<50)			0.0401
984												
985	**Lognormal GOF Test on Detected Observations Only**											
986					Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**					
987					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level					
988					Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
989				5% Lilliefors Critical Value		0.396	Detected Data appear Lognormal at 5% Significance Level					
990	Detected Data appear Lognormal at 5% Significance Level											
991												
992	Lognormal ROS Statistics Using Imputed Non-Detects											
993				Mean in Original Scale		0.0595				Mean in Log Scale		-3.108
994				SD in Original Scale		0.0503				SD in Log Scale		0.762
995				95% t UCL (assumes normality of ROS data)		0.0688				95% Percentile Bootstrap UCL		0.0693
996				95% BCA Bootstrap UCL		0.0705				95% Bootstrap t UCL		0.0699
997				95% H-UCL (Log ROS)		0.071						
998												
999	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
1000				KM Mean (logged)		-2.462				95% H-UCL (KM -Log)		0.092
1001				KM SD (logged)		0.243				95% Critical H Value (KM-Log)		1.718
1002				KM Standard Error of Mean (logged)		0.0316						
1003												
1004	DL/2 Statistics											
1005				DL/2 Normal						DL/2 Log-Transformed		
1006				Mean in Original Scale		0.0791				Mean in Log Scale		-2.942
1007				SD in Original Scale		0.128				SD in Log Scale		0.696
1008				95% t UCL (Assumes normality)		0.103				95% H-Stat UCL		0.0785
1009	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1010												
1011	Nonparametric Distribution Free UCL Statistics											
1012	Detected Data appear Normal Distributed at 5% Significance Level											
1013												
1014	Suggested UCL to Use											
1015				95% KM (t) UCL		0.0963				95% KM (Percentile Bootstrap) UCL		0.0959
1016												
1017	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1018	Recommendations are based upon data size, data distribution, and skewness.											
1019	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1020	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1021												
1022	cis-1,2-Dichloroethene											
1023												
1024	General Statistics											
1025				Total Number of Observations		81				Number of Distinct Observations		27
1026				Number of Detects		27				Number of Non-Detects		54
1027				Number of Distinct Detects		26				Number of Distinct Non-Detects		1
1028				Minimum Detect		0.21				Minimum Non-Detect		0.18
1029				Maximum Detect		10				Maximum Non-Detect		0.18
1030				Variance Detects		8.749				Percent Non-Detects		66.67%
1031				Mean Detects		2.793				SD Detects		2.958
1032				Median Detects		1.4				CV Detects		1.059
1033				Skewness Detects		1.213				Kurtosis Detects		0.421
1034				Mean of Logged Detects		0.41				SD of Logged Detects		1.192
1035												
1036	Normal GOF Test on Detects Only											
1037				Shapiro Wilk Test Statistic		0.811				Shapiro Wilk GOF Test		
1038				5% Shapiro Wilk Critical Value		0.923				Detected Data Not Normal at 5% Significance Level		
1039				Lilliefors Test Statistic		0.2				Lilliefors GOF Test		
1040				5% Lilliefors Critical Value		0.171				Detected Data Not Normal at 5% Significance Level		

	A	B	C	D	E	F	G	H	I	J	K	L
1041	**Detected Data Not Normal at 5% Significance Level**											
1042												
1043	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1044					Mean	1.051				Standard Error of Mean		0.235
1045					SD	2.08				95% KM (BCA) UCL		1.425
1046					95% KM (t) UCL	1.443				95% KM (Percentile Bootstrap) UCL		1.447
1047					95% KM (z) UCL	1.438				95% KM Bootstrap t UCL		1.533
1048					90% KM Chebyshev UCL	1.757				95% KM Chebyshev UCL		2.077
1049					97.5% KM Chebyshev UCL	2.522				99% KM Chebyshev UCL		3.394
1050												
1051	**Gamma GOF Tests on Detected Observations Only**											
1052					A-D Test Statistic	0.742	**Anderson-Darling GOF Test**					
1053					5% A-D Critical Value	0.776	Detected data appear Gamma Distributed at 5% Significance Level					
1054					K-S Test Statistic	0.158	**Kolmogrov-Smirnoff GOF**					
1055					5% K-S Critical Value	0.173	Detected data appear Gamma Distributed at 5% Significance Level					
1056	**Detected data appear Gamma Distributed at 5% Significance Level**											
1057												
1058	**Gamma Statistics on Detected Data Only**											
1059					k hat (MLE)	0.942				k star (bias corrected MLE)		0.862
1060					Theta hat (MLE)	2.965				Theta star (bias corrected MLE)		3.24
1061					nu hat (MLE)	50.87				nu star (bias corrected)		46.55
1062					MLE Mean (bias corrected)	2.793				MLE Sd (bias corrected)		3.008
1063												
1064	**Gamma Kaplan-Meier (KM) Statistics**											
1065					k hat (KM)	0.255				nu hat (KM)		41.37
1066					Approximate Chi Square Value (41.37, α)	27.63				Adjusted Chi Square Value (41.37, β)		27.42
1067					95% Gamma Approximate KM-UCL (use when n>=50)	1.574				95% Gamma Adjusted KM-UCL (use when n<50)		1.585
1068												
1069	**Gamma ROS Statistics using Imputed Non-Detects**											
1070	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1071	GROS may not be used when kstar of detected data is small such as < 0.1											
1072	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1073	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1074					Minimum	0.01				Mean		0.938
1075					Maximum	10				Median		0.01
1076					SD	2.142				CV		2.284
1077					k hat (MLE)	0.248				k star (bias corrected MLE)		0.247
1078					Theta hat (MLE)	3.782				Theta star (bias corrected MLE)		3.797
1079					nu hat (MLE)	40.16				nu star (bias corrected)		40.01
1080					MLE Mean (bias corrected)	0.938				MLE Sd (bias corrected)		1.887
1081										Adjusted Level of Significance (β)		0.047
1082					Approximate Chi Square Value (40.01, α)	26.51				Adjusted Chi Square Value (40.01, β)		26.32
1083					95% Gamma Approximate UCL (use when n>=50)	1.415				95% Gamma Adjusted UCL (use when n<50)		1.425
1084												
1085	**Lognormal GOF Test on Detected Observations Only**											
1086					Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**					
1087					5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level					
1088					Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**					
1089					5% Lilliefors Critical Value	0.171	Detected Data appear Lognormal at 5% Significance Level					
1090	**Detected Data appear Lognormal at 5% Significance Level**											
1091												
1092	**Lognormal ROS Statistics Using Imputed Non-Detects**											

	A	B	C	D	E	F	G	H	I	J	K	L
1093					Mean in Original Scale	0.981					Mean in Log Scale	-2.146
1094					SD in Original Scale	2.124					SD in Log Scale	2.319
1095				95% t UCL (assumes normality of ROS data)		1.373					95% Percentile Bootstrap UCL	1.388
1096					95% BCA Bootstrap UCL	1.452					95% Bootstrap t UCL	1.544
1097					95% H-UCL (Log ROS)	4.569						
1098												
1099					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
1100					KM Mean (logged)	-1.007					95% H-UCL (KM -Log)	1.054
1101					KM SD (logged)	1.208					95% Critical H Value (KM-Log)	2.439
1102					KM Standard Error of Mean (logged)	0.137						
1103												
1104					DL/2 Statistics							
1105					DL/2 Normal						DL/2 Log-Transformed	
1106					Mean in Original Scale	0.991					Mean in Log Scale	-1.469
1107					SD in Original Scale	2.118					SD in Log Scale	1.5
1108					95% t UCL (Assumes normality)	1.383					95% H-Stat UCL	1.125
1109					DL/2 is not a recommended method, provided for comparisons and historical reasons							
1110												
1111					Nonparametric Distribution Free UCL Statistics							
1112					Detected Data appear Gamma Distributed at 5% Significance Level							
1113												
1114					Suggested UCL to Use							
1115					95% KM (t) UCL	1.443					95% GROS Approximate Gamma UCL	1.415
1116					95% Approximate Gamma KM-UCL	1.574						
1117												
1118					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
1119					Recommendations are based upon data size, data distribution, and skewness.							
1120					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
1121					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
1122												
1123	Tetrachloroethene											
1124												
1125					General Statistics							
1126					Total Number of Observations	81					Number of Distinct Observations	26
1127					Number of Detects	25					Number of Non-Detects	56
1128					Number of Distinct Detects	25					Number of Distinct Non-Detects	1
1129					Minimum Detect	0.12					Minimum Non-Detect	0.1
1130					Maximum Detect	16					Maximum Non-Detect	0.1
1131					Variance Detects	17.84					Percent Non-Detects	69.14%
1132					Mean Detects	3.065					SD Detects	4.223
1133					Median Detects	1					CV Detects	1.378
1134					Skewness Detects	2.272					Kurtosis Detects	4.892
1135					Mean of Logged Detects	0.315					SD of Logged Detects	1.359
1136												
1137					Normal GOF Test on Detects Only							
1138					Shapiro Wilk Test Statistic	0.673					Shapiro Wilk GOF Test	
1139					5% Shapiro Wilk Critical Value	0.918					Detected Data Not Normal at 5% Significance Level	
1140					Lilliefors Test Statistic	0.271					Lilliefors GOF Test	
1141					5% Lilliefors Critical Value	0.177					Detected Data Not Normal at 5% Significance Level	
1142					Detected Data Not Normal at 5% Significance Level							
1143												
1144					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							

	A	B	C	D	E	F	G	H	I	J	K	L
1145					Mean	1.015				Standard Error of Mean		0.303
1146					SD	2.676				95% KM (BCA) UCL		1.565
1147					95% KM (t) UCL	1.52				95% KM (Percentile Bootstrap) UCL		1.531
1148					95% KM (z) UCL	1.514				95% KM Bootstrap t UCL		1.916
1149					90% KM Chebyshev UCL	1.926				95% KM Chebyshev UCL		2.338
1150					97.5% KM Chebyshev UCL	2.91				99% KM Chebyshev UCL		4.035
1151												
1152					Gamma GOF Tests on Detected Observations Only							
1153					A-D Test Statistic	0.65				Anderson-Darling GOF Test		
1154					5% A-D Critical Value	0.784				Detected data appear Gamma Distributed at 5% Significance Level		
1155					K-S Test Statistic	0.177				Kolmogrov-Smirnoff GOF		
1156					5% K-S Critical Value	0.181				Detected data appear Gamma Distributed at 5% Significance Level		
1157					Detected data appear Gamma Distributed at 5% Significance Level							
1158												
1159					Gamma Statistics on Detected Data Only							
1160					k hat (MLE)	0.745				k star (bias corrected MLE)		0.682
1161					Theta hat (MLE)	4.117				Theta star (bias corrected MLE)		4.495
1162					nu hat (MLE)	37.23				nu star (bias corrected)		34.1
1163					MLE Mean (bias corrected)	3.065				MLE Sd (bias corrected)		3.712
1164												
1165					Gamma Kaplan-Meier (KM) Statistics							
1166					k hat (KM)	0.144				nu hat (KM)		23.32
1167					Approximate Chi Square Value (23.32, α)	13.33				Adjusted Chi Square Value (23.32, β)		13.19
1168					95% Gamma Approximate KM-UCL (use when n>=50)	1.776				95% Gamma Adjusted KM-UCL (use when n<50)		1.794
1169												
1170					Gamma ROS Statistics using Imputed Non-Detects							
1171					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
1172					GROS may not be used when kstar of detected data is small such as < 0.1							
1173					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
1174					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
1175					Minimum	0.01				Mean		0.953
1176					Maximum	16				Median		0.01
1177					SD	2.714				CV		2.848
1178					k hat (MLE)	0.236				k star (bias corrected MLE)		0.235
1179					Theta hat (MLE)	4.039				Theta star (bias corrected MLE)		4.047
1180					nu hat (MLE)	38.23				nu star (bias corrected)		38.14
1181					MLE Mean (bias corrected)	0.953				MLE Sd (bias corrected)		1.964
1182										Adjusted Level of Significance (β)		0.047
1183					Approximate Chi Square Value (38.14, α)	25				Adjusted Chi Square Value (38.14, β)		24.81
1184					95% Gamma Approximate UCL (use when n>=50)	1.454				95% Gamma Adjusted UCL (use when n<50)		1.465
1185												
1186					Lognormal GOF Test on Detected Observations Only							
1187					Shapiro Wilk Test Statistic	0.965				Shapiro Wilk GOF Test		
1188					5% Shapiro Wilk Critical Value	0.918				Detected Data appear Lognormal at 5% Significance Level		
1189					Lilliefors Test Statistic	0.121				Lilliefors GOF Test		
1190					5% Lilliefors Critical Value	0.177				Detected Data appear Lognormal at 5% Significance Level		
1191					Detected Data appear Lognormal at 5% Significance Level							
1192												
1193					Lognormal ROS Statistics Using Imputed Non-Detects							
1194					Mean in Original Scale	0.978				Mean in Log Scale		-2.809
1195					SD in Original Scale	2.706				SD in Log Scale		2.711
1196					95% t UCL (assumes normality of ROS data)	1.478				95% Percentile Bootstrap UCL		1.517

	A	B	C	D	E	F	G	H	I	J	K	L
1197					95% BCA Bootstrap UCL	1.598				95% Bootstrap t UCL		1.862
1198					95% H-UCL (Log ROS)	8.692						
1199												
1200					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
1201					KM Mean (logged)	-1.495				95% H-UCL (KM -Log)		0.935
1202					KM SD (logged)	1.418				95% Critical H Value (KM-Log)		2.665
1203					KM Standard Error of Mean (logged)	0.161						
1204												
1205					DL/2 Statistics							
1206				DL/2 Normal					DL/2 Log-Transformed			
1207					Mean in Original Scale	0.981				Mean in Log Scale		-1.974
1208					SD in Original Scale	2.705				SD in Log Scale		1.71
1209					95% t UCL (Assumes normality)	1.481				95% H-Stat UCL		1.064
1210					DL/2 is not a recommended method, provided for comparisons and historical reasons							
1211												
1212					Nonparametric Distribution Free UCL Statistics							
1213					Detected Data appear Gamma Distributed at 5% Significance Level							
1214												
1215					Suggested UCL to Use							
1216					95% KM (t) UCL	1.52				95% GROS Approximate Gamma UCL		1.454
1217					95% Approximate Gamma KM-UCL	1.776						
1218												
1219					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
1220					Recommendations are based upon data size, data distribution, and skewness.							
1221					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
1222					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
1223												
1224	Trichloroethene											
1225												
1226					General Statistics							
1227					Total Number of Observations	81				Number of Distinct Observations		51
1228					Number of Detects	61				Number of Non-Detects		20
1229					Number of Distinct Detects	50				Number of Distinct Non-Detects		1
1230					Minimum Detect	0.11				Minimum Non-Detect		0.09
1231					Maximum Detect	4900				Maximum Non-Detect		0.09
1232					Variance Detects	750283				Percent Non-Detects		24.69%
1233					Mean Detects	288.9				SD Detects		866.2
1234					Median Detects	3.3				CV Detects		2.999
1235					Skewness Detects	3.933				Kurtosis Detects		16.46
1236					Mean of Logged Detects	2.131				SD of Logged Detects		2.943
1237												
1238					Normal GOF Test on Detects Only							
1239					Shapiro Wilk Test Statistic	0.392				Normal GOF Test on Detected Observations Only		
1240					5% Shapiro Wilk P Value	0				Detected Data Not Normal at 5% Significance Level		
1241					Lilliefors Test Statistic	0.453				Lilliefors GOF Test		
1242					5% Lilliefors Critical Value	0.113				Detected Data Not Normal at 5% Significance Level		
1243					Detected Data Not Normal at 5% Significance Level							
1244												
1245					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
1246					Mean	217.6				Standard Error of Mean		84.68
1247					SD	755.8				95% KM (BCA) UCL		390.1
1248					95% KM (t) UCL	358.5				95% KM (Percentile Bootstrap) UCL		364.8

	A	B	C	D	E	F	G	H	I	J	K	L
1249					95% KM (z) UCL	356.9				95% KM Bootstrap t UCL		462.4
1250					90% KM Chebyshev UCL	471.6				95% KM Chebyshev UCL		586.7
1251					97.5% KM Chebyshev UCL	746.4				99% KM Chebyshev UCL		1060
1252												
1253					Gamma GOF Tests on Detected Observations Only							
1254					A-D Test Statistic	4.766			Anderson-Darling GOF Test			
1255					5% A-D Critical Value	0.911			Detected Data Not Gamma Distributed at 5% Significance Level			
1256					K-S Test Statistic	0.233			Kolmogrov-Smirnoff GOF			
1257					5% K-S Critical Value	0.127			Detected Data Not Gamma Distributed at 5% Significance Level			
1258					Detected Data Not Gamma Distributed at 5% Significance Level							
1259												
1260					Gamma Statistics on Detected Data Only							
1261					k hat (MLE)	0.207				k star (bias corrected MLE)		0.208
1262					Theta hat (MLE)	1395				Theta star (bias corrected MLE)		1390
1263					nu hat (MLE)	25.26				nu star (bias corrected)		25.35
1264					MLE Mean (bias corrected)	288.9				MLE Sd (bias corrected)		633.7
1265												
1266					Gamma Kaplan-Meier (KM) Statistics							
1267					k hat (KM)	0.0829				nu hat (KM)		13.42
1268					Approximate Chi Square Value (13.42, α)	6.179				Adjusted Chi Square Value (13.42, β)		6.089
1269					95% Gamma Approximate KM-UCL (use when n>=50)	472.7				95% Gamma Adjusted KM-UCL (use when n<50)		479.6
1270					Gamma (KM) may not be used when k hat (KM) is < 0.1							
1271												
1272					Gamma ROS Statistics using Imputed Non-Detects							
1273					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
1274					GROS may not be used when kstar of detected data is small such as < 0.1							
1275					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
1276					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
1277					Minimum	0.01				Mean		217.5
1278					Maximum	4900				Median		1.3
1279					SD	760.5				CV		3.496
1280					k hat (MLE)	0.156				k star (bias corrected MLE)		0.158
1281					Theta hat (MLE)	1398				Theta star (bias corrected MLE)		1377
1282					nu hat (MLE)	25.2				nu star (bias corrected)		25.6
1283					MLE Mean (bias corrected)	217.5				MLE Sd (bias corrected)		547.3
1284										Adjusted Level of Significance (β)		0.047
1285					Approximate Chi Square Value (25.60, α)	15.07				Adjusted Chi Square Value (25.60, β)		14.93
1286					95% Gamma Approximate UCL (use when n>=50)	369.5				95% Gamma Adjusted UCL (use when n<50)		373.1
1287												
1288					Lognormal GOF Test on Detected Observations Only							
1289					Lilliefors Test Statistic	0.158			Lilliefors GOF Test			
1290					5% Lilliefors Critical Value	0.113			Detected Data Not Lognormal at 5% Significance Level			
1291					Detected Data Not Lognormal at 5% Significance Level							
1292												
1293					Lognormal ROS Statistics Using Imputed Non-Detects							
1294					Mean in Original Scale	217.6				Mean in Log Scale		0.438
1295					SD in Original Scale	760.5				SD in Log Scale		4.013
1296					95% t UCL (assumes normality of ROS data)	358.2				95% Percentile Bootstrap UCL		358.3
1297					95% BCA Bootstrap UCL	423				95% Bootstrap t UCL		492.5
1298					95% H-UCL (Log ROS)	73951						
1299												
1300					DL/2 Statistics							

	A	B	C	D	E	F	G	H	I	J	K	L
1301	DL/2 Normal						DL/2 Log-Transformed					
1302					Mean in Original Scale	217.6					Mean in Log Scale	0.839
1303					SD in Original Scale	760.5					SD in Log Scale	3.413
1304					95% t UCL (Assumes normality)	358.2					95% H-Stat UCL	5775
1305	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1306												
1307	Nonparametric Distribution Free UCL Statistics											
1308	Data do not follow a Discernible Distribution at 5% Significance Level											
1309												
1310	Suggested UCL to Use											
1311					97.5% KM (Chebyshev) UCL	746.4						
1312												
1313	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1314	Recommendations are based upon data size, data distribution, and skewness.											
1315	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1316	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1317												
1318												
1319	Vinyl chloride											
1320												
1321	General Statistics											
1322					Total Number of Observations	81			Number of Distinct Observations			5
1323					Number of Detects	1			Number of Non-Detects			80
1324					Number of Distinct Detects	1			Number of Distinct Non-Detects			4
1325												
1326	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
1327	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
1328												
1329	The data set for variable Vinyl chloride was not processed!											
1330												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			6/2/2016 1:18:27 PM								
5	From File			FFF-GW Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	1,2,4-Trichlorobenzene											
11												
12	General Statistics											
13	Total Number of Observations					41	Number of Distinct Observations					5
14	Number of Detects					2	Number of Non-Detects					39
15	Number of Distinct Detects					2	Number of Distinct Non-Detects					3
16	Minimum Detect					0.36	Minimum Non-Detect					0.19
17	Maximum Detect					0.54	Maximum Non-Detect					0.21
18	Variance Detects					0.0162	Percent Non-Detects					95.12%
19	Mean Detects					0.45	SD Detects					0.127
20	Median Detects					0.45	CV Detects					0.283
21	Skewness Detects					N/A	Kurtosis Detects					N/A
22	Mean of Logged Detects					-0.819	SD of Logged Detects					0.287
23												
24	Warning: Data set has only 2 Detected Values.											
25	This is not enough to compute meaningful or reliable statistics and estimates.											
26												
27												
28	Normal GOF Test on Detects Only											
29	Not Enough Data to Perform GOF Test											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	Mean					0.203	Standard Error of Mean					0.0131
33	SD					0.0594	95% KM (BCA) UCL					N/A
34	95% KM (t) UCL					0.225	95% KM (Percentile Bootstrap) UCL					N/A
35	95% KM (z) UCL					0.224	95% KM Bootstrap t UCL					N/A
36	90% KM Chebyshev UCL					0.242	95% KM Chebyshev UCL					0.26
37	97.5% KM Chebyshev UCL					0.285	99% KM Chebyshev UCL					0.333
38												
39	Gamma GOF Tests on Detected Observations Only											
40	Not Enough Data to Perform GOF Test											
41												
42	Gamma Statistics on Detected Data Only											
43	k hat (MLE)					24.66	k star (bias corrected MLE)					N/A
44	Theta hat (MLE)					0.0182	Theta star (bias corrected MLE)					N/A
45	nu hat (MLE)					98.65	nu star (bias corrected)					N/A
46	MLE Mean (bias corrected)					N/A	MLE Sd (bias corrected)					N/A
47												
48	Gamma Kaplan-Meier (KM) Statistics											
49	k hat (KM)					11.63	nu hat (KM)					953.8
50							Adjusted Level of Significance (β)					0.0441
51	Approximate Chi Square Value (953.78, α)					883.1	Adjusted Chi Square Value (953.78, β)					880.6
52	95% Gamma Approximate KM-UCL (use when n>=50)					0.219	95% Gamma Adjusted KM-UCL (use when n<50)					0.22

	A	B	C	D	E	F	G	H	I	J	K	L
53												
54	Lognormal GOF Test on Detected Observations Only											
55	Not Enough Data to Perform GOF Test											
56												
57	Lognormal ROS Statistics Using Imputed Non-Detects											
58					Mean in Original Scale	0.0621				Mean in Log Scale		-3.559
59					SD in Original Scale	0.101				SD in Log Scale		1.254
60					95% t UCL (assumes normality of ROS data)	0.0887				95% Percentile Bootstrap UCL		0.0921
61					95% BCA Bootstrap UCL	0.0987				95% Bootstrap t UCL		0.116
62					95% H-UCL (Log ROS)	0.106						
63												
64	DL/2 Statistics											
65			DL/2 Normal						DL/2 Log-Transformed			
66					Mean in Original Scale	0.114				Mean in Log Scale		-2.265
67					SD in Original Scale	0.0797				SD in Log Scale		0.336
68					95% t UCL (Assumes normality)	0.135				95% H-Stat UCL		0.121
69	DL/2 is not a recommended method, provided for comparisons and historical reasons											
70												
71	Nonparametric Distribution Free UCL Statistics											
72	Data do not follow a Discernible Distribution at 5% Significance Level											
73												
74	Suggested UCL to Use											
75					95% KM (t) UCL	0.225				95% KM (% Bootstrap) UCL		N/A
76	Warning: One or more Recommended UCL(s) not available!											
77												
78	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
79	Recommendations are based upon data size, data distribution, and skewness.											
80	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
81	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
82												
83	Aluminum											
84												
85	General Statistics											
86					Total Number of Observations	23				Number of Distinct Observations		16
87					Number of Detects	15				Number of Non-Detects		8
88					Number of Distinct Detects	15				Number of Distinct Non-Detects		1
89					Minimum Detect	0.0774				Minimum Non-Detect		0.0721
90					Maximum Detect	2.3				Maximum Non-Detect		0.0721
91					Variance Detects	0.495				Percent Non-Detects		34.78%
92					Mean Detects	0.589				SD Detects		0.704
93					Median Detects	0.279				CV Detects		1.194
94					Skewness Detects	1.629				Kurtosis Detects		1.77
95					Mean of Logged Detects	-1.165				SD of Logged Detects		1.169
96												
97	Normal GOF Test on Detects Only											
98					Shapiro Wilk Test Statistic	0.75				Shapiro Wilk GOF Test		
99					5% Shapiro Wilk Critical Value	0.881				Detected Data Not Normal at 5% Significance Level		
100					Lilliefors Test Statistic	0.234				Lilliefors GOF Test		
101					5% Lilliefors Critical Value	0.229				Detected Data Not Normal at 5% Significance Level		
102	Detected Data Not Normal at 5% Significance Level											
103												
104	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											

	A	B	C	D	E	F	G	H	I	J	K	L
105					Mean	0.409				Standard Error of Mean		0.13
106					SD	0.602				95% KM (BCA) UCL		0.631
107					95% KM (t) UCL	0.632				95% KM (Percentile Bootstrap) UCL		0.635
108					95% KM (z) UCL	0.623				95% KM Bootstrap t UCL		0.782
109					90% KM Chebyshev UCL	0.799				95% KM Chebyshev UCL		0.975
110					97.5% KM Chebyshev UCL	1.22				99% KM Chebyshev UCL		1.701
111												
112					**Gamma GOF Tests on Detected Observations Only**							
113					A-D Test Statistic	0.666	**Anderson-Darling GOF Test**					
114					5% A-D Critical Value	0.767	Detected data appear Gamma Distributed at 5% Significance Level					
115					K-S Test Statistic	0.186	**Kolmogrov-Smirnoff GOF**					
116					5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level					
117					**Detected data appear Gamma Distributed at 5% Significance Level**							
118												
119					**Gamma Statistics on Detected Data Only**							
120					k hat (MLE)	0.917				k star (bias corrected MLE)		0.778
121					Theta hat (MLE)	0.642				Theta star (bias corrected MLE)		0.757
122					nu hat (MLE)	27.52				nu star (bias corrected)		23.35
123					MLE Mean (bias corrected)	0.589				MLE Sd (bias corrected)		0.668
124												
125					**Gamma Kaplan-Meier (KM) Statistics**							
126					k hat (KM)	0.463				nu hat (KM)		21.29
127					Approximate Chi Square Value (21.29, α)	11.8				Adjusted Chi Square Value (21.29, β)		11.29
128					95% Gamma Approximate KM-UCL (use when n>=50)	0.738				95% Gamma Adjusted KM-UCL (use when n<50)		0.771
129												
130					**Gamma ROS Statistics using Imputed Non-Detects**							
131					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
132					GROS may not be used when kstar of detected data is small such as < 0.1							
133					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
134					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
135					Minimum	0.01				Mean		0.388
136					Maximum	2.3				Median		0.0998
137					SD	0.628				CV		1.62
138					k hat (MLE)	0.456				k star (bias corrected MLE)		0.425
139					Theta hat (MLE)	0.85				Theta star (bias corrected MLE)		0.911
140					nu hat (MLE)	20.97				nu star (bias corrected)		19.56
141					MLE Mean (bias corrected)	0.388				MLE Sd (bias corrected)		0.594
142										Adjusted Level of Significance (β)		0.0389
143					Approximate Chi Square Value (19.56, α)	10.53				Adjusted Chi Square Value (19.56, β)		10.05
144					95% Gamma Approximate UCL (use when n>=50)	0.72				95% Gamma Adjusted UCL (use when n<50)		0.755
145												
146					**Lognormal GOF Test on Detected Observations Only**							
147					Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**					
148					5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level					
149					Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**					
150					5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level					
151					**Detected Data appear Lognormal at 5% Significance Level**							
152												
153					**Lognormal ROS Statistics Using Imputed Non-Detects**							
154					Mean in Original Scale	0.391				Mean in Log Scale		-2.206
155					SD in Original Scale	0.626				SD in Log Scale		1.793
156					95% t UCL (assumes normality of ROS data)	0.615				95% Percentile Bootstrap UCL		0.623

	A	B	C	D	E	F	G	H	I	J	K	L
157					95% BCA Bootstrap UCL	0.659				95% Bootstrap t UCL		0.78
158					95% H-UCL (Log ROS)	2.271						
159												
160					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
161					KM Mean (logged)	-1.674				95% H-UCL (KM -Log)		0.707
162					KM SD (logged)	1.148				95% Critical H Value (KM-Log)		2.727
163					KM Standard Error of Mean (logged)	0.248						
164												
165					DL/2 Statistics							
166				DL/2 Normal					DL/2 Log-Transformed			
167					Mean in Original Scale	0.397				Mean in Log Scale		-1.916
168					SD in Original Scale	0.623				SD in Log Scale		1.405
169					95% t UCL (Assumes normality)	0.62				95% H-Stat UCL		1.001
170					DL/2 is not a recommended method, provided for comparisons and historical reasons							
171												
172					Nonparametric Distribution Free UCL Statistics							
173					Detected Data appear Gamma Distributed at 5% Significance Level							
174												
175					Suggested UCL to Use							
176					95% KM (BCA) UCL	0.631				95% GROS Adjusted Gamma UCL		0.755
177					95% Adjusted Gamma KM-UCL	0.771						
178												
179					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
180					Recommendations are based upon data size, data distribution, and skewness.							
181					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
182					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
183												
184	Chromium											
185												
186					General Statistics							
187					Total Number of Observations	23				Number of Distinct Observations		4
188					Number of Detects	3				Number of Non-Detects		20
189					Number of Distinct Detects	3				Number of Distinct Non-Detects		1
190					Minimum Detect	0.008				Minimum Non-Detect		0.0045
191					Maximum Detect	0.0199				Maximum Non-Detect		0.0045
192					Variance Detects	4.5303E-5				Percent Non-Detects		86.96%
193					Mean Detects	0.0121				SD Detects		0.00673
194					Median Detects	0.0085				CV Detects		0.555
195					Skewness Detects	1.721				Kurtosis Detects		N/A
196					Mean of Logged Detects	-4.504				SD of Logged Detects		0.51
197												
198					Warning: Data set has only 3 Detected Values.							
199					This is not enough to compute meaningful or reliable statistics and estimates.							
200												
201												
202					Normal GOF Test on Detects Only							
203					Shapiro Wilk Test Statistic	0.781				Shapiro Wilk GOF Test		
204					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Normal at 5% Significance Level		
205					Lilliefors Test Statistic	0.372				Lilliefors GOF Test		
206					5% Lilliefors Critical Value	0.512				Detected Data appear Normal at 5% Significance Level		
207					Detected Data appear Normal at 5% Significance Level							
208												

	A	B	C	D	E	F	G	H	I	J	K	L
209	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
210					Mean	0.0055				Standard Error of Mean		8.2941E-4
211					SD	0.00325				95% KM (BCA) UCL		N/A
212					95% KM (t) UCL	0.00692				95% KM (Percentile Bootstrap) UCL		N/A
213					95% KM (z) UCL	0.00686				95% KM Bootstrap t UCL		N/A
214					90% KM Chebyshev UCL	0.00798				95% KM Chebyshev UCL		0.00911
215					97.5% KM Chebyshev UCL	0.0107				99% KM Chebyshev UCL		0.0137
216												
217	Gamma GOF Tests on Detected Observations Only											
218	Not Enough Data to Perform GOF Test											
219												
220	Gamma Statistics on Detected Data Only											
221					k hat (MLE)	5.564				k star (bias corrected MLE)		N/A
222					Theta hat (MLE)	0.00218				Theta star (bias corrected MLE)		N/A
223					nu hat (MLE)	33.38				nu star (bias corrected)		N/A
224					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A
225												
226	Gamma Kaplan-Meier (KM) Statistics											
227					k hat (KM)	2.863				nu hat (KM)		131.7
228										Adjusted Level of Significance (β)		0.0389
229					Approximate Chi Square Value (131.71, α)	106.2				Adjusted Chi Square Value (131.71, β)		104.5
230					95% Gamma Approximate KM-UCL (use when n>=50)	0.00682				95% Gamma Adjusted KM-UCL (use when n<50)		0.00692
231												
232	Lognormal GOF Test on Detected Observations Only											
233					Shapiro Wilk Test Statistic	0.8				Shapiro Wilk GOF Test		
234					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Lognormal at 5% Significance Level		
235					Lilliefors Test Statistic	0.364				Lilliefors GOF Test		
236					5% Lilliefors Critical Value	0.512				Detected Data appear Lognormal at 5% Significance Level		
237	Detected Data appear Lognormal at 5% Significance Level											
238												
239	Lognormal ROS Statistics Using Imputed Non-Detects											
240					Mean in Original Scale	0.00244				Mean in Log Scale		-7.172
241					SD in Original Scale	0.00445				SD in Log Scale		1.607
242					95% t UCL (assumes normality of ROS data)	0.00403				95% Percentile Bootstrap UCL		0.00413
243					95% BCA Bootstrap UCL	0.00468				95% Bootstrap t UCL		0.00636
244					95% H-UCL (Log ROS)	0.009						
245												
246	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
247					KM Mean (logged)	-5.286				95% H-UCL (KM -Log)		0.00612
248					KM SD (logged)	0.338				95% Critical H Value (KM-Log)		1.847
249					KM Standard Error of Mean (logged)	0.0863						
250												
251	DL/2 Statistics											
252			DL/2 Normal							DL/2 Log-Transformed		
253					Mean in Original Scale	0.00354				Mean in Log Scale		-5.889
254					SD in Original Scale	0.00396				SD in Log Scale		0.569
255					95% t UCL (Assumes normality)	0.00496				95% H-Stat UCL		0.00417
256	DL/2 is not a recommended method, provided for comparisons and historical reasons											
257												
258	Nonparametric Distribution Free UCL Statistics											
259	Detected Data appear Normal Distributed at 5% Significance Level											
260												

	A	B	C	D	E	F	G	H	I	J	K	L
261						Suggested UCL to Use						
262					95% KM (t) UCL	0.00692			95% KM (Percentile Bootstrap) UCL			N/A
263						Warning: One or more Recommended UCL(s) not available!						
264												
265					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
266					Recommendations are based upon data size, data distribution, and skewness.							
267					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
268					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
269												
270	Formaldehyde											
271												
272						General Statistics						
273					Total Number of Observations	41			Number of Distinct Observations			5
274					Number of Detects	4			Number of Non-Detects			37
275					Number of Distinct Detects	4			Number of Distinct Non-Detects			1
276					Minimum Detect	5.26			Minimum Non-Detect			5
277					Maximum Detect	18.8			Maximum Non-Detect			5
278					Variance Detects	33.21			Percent Non-Detects			90.24%
279					Mean Detects	10.62			SD Detects			5.763
280					Median Detects	9.21			CV Detects			0.543
281					Skewness Detects	1.35			Kurtosis Detects			2.547
282					Mean of Logged Detects	2.259			SD of Logged Detects			0.522
283												
284						Normal GOF Test on Detects Only						
285					Shapiro Wilk Test Statistic	0.876			Shapiro Wilk GOF Test			
286					5% Shapiro Wilk Critical Value	0.748			Detected Data appear Normal at 5% Significance Level			
287					Lilliefors Test Statistic	0.339			Lilliefors GOF Test			
288					5% Lilliefors Critical Value	0.443			Detected Data appear Normal at 5% Significance Level			
289						Detected Data appear Normal at 5% Significance Level						
290												
291						Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
292					Mean	5.548			Standard Error of Mean			0.412
293					SD	2.283			95% KM (BCA) UCL			N/A
294					95% KM (t) UCL	6.241			95% KM (Percentile Bootstrap) UCL			N/A
295					95% KM (z) UCL	6.225			95% KM Bootstrap t UCL			N/A
296					90% KM Chebyshev UCL	6.783			95% KM Chebyshev UCL			7.343
297					97.5% KM Chebyshev UCL	8.119			99% KM Chebyshev UCL			9.644
298												
299						Gamma GOF Tests on Detected Observations Only						
300					A-D Test Statistic	0.352			Anderson-Darling GOF Test			
301					5% A-D Critical Value	0.659			Detected data appear Gamma Distributed at 5% Significance Level			
302					K-S Test Statistic	0.303			Kolmogrov-Smirnoff GOF			
303					5% K-S Critical Value	0.396			Detected data appear Gamma Distributed at 5% Significance Level			
304						Detected data appear Gamma Distributed at 5% Significance Level						
305												
306						Gamma Statistics on Detected Data Only						
307					k hat (MLE)	4.962			k star (bias corrected MLE)			1.407
308					Theta hat (MLE)	2.14			Theta star (bias corrected MLE)			7.547
309					nu hat (MLE)	39.7			nu star (bias corrected)			11.26
310					MLE Mean (bias corrected)	10.62			MLE Sd (bias corrected)			8.953
311												
312						Gamma Kaplan-Meier (KM) Statistics						

	A	B	C	D	E	F	G	H	I	J	K	L
313					k hat (KM)	5.907					nu hat (KM)	484.4
314					Approximate Chi Square Value (484.40, α)	434.4					Adjusted Chi Square Value (484.40, β)	432.6
315					95% Gamma Approximate KM-UCL (use when n>=50)	6.187					95% Gamma Adjusted KM-UCL (use when n<50)	6.212
316												
317					**Gamma ROS Statistics using Imputed Non-Detects**							
318					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
319					GROS may not be used when kstar of detected data is small such as < 0.1							
320					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
321					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
322					Minimum	0.01					Mean	1.06
323					Maximum	18.8					Median	0.01
324					SD	3.553					CV	3.351
325					k hat (MLE)	0.19					k star (bias corrected MLE)	0.193
326					Theta hat (MLE)	5.567					Theta star (bias corrected MLE)	5.5
327					nu hat (MLE)	15.62					nu star (bias corrected)	15.81
328					MLE Mean (bias corrected)	1.06					MLE Sd (bias corrected)	2.415
329											Adjusted Level of Significance (β)	0.0441
330					Approximate Chi Square Value (15.81, α)	7.828					Adjusted Chi Square Value (15.81, β)	7.623
331					95% Gamma Approximate UCL (use when n>=50)	2.142					95% Gamma Adjusted UCL (use when n<50)	N/A
332												
333					**Lognormal GOF Test on Detected Observations Only**							
334					Shapiro Wilk Test Statistic	0.946					**Shapiro Wilk GOF Test**	
335					5% Shapiro Wilk Critical Value	0.748					Detected Data appear Lognormal at 5% Significance Level	
336					Lilliefors Test Statistic	0.27					**Lilliefors GOF Test**	
337					5% Lilliefors Critical Value	0.443					Detected Data appear Lognormal at 5% Significance Level	
338					**Detected Data appear Lognormal at 5% Significance Level**							
339												
340					**Lognormal ROS Statistics Using Imputed Non-Detects**							
341					Mean in Original Scale	1.695					Mean in Log Scale	-0.792
342					SD in Original Scale	3.469					SD in Log Scale	1.707
343					95% t UCL (assumes normality of ROS data)	2.607					95% Percentile Bootstrap UCL	2.663
344					95% BCA Bootstrap UCL	3.013					95% Bootstrap t UCL	3.53
345					95% H-UCL (Log ROS)	4.655						
346												
347					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
348					KM Mean (logged)	1.673					95% H-UCL (KM -Log)	5.854
349					KM SD (logged)	0.239					95% Critical H Value (KM-Log)	1.744
350					KM Standard Error of Mean (logged)	0.0431						
351												
352					**DL/2 Statistics**							
353					**DL/2 Normal**						**DL/2 Log-Transformed**	
354					Mean in Original Scale	3.292					Mean in Log Scale	1.047
355					SD in Original Scale	2.905					SD in Log Scale	0.428
356					95% t UCL (Assumes normality)	4.056					95% H-Stat UCL	3.539
357					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
358												
359					**Nonparametric Distribution Free UCL Statistics**							
360					**Detected Data appear Normal Distributed at 5% Significance Level**							
361												
362					**Suggested UCL to Use**							
363					95% KM (t) UCL	6.241					95% KM (Percentile Bootstrap) UCL	N/A
364					**Warning: One or more Recommended UCL(s) not available!**							

	A	B	C	D	E	F	G	H	I	J	K	L
365												
366	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
367	Recommendations are based upon data size, data distribution, and skewness.											
368	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
369	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
370												
371	**Lead**											
372												
373	**General Statistics**											
374					Total Number of Observations	23			Number of Distinct Observations			5
375					Number of Detects	4			Number of Non-Detects			19
376					Number of Distinct Detects	4			Number of Distinct Non-Detects			1
377					Minimum Detect	0.0058			Minimum Non-Detect			0.004
378					Maximum Detect	0.0682			Maximum Non-Detect			0.004
379					Variance Detects	8.3831E-4			Percent Non-Detects			82.61%
380					Mean Detects	0.0372			SD Detects			0.029
381					Median Detects	0.0375			CV Detects			0.778
382					Skewness Detects	-0.0256			Kurtosis Detects			-3.743
383					Mean of Logged Detects	-3.658			SD of Logged Detects			1.122
384												
385	**Normal GOF Test on Detects Only**											
386					Shapiro Wilk Test Statistic	0.937			**Shapiro Wilk GOF Test**			
387					5% Shapiro Wilk Critical Value	0.748			Detected Data appear Normal at 5% Significance Level			
388					Lilliefors Test Statistic	0.222			**Lilliefors GOF Test**			
389					5% Lilliefors Critical Value	0.443			Detected Data appear Normal at 5% Significance Level			
390	**Detected Data appear Normal at 5% Significance Level**											
391												
392	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
393					Mean	0.00978			Standard Error of Mean			0.00394
394					SD	0.0164			95% KM (BCA) UCL			N/A
395					95% KM (t) UCL	0.0165			95% KM (Percentile Bootstrap) UCL			N/A
396					95% KM (z) UCL	0.0163			95% KM Bootstrap t UCL			N/A
397					90% KM Chebyshev UCL	0.0216			95% KM Chebyshev UCL			0.027
398					97.5% KM Chebyshev UCL	0.0344			99% KM Chebyshev UCL			0.049
399												
400	**Gamma GOF Tests on Detected Observations Only**											
401					A-D Test Statistic	0.307			**Anderson-Darling GOF Test**			
402					5% A-D Critical Value	0.662			Detected data appear Gamma Distributed at 5% Significance Level			
403					K-S Test Statistic	0.277			**Kolmogrov-Smirnoff GOF**			
404					5% K-S Critical Value	0.399			Detected data appear Gamma Distributed at 5% Significance Level			
405	**Detected data appear Gamma Distributed at 5% Significance Level**											
406												
407	**Gamma Statistics on Detected Data Only**											
408					k hat (MLE)	1.508			k star (bias corrected MLE)			0.544
409					Theta hat (MLE)	0.0247			Theta star (bias corrected MLE)			0.0685
410					nu hat (MLE)	12.06			nu star (bias corrected)			4.349
411					MLE Mean (bias corrected)	0.0372			MLE Sd (bias corrected)			0.0505
412												
413	**Gamma Kaplan-Meier (KM) Statistics**											
414					k hat (KM)	0.357			nu hat (KM)			16.42
415					Approximate Chi Square Value (16.42, α)	8.256			Adjusted Chi Square Value (16.42, β)			7.838
416					95% Gamma Approximate KM-UCL (use when n>=50)	0.0194			95% Gamma Adjusted KM-UCL (use when n<50)			0.0205

	A	B	C	D	E	F	G	H	I	J	K	L
417												
418	**Gamma ROS Statistics using Imputed Non-Detects**											
419	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
420	GROS may not be used when kstar of detected data is small such as < 0.1											
421	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
422	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
423					Minimum	0.0058				Mean		0.0147
424					Maximum	0.0682				Median		0.01
425					SD	0.015				CV		1.019
426					k hat (MLE)	2.397				k star (bias corrected MLE)		2.113
427					Theta hat (MLE)	0.00615				Theta star (bias corrected MLE)		0.00697
428					nu hat (MLE)	110.3				nu star (bias corrected)		97.22
429					MLE Mean (bias corrected)	0.0147				MLE Sd (bias corrected)		0.0101
430										Adjusted Level of Significance (β)		0.0389
431					Approximate Chi Square Value (97.22, α)	75.47				Adjusted Chi Square Value (97.22, β)		74.09
432					95% Gamma Approximate UCL (use when n>=50)	0.019				95% Gamma Adjusted UCL (use when n<50)		N/A
433												
434	**Lognormal GOF Test on Detected Observations Only**											
435					Shapiro Wilk Test Statistic	0.912				**Shapiro Wilk GOF Test**		
436					5% Shapiro Wilk Critical Value	0.748				Detected Data appear Lognormal at 5% Significance Level		
437					Lilliefors Test Statistic	0.247				**Lilliefors GOF Test**		
438					5% Lilliefors Critical Value	0.443				Detected Data appear Lognormal at 5% Significance Level		
439	**Detected Data appear Lognormal at 5% Significance Level**											
440												
441	**Lognormal ROS Statistics Using Imputed Non-Detects**											
442					Mean in Original Scale	0.00694				Mean in Log Scale		-8.193
443					SD in Original Scale	0.0178				SD in Log Scale		3.007
444					95% t UCL (assumes normality of ROS data)	0.0133				95% Percentile Bootstrap UCL		0.0132
445					95% BCA Bootstrap UCL	0.0164				95% Bootstrap t UCL		0.0289
446					95% H-UCL (Log ROS)	1.036						
447												
448	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
449					KM Mean (logged)	-5.197				95% H-UCL (KM -Log)		0.0115
450					KM SD (logged)	0.814				95% Critical H Value (KM-Log)		2.296
451					KM Standard Error of Mean (logged)	0.196						
452												
453	**DL/2 Statistics**											
454	**DL/2 Normal**						**DL/2 Log-Transformed**					
455					Mean in Original Scale	0.00813				Mean in Log Scale		-5.77
456					SD in Original Scale	0.0173				SD in Log Scale		1.074
457					95% t UCL (Assumes normality)	0.0143				95% H-Stat UCL		0.0101
458	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
459												
460	**Nonparametric Distribution Free UCL Statistics**											
461	**Detected Data appear Normal Distributed at 5% Significance Level**											
462												
463	**Suggested UCL to Use**											
464					95% KM (t) UCL	0.0165				95% KM (Percentile Bootstrap) UCL		N/A
465	**Warning: One or more Recommended UCL(s) not available!**											
466												
467	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
468	Recommendations are based upon data size, data distribution, and skewness.											

	A	B	C	D	E	F	G	H	I	J	K	L
469	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
470	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
471												

SURROUNDING INDUSTRIAL PROPERTIES - GROUNDWATER

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:45:37 PM
From File	ProUCL Input Files_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (1,1-dichloroethane)

General Statistics

Total Number of Observations	146	Number of Distinct Observations	21
Number of Detects	19	Number of Non-Detects	127
Number of Distinct Detects	19	Number of Distinct Non-Detects	2
Minimum Detect	0.15	Minimum Non-Detect	0.1
Maximum Detect	41	Maximum Non-Detect	0.13
Variance Detects	184.2	Percent Non-Detects	86.99%
Mean Detects	6.333	SD Detects	13.57
Median Detects	0.56	CV Detects	2.143
Skewness Detects	2.08	Kurtosis Detects	2.701
Mean of Logged Detects	-0.0503	SD of Logged Detects	1.773

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.492	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.467	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.203	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.911	Standard Error of Mean	0.443
SD	5.206	95% KM (BCA) UCL	1.738
95% KM (t) UCL	1.644	95% KM (Percentile Bootstrap) UCL	1.675
95% KM (z) UCL	1.639	95% KM Bootstrap t UCL	1.968
90% KM Chebyshev UCL	2.239	95% KM Chebyshev UCL	2.841
97.5% KM Chebyshev UCL	3.676	99% KM Chebyshev UCL	5.316

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.963	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.832	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.34	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.214	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.354	k star (bias corrected MLE)	0.333
Theta hat (MLE)	17.89	Theta star (bias corrected MLE)	19.01
nu hat (MLE)	13.45	nu star (bias corrected)	12.66
MLE Mean (bias corrected)	6.333	MLE Sd (bias corrected)	10.97

	A	B	C	D	E	F	G	H	I	J	K	L
53	Gamma Kaplan-Meier (KM) Statistics											
54					k hat (KM)	0.0306					nu hat (KM)	8.943
55					Approximate Chi Square Value (8.94, α)	3.293					Adjusted Chi Square Value (8.94, β)	3.258
56					95% Gamma Approximate KM-UCL (use when n>=50)	2.475					95% Gamma Adjusted KM-UCL (use when n<50)	2.501
57	Gamma (KM) may not be used when k hat (KM) is < 0.1											
58												
59	Gamma ROS Statistics using Imputed Non-Detects											
60	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
61	GROS may not be used when kstar of detected data is small such as < 0.1											
62	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
63	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
64					Minimum	0.01					Mean	0.833
65					Maximum	41					Median	0.01
66					SD	5.236					CV	6.288
67					k hat (MLE)	0.193					k star (bias corrected MLE)	0.194
68					Theta hat (MLE)	4.31					Theta star (bias corrected MLE)	4.297
69					nu hat (MLE)	56.42					nu star (bias corrected)	56.59
70					MLE Mean (bias corrected)	0.833					MLE Sd (bias corrected)	1.892
71											Adjusted Level of Significance (β)	0.0484
72					Approximate Chi Square Value (56.59, α)	40.3					Adjusted Chi Square Value (56.59, β)	40.16
73					95% Gamma Approximate UCL (use when n>=50)	1.169					95% Gamma Adjusted UCL (use when n<50)	1.173
74												
75	Lognormal GOF Test on Detected Observations Only											
76					Shapiro Wilk Test Statistic	0.795	Shapiro Wilk GOF Test					
77					5% Shapiro Wilk Critical Value	0.901	Detected Data Not Lognormal at 5% Significance Level					
78					Lilliefors Test Statistic	0.194	Lilliefors GOF Test					
79					5% Lilliefors Critical Value	0.203	Detected Data appear Lognormal at 5% Significance Level					
80	Detected Data appear Approximate Lognormal at 5% Significance Level											
81												
82	Lognormal ROS Statistics Using Imputed Non-Detects											
83					Mean in Original Scale	0.83					Mean in Log Scale	-7.33
84					SD in Original Scale	5.237					SD in Log Scale	4.416
85					95% t UCL (assumes normality of ROS data)	1.547					95% Percentile Bootstrap UCL	1.644
86					95% BCA Bootstrap UCL	1.84					95% Bootstrap t UCL	11.36
87					95% H-UCL (Log ROS)	120.4						
88												
89	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
90					KM Mean (logged)	-2.009					95% H-UCL (KM -Log)	0.259
91					KM SD (logged)	0.981					95% Critical H Value (KM-Log)	2.185
92					KM Standard Error of Mean (logged)	0.0834						
93												
94	DL/2 Statistics											
95	DL/2 Normal						DL/2 Log-Transformed					
96					Mean in Original Scale	0.878					Mean in Log Scale	-2.431
97					SD in Original Scale	5.229					SD in Log Scale	1.12
98					95% t UCL (Assumes normality)	1.594					95% H-Stat UCL	0.204
99	DL/2 is not a recommended method, provided for comparisons and historical reasons											
100												
101	Nonparametric Distribution Free UCL Statistics											
102	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
103												
104	Suggested UCL to Use											

	A	B	C	D	E	F	G	H	I	J	K	L
105					95% KM (Chebyshev) UCL	2.841						
106												
107	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
108	Recommendations are based upon data size, data distribution, and skewness.											
109	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
110	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
111												
112												
113	Value (acetone)											
114												
115	General Statistics											
116	Total Number of Observations					146	Number of Distinct Observations					31
117	Number of Detects					33	Number of Non-Detects					113
118	Number of Distinct Detects					29	Number of Distinct Non-Detects					2
119	Minimum Detect					6.1	Minimum Non-Detect					2.5
120	Maximum Detect					1400	Maximum Non-Detect					2.7
121	Variance Detects					61629	Percent Non-Detects					77.4%
122	Mean Detects					87.07	SD Detects					248.3
123	Median Detects					23	CV Detects					2.851
124	Skewness Detects					4.975	Kurtosis Detects					26.29
125	Mean of Logged Detects					3.32	SD of Logged Detects					1.203
126												
127	Normal GOF Test on Detects Only											
128	Shapiro Wilk Test Statistic					0.336	Shapiro Wilk GOF Test					
129	5% Shapiro Wilk Critical Value					0.931	Detected Data Not Normal at 5% Significance Level					
130	Lilliefors Test Statistic					0.419	Lilliefors GOF Test					
131	5% Lilliefors Critical Value					0.154	Detected Data Not Normal at 5% Significance Level					
132	Detected Data Not Normal at 5% Significance Level											
133												
134	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
135	Mean					21.61	Standard Error of Mean					10.21
136	SD					121.5	95% KM (BCA) UCL					41.97
137	95% KM (t) UCL					38.52	95% KM (Percentile Bootstrap) UCL					39.67
138	95% KM (z) UCL					38.41	95% KM Bootstrap t UCL					83.59
139	90% KM Chebyshev UCL					52.24	95% KM Chebyshev UCL					66.12
140	97.5% KM Chebyshev UCL					85.38	99% KM Chebyshev UCL					123.2
141												
142	Gamma GOF Tests on Detected Observations Only											
143	A-D Test Statistic					3.935	Anderson-Darling GOF Test					
144	5% A-D Critical Value					0.807	Detected Data Not Gamma Distributed at 5% Significance Level					
145	K-S Test Statistic					0.289	Kolmogrov-Smirnoff GOF					
146	5% K-S Critical Value					0.161	Detected Data Not Gamma Distributed at 5% Significance Level					
147	Detected Data Not Gamma Distributed at 5% Significance Level											
148												
149	Gamma Statistics on Detected Data Only											
150	k hat (MLE)					0.546	k star (bias corrected MLE)					0.517
151	Theta hat (MLE)					159.3	Theta star (bias corrected MLE)					168.4
152	nu hat (MLE)					36.07	nu star (bias corrected)					34.12
153	MLE Mean (bias corrected)					87.07	MLE Sd (bias corrected)					121.1
154												
155	Gamma Kaplan-Meier (KM) Statistics											
156	k hat (KM)					0.0317	nu hat (KM)					9.243

	A	B	C	D	E	F	G	H	I	J	K	L
157	Approximate Chi Square Value (9.24, α)					3.474	Adjusted Chi Square Value (9.24, β)					3.439
158	95% Gamma Approximate KM-UCL (use when n>=50)					57.5	95% Gamma Adjusted KM-UCL (use when n<50)					58.09
159	Gamma (KM) may not be used when k hat (KM) is < 0.1											
160												
161	**Gamma ROS Statistics using Imputed Non-Detects**											
162	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
163	GROS may not be used when kstar of detected data is small such as < 0.1											
164	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
165	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
166	Minimum					0.01	Mean					19.69
167	Maximum					1400	Median					0.01
168	SD					122.2	CV					6.208
169	k hat (MLE)					0.135	k star (bias corrected MLE)					0.137
170	Theta hat (MLE)					146.1	Theta star (bias corrected MLE)					144.2
171	nu hat (MLE)					39.34	nu star (bias corrected)					39.86
172	MLE Mean (bias corrected)					19.69	MLE Sd (bias corrected)					53.28
173							Adjusted Level of Significance (β)					0.0484
174	Approximate Chi Square Value (39.86, α)					26.4	Adjusted Chi Square Value (39.86, β)					26.29
175	95% Gamma Approximate UCL (use when n>=50)					29.73	95% Gamma Adjusted UCL (use when n<50)					29.85
176												
177	**Lognormal GOF Test on Detected Observations Only**											
178	Shapiro Wilk Test Statistic					0.878	**Shapiro Wilk GOF Test**					
179	5% Shapiro Wilk Critical Value					0.931	Detected Data Not Lognormal at 5% Significance Level					
180	Lilliefors Test Statistic					0.13	**Lilliefors GOF Test**					
181	5% Lilliefors Critical Value					0.154	Detected Data appear Lognormal at 5% Significance Level					
182	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
183												
184	**Lognormal ROS Statistics Using Imputed Non-Detects**											
185	Mean in Original Scale					20.45	Mean in Log Scale					-0.199
186	SD in Original Scale					122.1	SD in Log Scale					2.609
187	95% t UCL (assumes normality of ROS data)					37.17	95% Percentile Bootstrap UCL					40.64
188	95% BCA Bootstrap UCL					51.99	95% Bootstrap t UCL					83.29
189	95% H-UCL (Log ROS)					59.25						
190												
191	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
192	KM Mean (logged)					1.46	95% H-UCL (KM -Log)					10.46
193	KM SD (logged)					1.152	95% Critical H Value (KM-Log)					2.345
194	KM Standard Error of Mean (logged)					0.0968						
195												
196	**DL/2 Statistics**											
197	**DL/2 Normal**						**DL/2 Log-Transformed**					
198	Mean in Original Scale					20.71	Mean in Log Scale					0.972
199	SD in Original Scale					122	SD in Log Scale					1.393
200	95% t UCL (Assumes normality)					37.43	95% H-Stat UCL					9.417
201	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
202												
203	**Nonparametric Distribution Free UCL Statistics**											
204	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**											
205												
206	**Suggested UCL to Use**											
207	95% KM (BCA) UCL					41.97						
208												

	A	B	C	D	E	F	G	H	I	J	K	L
209	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
210	Recommendations are based upon data size, data distribution, and skewness.											
211	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
212	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
213												
214	**Value (benzene)**											
215												
216	**General Statistics**											
217	Total Number of Observations					146	Number of Distinct Observations					21
218	Number of Detects					28	Number of Non-Detects					118
219	Number of Distinct Detects					20	Number of Distinct Non-Detects					2
220	Minimum Detect					0.092	Minimum Non-Detect					0.08
221	Maximum Detect					0.95	Maximum Non-Detect					0.13
222	Variance Detects					0.0582	Percent Non-Detects					80.82%
223	Mean Detects					0.321	SD Detects					0.241
224	Median Detects					0.23	CV Detects					0.751
225	Skewness Detects					1.436	Kurtosis Detects					1.224
226	Mean of Logged Detects					-1.366	SD of Logged Detects					0.671
227												
228	**Normal GOF Test on Detects Only**											
229	Shapiro Wilk Test Statistic					0.807	**Shapiro Wilk GOF Test**					
230	5% Shapiro Wilk Critical Value					0.924	Detected Data Not Normal at 5% Significance Level					
231	Lilliefors Test Statistic					0.183	**Lilliefors GOF Test**					
232	5% Lilliefors Critical Value					0.167	Detected Data Not Normal at 5% Significance Level					
233	**Detected Data Not Normal at 5% Significance Level**											
234												
235	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
236	Mean					0.127	Standard Error of Mean					0.0118
237	SD					0.141	95% KM (BCA) UCL					0.148
238	95% KM (t) UCL					0.146	95% KM (Percentile Bootstrap) UCL					0.147
239	95% KM (z) UCL					0.146	95% KM Bootstrap t UCL					0.152
240	90% KM Chebyshev UCL					0.162	95% KM Chebyshev UCL					0.178
241	97.5% KM Chebyshev UCL					0.201	99% KM Chebyshev UCL					0.244
242												
243	**Gamma GOF Tests on Detected Observations Only**											
244	A-D Test Statistic					0.873	**Anderson-Darling GOF Test**					
245	5% A-D Critical Value					0.757	Detected Data Not Gamma Distributed at 5% Significance Level					
246	K-S Test Statistic					0.158	**Kolmogrov-Smirnoff GOF**					
247	5% K-S Critical Value					0.167	Detected data appear Gamma Distributed at 5% Significance Level					
248	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
249												
250	**Gamma Statistics on Detected Data Only**											
251	k hat (MLE)					2.325	k star (bias corrected MLE)					2.099
252	Theta hat (MLE)					0.138	Theta star (bias corrected MLE)					0.153
253	nu hat (MLE)					130.2	nu star (bias corrected)					117.6
254	MLE Mean (bias corrected)					0.321	MLE Sd (bias corrected)					0.222
255												
256	**Gamma Kaplan-Meier (KM) Statistics**											
257	k hat (KM)					0.811	nu hat (KM)					236.7
258	Approximate Chi Square Value (236.70, α)					202.1	Adjusted Chi Square Value (236.70, β)					201.8
259	95% Gamma Approximate KM-UCL (use when n>=50)					0.148	95% Gamma Adjusted KM-UCL (use when n<50)					0.148
260												

	A	B	C	D	E	F	G	H	I	J	K	L
261	**Gamma ROS Statistics using Imputed Non-Detects**											
262	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
263	GROS may not be used when kstar of detected data is small such as < 0.1											
264	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
265	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
266					Minimum	0.01				Mean		0.0701
267					Maximum	0.95				Median		0.01
268					SD	0.161				CV		2.297
269					k hat (MLE)	0.488				k star (bias corrected MLE)		0.482
270					Theta hat (MLE)	0.144				Theta star (bias corrected MLE)		0.145
271					nu hat (MLE)	142.4				nu star (bias corrected)		140.8
272					MLE Mean (bias corrected)	0.0701				MLE Sd (bias corrected)		0.101
273										Adjusted Level of Significance (β)		0.0484
274					Approximate Chi Square Value (140.77, α)	114.4				Adjusted Chi Square Value (140.77, β)		114.1
275					95% Gamma Approximate UCL (use when n>=50)	0.0862				95% Gamma Adjusted UCL (use when n<50)		0.0864
276												
277	**Lognormal GOF Test on Detected Observations Only**											
278					Shapiro Wilk Test Statistic	0.938				**Shapiro Wilk GOF Test**		
279					5% Shapiro Wilk Critical Value	0.924				Detected Data appear Lognormal at 5% Significance Level		
280					Lilliefors Test Statistic	0.134				**Lilliefors GOF Test**		
281					5% Lilliefors Critical Value	0.167				Detected Data appear Lognormal at 5% Significance Level		
282	**Detected Data appear Lognormal at 5% Significance Level**											
283												
284	**Lognormal ROS Statistics Using Imputed Non-Detects**											
285					Mean in Original Scale	0.0849				Mean in Log Scale		-3.552
286					SD in Original Scale	0.157				SD in Log Scale		1.516
287					95% t UCL (assumes normality of ROS data)	0.106				95% Percentile Bootstrap UCL		0.107
288					95% BCA Bootstrap UCL	0.111				95% Bootstrap t UCL		0.113
289					95% H-UCL (Log ROS)	0.128						
290												
291	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
292					KM Mean (logged)	-2.3				95% H-UCL (KM -Log)		0.126
293					KM SD (logged)	0.54				95% Critical H Value (KM-Log)		1.853
294					KM Standard Error of Mean (logged)	0.0456						
295												
296	**DL/2 Statistics**											
297					**DL/2 Normal**					**DL/2 Log-Transformed**		
298					Mean in Original Scale	0.0982				Mean in Log Scale		-2.78
299					SD in Original Scale	0.151				SD in Log Scale		0.771
300					95% t UCL (Assumes normality)	0.119				95% H-Stat UCL		0.0949
301	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
302												
303	**Nonparametric Distribution Free UCL Statistics**											
304	**Detected Data appear Approximate Gamma Distributed at 5% Significance Level**											
305												
306	**Suggested UCL to Use**											
307					95% KM (t) UCL	0.146				95% GROS Approximate Gamma UCL		0.0862
308					95% Approximate Gamma KM-UCL	0.148						
309												
310	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
311	Recommendations are based upon data size, data distribution, and skewness.											
312	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Value (bis(2-ethylhexyl)phthalate)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	4
Number of Detects	1	Number of Non-Detects	4
Number of Distinct Detects	1	Number of Distinct Non-Detects	3

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Value (bis(2-ethylhexyl)phthalate) was not processed!

Value (bromodichloromethane)

General Statistics

Total Number of Observations	146	Number of Distinct Observations	10
Number of Detects	8	Number of Non-Detects	138
Number of Distinct Detects	8	Number of Distinct Non-Detects	2
Minimum Detect	0.39	Minimum Non-Detect	0.093
Maximum Detect	1.3	Maximum Non-Detect	0.12
Variance Detects	0.118	Percent Non-Detects	94.52%
Mean Detects	0.708	SD Detects	0.344
Median Detects	0.56	CV Detects	0.486
Skewness Detects	0.766	Kurtosis Detects	-0.937
Mean of Logged Detects	-0.445	SD of Logged Detects	0.471

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.127	Standard Error of Mean	0.0141
SD	0.159	95% KM (BCA) UCL	0.151
95% KM (t) UCL	0.15	95% KM (Percentile Bootstrap) UCL	0.151
95% KM (z) UCL	0.15	95% KM Bootstrap t UCL	0.153
90% KM Chebyshev UCL	0.169	95% KM Chebyshev UCL	0.188
97.5% KM Chebyshev UCL	0.214	99% KM Chebyshev UCL	0.266

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.615	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.29	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

	A	B	C	D	E	F	G	H	I	J	K	L
365					k hat (MLE)	5.191					k star (bias corrected MLE)	3.328
366					Theta hat (MLE)	0.136					Theta star (bias corrected MLE)	0.213
367					nu hat (MLE)	83.05					nu star (bias corrected)	53.24
368					MLE Mean (bias corrected)	0.708					MLE Sd (bias corrected)	0.388
369												
370					**Gamma Kaplan-Meier (KM) Statistics**							
371					k hat (KM)	0.636					nu hat (KM)	185.7
372					Approximate Chi Square Value (185.72, α)	155.2					Adjusted Chi Square Value (185.72, β)	154.9
373					95% Gamma Approximate KM-UCL (use when n>=50)	0.152					95% Gamma Adjusted KM-UCL (use when n<50)	0.152
374												
375					**Gamma ROS Statistics using Imputed Non-Detects**							
376					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
377					GROS may not be used when kstar of detected data is small such as < 0.1							
378					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
379					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
380					Minimum	0.01					Mean	0.0512
381					Maximum	1.3					Median	0.01
382					SD	0.177					CV	3.455
383					k hat (MLE)	0.477					k star (bias corrected MLE)	0.471
384					Theta hat (MLE)	0.107					Theta star (bias corrected MLE)	0.109
385					nu hat (MLE)	139.2					nu star (bias corrected)	137.6
386					MLE Mean (bias corrected)	0.0512					MLE Sd (bias corrected)	0.0746
387											Adjusted Level of Significance (β)	0.0484
388					Approximate Chi Square Value (137.63, α)	111.5					Adjusted Chi Square Value (137.63, β)	111.3
389					95% Gamma Approximate UCL (use when n>=50)	0.0632					95% Gamma Adjusted UCL (use when n<50)	0.0633
390												
391					**Lognormal GOF Test on Detected Observations Only**							
392					Shapiro Wilk Test Statistic	0.863					**Shapiro Wilk GOF Test**	
393					5% Shapiro Wilk Critical Value	0.818					Detected Data appear Lognormal at 5% Significance Level	
394					Lilliefors Test Statistic	0.273					**Lilliefors GOF Test**	
395					5% Lilliefors Critical Value	0.313					Detected Data appear Lognormal at 5% Significance Level	
396					**Detected Data appear Lognormal at 5% Significance Level**							
397												
398					**Lognormal ROS Statistics Using Imputed Non-Detects**							
399					Mean in Original Scale	0.0873					Mean in Log Scale	-3.55
400					SD in Original Scale	0.179					SD in Log Scale	1.518
401					95% t UCL (assumes normality of ROS data)	0.112					95% Percentile Bootstrap UCL	0.114
402					95% BCA Bootstrap UCL	0.121					95% Bootstrap t UCL	0.121
403					95% H-UCL (Log ROS)	0.128						
404												
405					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
406					KM Mean (logged)	-2.269					95% H-UCL (KM -Log)	0.122
407					KM SD (logged)	0.451					95% Critical H Value (KM-Log)	1.802
408					KM Standard Error of Mean (logged)	0.0399						
409												
410					**DL/2 Statistics**							
411					**DL/2 Normal**						**DL/2 Log-Transformed**	
412					Mean in Original Scale	0.0934					Mean in Log Scale	-2.724
413					SD in Original Scale	0.167					SD in Log Scale	0.568
414					95% t UCL (Assumes normality)	0.116					95% H-Stat UCL	0.0842
415					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
416												

	A	B	C	D	E	F	G	H	I	J	K	L
417	Nonparametric Distribution Free UCL Statistics											
418	Detected Data appear Normal Distributed at 5% Significance Level											
419												
420	Suggested UCL to Use											
421					95% KM (t) UCL	0.15			95% KM (Percentile Bootstrap) UCL			0.151
422												
423	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
424	Recommendations are based upon data size, data distribution, and skewness.											
425	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
426	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
427												
428	Value (carbon tetrachloride)											
429												
430	General Statistics											
431					Total Number of Observations	146			Number of Distinct Observations			25
432					Number of Detects	27			Number of Non-Detects			119
433					Number of Distinct Detects	23			Number of Distinct Non-Detects			2
434					Minimum Detect	0.16			Minimum Non-Detect			0.06
435					Maximum Detect	1			Maximum Non-Detect			0.19
436					Variance Detects	0.0678			Percent Non-Detects			81.51%
437					Mean Detects	0.58			SD Detects			0.26
438					Median Detects	0.66			CV Detects			0.449
439					Skewness Detects	0.114			Kurtosis Detects			-1.103
440					Mean of Logged Detects	-0.661			SD of Logged Detects			0.518
441												
442	Normal GOF Test on Detects Only											
443					Shapiro Wilk Test Statistic	0.932			Shapiro Wilk GOF Test			
444					5% Shapiro Wilk Critical Value	0.923			Detected Data appear Normal at 5% Significance Level			
445					Lilliefors Test Statistic	0.139			Lilliefors GOF Test			
446					5% Lilliefors Critical Value	0.171			Detected Data appear Normal at 5% Significance Level			
447	Detected Data appear Normal at 5% Significance Level											
448												
449	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
450					Mean	0.156			Standard Error of Mean			0.0194
451					SD	0.23			95% KM (BCA) UCL			0.185
452					95% KM (t) UCL	0.188			95% KM (Percentile Bootstrap) UCL			0.189
453					95% KM (z) UCL	0.188			95% KM Bootstrap t UCL			0.193
454					90% KM Chebyshev UCL	0.215			95% KM Chebyshev UCL			0.241
455					97.5% KM Chebyshev UCL	0.277			99% KM Chebyshev UCL			0.349
456												
457	Gamma GOF Tests on Detected Observations Only											
458					A-D Test Statistic	0.661			Anderson-Darling GOF Test			
459					5% A-D Critical Value	0.748			Detected data appear Gamma Distributed at 5% Significance Level			
460					K-S Test Statistic	0.187			Kolmogrov-Smirnoff GOF			
461					5% K-S Critical Value	0.169			Detected Data Not Gamma Distributed at 5% Significance Level			
462	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
463												
464	Gamma Statistics on Detected Data Only											
465					k hat (MLE)	4.473			k star (bias corrected MLE)			4.001
466					Theta hat (MLE)	0.13			Theta star (bias corrected MLE)			0.145
467					nu hat (MLE)	241.6			nu star (bias corrected)			216.1
468					MLE Mean (bias corrected)	0.58			MLE Sd (bias corrected)			0.29

	A	B	C	D	E	F	G	H	I	J	K	L
469												
470						Gamma Kaplan-Meier (KM) Statistics						
471					k hat (KM)	0.463					nu hat (KM)	135.2
472					Approximate Chi Square Value (135.23, α)	109.4					Adjusted Chi Square Value (135.23, β)	109.1
473					95% Gamma Approximate KM-UCL (use when n>=50)	0.193					95% Gamma Adjusted KM-UCL (use when n<50)	0.194
474												
475						Gamma ROS Statistics using Imputed Non-Detects						
476						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
477						GROS may not be used when kstar of detected data is small such as < 0.1						
478						For such situations, GROS method tends to yield inflated values of UCLs and BTVs						
479						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						
480					Minimum	0.01					Mean	0.141
481					Maximum	1					Median	0.01
482					SD	0.245					CV	1.74
483					k hat (MLE)	0.45					k star (bias corrected MLE)	0.446
484					Theta hat (MLE)	0.312					Theta star (bias corrected MLE)	0.315
485					nu hat (MLE)	131.5					nu star (bias corrected)	130.1
486					MLE Mean (bias corrected)	0.141					MLE Sd (bias corrected)	0.211
487											Adjusted Level of Significance (β)	0.0484
488					Approximate Chi Square Value (130.13, α)	104.8					Adjusted Chi Square Value (130.13, β)	104.6
489					95% Gamma Approximate UCL (use when n>=50)	0.175					95% Gamma Adjusted UCL (use when n<50)	0.175
490												
491						Lognormal GOF Test on Detected Observations Only						
492					Shapiro Wilk Test Statistic	0.924					Shapiro Wilk GOF Test	
493					5% Shapiro Wilk Critical Value	0.923					Detected Data appear Lognormal at 5% Significance Level	
494					Lilliefors Test Statistic	0.201					Lilliefors GOF Test	
495					5% Lilliefors Critical Value	0.171					Detected Data Not Lognormal at 5% Significance Level	
496						Detected Data appear Approximate Lognormal at 5% Significance Level						
497												
498						Lognormal ROS Statistics Using Imputed Non-Detects						
499					Mean in Original Scale	0.188					Mean in Log Scale	-2.236
500					SD in Original Scale	0.226					SD in Log Scale	1.08
501					95% t UCL (assumes normality of ROS data)	0.219					95% Percentile Bootstrap UCL	0.22
502					95% BCA Bootstrap UCL	0.223					95% Bootstrap t UCL	0.224
503					95% H-UCL (Log ROS)	0.235						
504												
505						UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed						
506					KM Mean (logged)	-2.413					95% H-UCL (KM -Log)	0.151
507					KM SD (logged)	0.864					95% Critical H Value (KM-Log)	2.084
508					KM Standard Error of Mean (logged)	0.073						
509												
510						DL/2 Statistics						
511					DL/2 Normal						DL/2 Log-Transformed	
512					Mean in Original Scale	0.145					Mean in Log Scale	-2.751
513					SD in Original Scale	0.237					SD in Log Scale	1.117
514					95% t UCL (Assumes normality)	0.177					95% H-Stat UCL	0.148
515						DL/2 is not a recommended method, provided for comparisons and historical reasons						
516												
517						Nonparametric Distribution Free UCL Statistics						
518						Detected Data appear Normal Distributed at 5% Significance Level						
519												
520						Suggested UCL to Use						

	A	B	C	D	E	F	G	H	I	J	K	L
521					95% KM (t) UCL	0.188			95% KM (Percentile Bootstrap) UCL			0.189
522												
523	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
524	Recommendations are based upon data size, data distribution, and skewness.											
525	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
526	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
527												
528	Value (chloroform)											
529												
530	General Statistics											
531					Total Number of Observations	146			Number of Distinct Observations			42
532					Number of Detects	58			Number of Non-Detects			88
533					Number of Distinct Detects	40			Number of Distinct Non-Detects			2
534					Minimum Detect	0.11			Minimum Non-Detect			0.08
535					Maximum Detect	19			Maximum Non-Detect			0.15
536					Variance Detects	21.57			Percent Non-Detects			60.27%
537					Mean Detects	2.508			SD Detects			4.644
538					Median Detects	0.31			CV Detects			1.852
539					Skewness Detects	2.368			Kurtosis Detects			4.966
540					Mean of Logged Detects	-0.38			SD of Logged Detects			1.507
541												
542	Normal GOF Test on Detects Only											
543					Shapiro Wilk Test Statistic	0.568			Normal GOF Test on Detected Observations Only			
544					5% Shapiro Wilk P Value	0			Detected Data Not Normal at 5% Significance Level			
545					Lilliefors Test Statistic	0.334			Lilliefors GOF Test			
546					5% Lilliefors Critical Value	0.116			Detected Data Not Normal at 5% Significance Level			
547	Detected Data Not Normal at 5% Significance Level											
548												
549	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
550					Mean	1.045			Standard Error of Mean			0.262
551					SD	3.135			95% KM (BCA) UCL			1.478
552					95% KM (t) UCL	1.478			95% KM (Percentile Bootstrap) UCL			1.505
553					95% KM (z) UCL	1.475			95% KM Bootstrap t UCL			1.645
554					90% KM Chebyshev UCL	1.83			95% KM Chebyshev UCL			2.186
555					97.5% KM Chebyshev UCL	2.679			99% KM Chebyshev UCL			3.649
556												
557	Gamma GOF Tests on Detected Observations Only											
558					A-D Test Statistic	5.859			Anderson-Darling GOF Test			
559					5% A-D Critical Value	0.818			Detected Data Not Gamma Distributed at 5% Significance Level			
560					K-S Test Statistic	0.26			Kolmogrov-Smirnoff GOF			
561					5% K-S Critical Value	0.124			Detected Data Not Gamma Distributed at 5% Significance Level			
562	Detected Data Not Gamma Distributed at 5% Significance Level											
563												
564	Gamma Statistics on Detected Data Only											
565					k hat (MLE)	0.49			k star (bias corrected MLE)			0.476
566					Theta hat (MLE)	5.115			Theta star (bias corrected MLE)			5.263
567					nu hat (MLE)	56.88			nu star (bias corrected)			55.27
568					MLE Mean (bias corrected)	2.508			MLE Sd (bias corrected)			3.633
569												
570	Gamma Kaplan-Meier (KM) Statistics											
571					k hat (KM)	0.111			nu hat (KM)			32.43
572					Approximate Chi Square Value (32.43, α)	20.41			Adjusted Chi Square Value (32.43, β)			20.32

	A	B	C	D	E	F	G	H	I	J	K	L
573	95% Gamma Approximate KM-UCL (use when n>=50)					1.66	95% Gamma Adjusted KM-UCL (use when n<50)					1.668
574												
575	**Gamma ROS Statistics using Imputed Non-Detects**											
576	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
577	GROS may not be used when kstar of detected data is small such as < 0.1											
578	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
579	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
580	Minimum					0.01	Mean					1.002
581	Maximum					19	Median					0.01
582	SD					3.159	CV					3.152
583	k hat (MLE)					0.244	k star (bias corrected MLE)					0.243
584	Theta hat (MLE)					4.116	Theta star (bias corrected MLE)					4.123
585	nu hat (MLE)					71.11	nu star (bias corrected)					70.98
586	MLE Mean (bias corrected)					1.002	MLE Sd (bias corrected)					2.033
587							Adjusted Level of Significance (β)					0.0484
588	Approximate Chi Square Value (70.98, α)					52.59	Adjusted Chi Square Value (70.98, β)					52.43
589	95% Gamma Approximate UCL (use when n>=50)					1.353	95% Gamma Adjusted UCL (use when n<50)					1.357
590												
591	**Lognormal GOF Test on Detected Observations Only**											
592	Lilliefors Test Statistic					0.21	**Lilliefors GOF Test**					
593	5% Lilliefors Critical Value					0.116	Detected Data Not Lognormal at 5% Significance Level					
594	**Detected Data Not Lognormal at 5% Significance Level**											
595												
596	**Lognormal ROS Statistics Using Imputed Non-Detects**											
597	Mean in Original Scale					1.009	Mean in Log Scale					-3.038
598	SD in Original Scale					3.157	SD in Log Scale					2.707
599	95% t UCL (assumes normality of ROS data)					1.442	95% Percentile Bootstrap UCL					1.471
600	95% BCA Bootstrap UCL					1.566	95% Bootstrap t UCL					1.634
601	95% H-UCL (Log ROS)					4.786						
602												
603	**DL/2 Statistics**											
604	**DL/2 Normal**						**DL/2 Log-Transformed**					
605	Mean in Original Scale					1.025	Mean in Log Scale					-2.005
606	SD in Original Scale					3.152	SD in Log Scale					1.639
607	95% t UCL (Assumes normality)					1.457	95% H-Stat UCL					0.762
608	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
609												
610	**Nonparametric Distribution Free UCL Statistics**											
611	**Data do not follow a Discernible Distribution at 5% Significance Level**											
612												
613	**Suggested UCL to Use**											
614	95% KM (Chebyshev) UCL					2.186						
615												
616	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
617	Recommendations are based upon data size, data distribution, and skewness.											
618	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
619	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
620												
621	**Value (cis-1,2-dichloroethene)**											
622												
623	**General Statistics**											
624	Total Number of Observations					146	Number of Distinct Observations					35

	A	B	C	D	E	F	G	H	I	J	K	L
625					Number of Detects	43				Number of Non-Detects		103
626					Number of Distinct Detects	33				Number of Distinct Non-Detects		2
627					Minimum Detect	0.19				Minimum Non-Detect		0.18
628					Maximum Detect	7.4				Maximum Non-Detect		0.2
629					Variance Detects	1.311				Percent Non-Detects		70.55%
630					Mean Detects	0.647				SD Detects		1.145
631					Median Detects	0.34				CV Detects		1.77
632					Skewness Detects	5.297				Kurtosis Detects		30.43
633					Mean of Logged Detects	-0.855				SD of Logged Detects		0.71
634												
635					Normal GOF Test on Detects Only							
636					Shapiro Wilk Test Statistic	0.369			Shapiro Wilk GOF Test			
637					5% Shapiro Wilk Critical Value	0.943			Detected Data Not Normal at 5% Significance Level			
638					Lilliefors Test Statistic	0.345			Lilliefors GOF Test			
639					5% Lilliefors Critical Value	0.135			Detected Data Not Normal at 5% Significance Level			
640					Detected Data Not Normal at 5% Significance Level							
641												
642					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
643					Mean	0.318				Standard Error of Mean		0.0544
644					SD	0.65				95% KM (BCA) UCL		0.421
645					95% KM (t) UCL	0.408				95% KM (Percentile Bootstrap) UCL		0.417
646					95% KM (z) UCL	0.407				95% KM Bootstrap t UCL		0.62
647					90% KM Chebyshev UCL	0.481				95% KM Chebyshev UCL		0.555
648					97.5% KM Chebyshev UCL	0.657				99% KM Chebyshev UCL		0.859
649												
650					Gamma GOF Tests on Detected Observations Only							
651					A-D Test Statistic	4.939			Anderson-Darling GOF Test			
652					5% A-D Critical Value	0.771			Detected Data Not Gamma Distributed at 5% Significance Level			
653					K-S Test Statistic	0.283			Kolmogrov-Smirnoff GOF			
654					5% K-S Critical Value	0.138			Detected Data Not Gamma Distributed at 5% Significance Level			
655					Detected Data Not Gamma Distributed at 5% Significance Level							
656												
657					Gamma Statistics on Detected Data Only							
658					k hat (MLE)	1.336				k star (bias corrected MLE)		1.258
659					Theta hat (MLE)	0.484				Theta star (bias corrected MLE)		0.514
660					nu hat (MLE)	114.9				nu star (bias corrected)		108.2
661					MLE Mean (bias corrected)	0.647				MLE Sd (bias corrected)		0.577
662												
663					Gamma Kaplan-Meier (KM) Statistics							
664					k hat (KM)	0.239				nu hat (KM)		69.69
665					Approximate Chi Square Value (69.69, α)	51.47				Adjusted Chi Square Value (69.69, β)		51.31
666					95% Gamma Approximate KM-UCL (use when n>=50)	0.43				95% Gamma Adjusted KM-UCL (use when n<50)		0.431
667												
668					Gamma ROS Statistics using Imputed Non-Detects							
669					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
670					GROS may not be used when kstar of detected data is small such as < 0.1							
671					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
672					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
673					Minimum	0.01				Mean		0.198
674					Maximum	7.4				Median		0.01
675					SD	0.682				CV		3.451
676					k hat (MLE)	0.357				k star (bias corrected MLE)		0.354

	A–E	F	G–K	L
677	Theta hat (MLE)	0.554	Theta star (bias corrected MLE)	0.558
678	nu hat (MLE)	104.2	nu star (bias corrected)	103.4
679	MLE Mean (bias corrected)	0.198	MLE Sd (bias corrected)	0.332
680			Adjusted Level of Significance (β)	0.0484
681	Approximate Chi Square Value (103.38, α)	80.92	Adjusted Chi Square Value (103.38, β)	80.72
682	95% Gamma Approximate UCL (use when n>=50)	0.252	95% Gamma Adjusted UCL (use when n<50)	0.253
683				
684	**Lognormal GOF Test on Detected Observations Only**			
685	Shapiro Wilk Test Statistic	0.804	**Shapiro Wilk GOF Test**	
686	5% Shapiro Wilk Critical Value	0.943	Detected Data Not Lognormal at 5% Significance Level	
687	Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**	
688	5% Lilliefors Critical Value	0.135	Detected Data Not Lognormal at 5% Significance Level	
689	**Detected Data Not Lognormal at 5% Significance Level**			
690				
691	**Lognormal ROS Statistics Using Imputed Non-Detects**			
692	Mean in Original Scale	0.233	Mean in Log Scale	-2.487
693	SD in Original Scale	0.673	SD in Log Scale	1.378
694	95% t UCL (assumes normality of ROS data)	0.325	95% Percentile Bootstrap UCL	0.333
695	95% BCA Bootstrap UCL	0.425	95% Bootstrap t UCL	0.49
696	95% H-UCL (Log ROS)	0.289		
697				
698	**DL/2 Statistics**			
699	**DL/2 Normal**		**DL/2 Log-Transformed**	
700	Mean in Original Scale	0.256	Mean in Log Scale	-1.932
701	SD in Original Scale	0.666	SD in Log Scale	0.797
702	95% t UCL (Assumes normality)	0.347	95% H-Stat UCL	0.228
703	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
704				
705	**Nonparametric Distribution Free UCL Statistics**			
706	**Data do not follow a Discernible Distribution at 5% Significance Level**			
707				
708	**Suggested UCL to Use**			
709	95% KM (t) UCL	0.408	95% KM (% Bootstrap) UCL	0.417
710				
711	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
712	Recommendations are based upon data size, data distribution, and skewness.			
713	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
714	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
715				
716	**Value (iron)**			
717				
718	**General Statistics**			
719	Total Number of Observations	16	Number of Distinct Observations	14
720	Number of Detects	14	Number of Non-Detects	2
721	Number of Distinct Detects	13	Number of Distinct Non-Detects	1
722	Minimum Detect	0.0921	Minimum Non-Detect	0.0736
723	Maximum Detect	21.4	Maximum Non-Detect	0.0736
724	Variance Detects	43.02	Percent Non-Detects	12.5%
725	Mean Detects	3.276	SD Detects	6.559
726	Median Detects	0.709	CV Detects	2.002
727	Skewness Detects	2.384	Kurtosis Detects	4.77
728	Mean of Logged Detects	-0.262	SD of Logged Detects	1.661

	A	B	C	D	E	F	G	H	I	J	K	L
729												
730						Normal GOF Test on Detects Only						
731					Shapiro Wilk Test Statistic	0.537	Shapiro Wilk GOF Test					
732					5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level					
733					Lilliefors Test Statistic	0.391	Lilliefors GOF Test					
734					5% Lilliefors Critical Value	0.237	Detected Data Not Normal at 5% Significance Level					
735						Detected Data Not Normal at 5% Significance Level						
736												
737						Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
738					Mean	2.876			Standard Error of Mean			1.558
739					SD	6.006			95% KM (BCA) UCL			5.712
740					95% KM (t) UCL	5.607			95% KM (Percentile Bootstrap) UCL			5.519
741					95% KM (z) UCL	5.439			95% KM Bootstrap t UCL			21.91
742					90% KM Chebyshev UCL	7.55			95% KM Chebyshev UCL			9.668
743					97.5% KM Chebyshev UCL	12.61			99% KM Chebyshev UCL			18.38
744												
745						Gamma GOF Tests on Detected Observations Only						
746					A-D Test Statistic	1.315	Anderson-Darling GOF Test					
747					5% A-D Critical Value	0.804	Detected Data Not Gamma Distributed at 5% Significance Level					
748					K-S Test Statistic	0.259	Kolmogrov-Smirnoff GOF					
749					5% K-S Critical Value	0.243	Detected Data Not Gamma Distributed at 5% Significance Level					
750						Detected Data Not Gamma Distributed at 5% Significance Level						
751												
752						Gamma Statistics on Detected Data Only						
753					k hat (MLE)	0.446			k star (bias corrected MLE)			0.398
754					Theta hat (MLE)	7.339			Theta star (bias corrected MLE)			8.224
755					nu hat (MLE)	12.5			nu star (bias corrected)			11.15
756					MLE Mean (bias corrected)	3.276			MLE Sd (bias corrected)			5.191
757												
758						Gamma Kaplan-Meier (KM) Statistics						
759					k hat (KM)	0.229			nu hat (KM)			7.336
760					Approximate Chi Square Value (7.34, α)	2.357			Adjusted Chi Square Value (7.34, β)			2.049
761					95% Gamma Approximate KM-UCL (use when n>=50)	8.951			95% Gamma Adjusted KM-UCL (use when n<50)			10.3
762												
763						Gamma ROS Statistics using Imputed Non-Detects						
764						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
765						GROS may not be used when kstar of detected data is small such as < 0.1						
766						For such situations, GROS method tends to yield inflated values of UCLs and BTVs						
767						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						
768					Minimum	0.01			Mean			2.868
769					Maximum	21.4			Median			0.416
770					SD	6.207			CV			2.164
771					k hat (MLE)	0.36			k star (bias corrected MLE)			0.334
772					Theta hat (MLE)	7.963			Theta star (bias corrected MLE)			8.579
773					nu hat (MLE)	11.53			nu star (bias corrected)			10.7
774					MLE Mean (bias corrected)	2.868			MLE Sd (bias corrected)			4.96
775									Adjusted Level of Significance (β)			0.0335
776					Approximate Chi Square Value (10.70, α)	4.382			Adjusted Chi Square Value (10.70, β)			3.932
777					95% Gamma Approximate UCL (use when n>=50)	7.001			95% Gamma Adjusted UCL (use when n<50)			7.803
778												
779						Lognormal GOF Test on Detected Observations Only						
780					Shapiro Wilk Test Statistic	0.907	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
781					5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level					
782					Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**					
783					5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level					
784	**Detected Data appear Lognormal at 5% Significance Level**											
785												
786	**Lognormal ROS Statistics Using Imputed Non-Detects**											
787					Mean in Original Scale	2.869				Mean in Log Scale		-0.749
788					SD in Original Scale	6.207				SD in Log Scale		2.045
789					95% t UCL (assumes normality of ROS data)	5.589				95% Percentile Bootstrap UCL		5.576
790					95% BCA Bootstrap UCL	6.771				95% Bootstrap t UCL		21.62
791					95% H-UCL (Log ROS)	42.41						
792												
793	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
794					KM Mean (logged)	-0.555				95% H-UCL (KM -Log)		12.89
795					KM SD (logged)	1.686				95% Critical H Value (KM-Log)		3.882
796					KM Standard Error of Mean (logged)	0.437						
797												
798	**DL/2 Statistics**											
799				**DL/2 Normal**			**DL/2 Log-Transformed**					
800					Mean in Original Scale	2.871				Mean in Log Scale		-0.642
801					SD in Original Scale	6.205				SD in Log Scale		1.863
802					95% t UCL (Assumes normality)	5.591				95% H-Stat UCL		22.58
803	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
804												
805	**Nonparametric Distribution Free UCL Statistics**											
806	**Detected Data appear Lognormal Distributed at 5% Significance Level**											
807												
808	**Suggested UCL to Use**											
809					99% KM (Chebyshev) UCL	18.38						
810												
811	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
812	Recommendations are based upon data size, data distribution, and skewness.											
813	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
814	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
815												
816												
817	**Value (manganese)**											
818												
819	**General Statistics**											
820					Total Number of Observations	4				Number of Distinct Observations		4
821										Number of Missing Observations		0
822					Minimum	0.0153				Mean		2.041
823					Maximum	7.82				Median		0.164
824					SD	3.855				Std. Error of Mean		1.928
825					Coefficient of Variation	1.889				Skewness		1.993
826												
827	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
828	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
829	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
830	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
831												
832	**Normal GOF Test**											

	A	B	C	D	E	F	G	H	I	J	K	L
833					Shapiro Wilk Test Statistic	0.656	**Shapiro Wilk GOF Test**					
834					5% Shapiro Wilk Critical Value	0.748	Data Not Normal at 5% Significance Level					
835					Lilliefors Test Statistic	0.424	**Lilliefors GOF Test**					
836					5% Lilliefors Critical Value	0.443	Data appear Normal at 5% Significance Level					
837	**Data appear Approximate Normal at 5% Significance Level**											
838												
839	**Assuming Normal Distribution**											
840	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
841					95% Student's-t UCL	6.577	95% Adjusted-CLT UCL (Chen-1995)					7.264
842							95% Modified-t UCL (Johnson-1978)					6.897
843												
844	**Gamma GOF Test**											
845					A-D Test Statistic	0.461	**Anderson-Darling Gamma GOF Test**					
846					5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level					
847					K-S Test Statistic	0.306	**Kolmogrov-Smirnoff Gamma GOF Test**					
848					5% K-S Critical Value	0.419	Detected data appear Gamma Distributed at 5% Significance Level					
849	**Detected data appear Gamma Distributed at 5% Significance Level**											
850												
851	**Gamma Statistics**											
852					k hat (MLE)	0.286	k star (bias corrected MLE)					0.238
853					Theta hat (MLE)	7.131	Theta star (bias corrected MLE)					8.567
854					nu hat (MLE)	2.289	nu star (bias corrected)					1.906
855					MLE Mean (bias corrected)	2.041	MLE Sd (bias corrected)					4.181
856							Approximate Chi Square Value (0.05)					0.139
857					Adjusted Level of Significance	N/A	Adjusted Chi Square Value					N/A
858												
859	**Assuming Gamma Distribution**											
860					95% Approximate Gamma UCL (use when n>=50))	27.9	95% Adjusted Gamma UCL (use when n<50)					N/A
861												
862	**Lognormal GOF Test**											
863					Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk Lognormal GOF Test**					
864					5% Shapiro Wilk Critical Value	0.748	Data appear Lognormal at 5% Significance Level					
865					Lilliefors Test Statistic	0.24	**Lilliefors Lognormal GOF Test**					
866					5% Lilliefors Critical Value	0.443	Data appear Lognormal at 5% Significance Level					
867	**Data appear Lognormal at 5% Significance Level**											
868												
869	**Lognormal Statistics**											
870					Minimum of Logged Data	-4.18	Mean of logged Data					-1.715
871					Maximum of Logged Data	2.057	SD of logged Data					2.819
872												
873	**Assuming Lognormal Distribution**											
874					95% H-UCL	1.002E+14	90% Chebyshev (MVUE) UCL					5.362
875					95% Chebyshev (MVUE) UCL	7.13	97.5% Chebyshev (MVUE) UCL					9.583
876					99% Chebyshev (MVUE) UCL	14.4						
877												
878	**Nonparametric Distribution Free UCL Statistics**											
879	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
880												
881	**Nonparametric Distribution Free UCLs**											
882					95% CLT UCL	5.211	95% Jackknife UCL					6.577
883					95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL					N/A
884					95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL					N/A

	A	B	C	D	E	F	G	H	I	J	K	L
885					95% BCA Bootstrap UCL	N/A						
886					90% Chebyshev(Mean, Sd) UCL	7.823				95% Chebyshev(Mean, Sd) UCL		10.44
887					97.5% Chebyshev(Mean, Sd) UCL	14.08				99% Chebyshev(Mean, Sd) UCL		21.22
888												
889					**Suggested UCL to Use**							
890					95% Student's-t UCL	6.577						
891												
892	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
893	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
894	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
895	For additional insight the user may want to consult a statistician.											
896												
897	**Value (toluene)**											
898												
899					**General Statistics**							
900					Total Number of Observations	146				Number of Distinct Observations		76
901					Number of Detects	104				Number of Non-Detects		42
902					Number of Distinct Detects	75				Number of Distinct Non-Detects		2
903					Minimum Detect	0.14				Minimum Non-Detect		0.09
904					Maximum Detect	170				Maximum Non-Detect		0.15
905					Variance Detects	601.8				Percent Non-Detects		28.77%
906					Mean Detects	6.753				SD Detects		24.53
907					Median Detects	0.78				CV Detects		3.633
908					Skewness Detects	5.203				Kurtosis Detects		28.47
909					Mean of Logged Detects	-0.0341				SD of Logged Detects		1.537
910												
911					**Normal GOF Test on Detects Only**							
912					Shapiro Wilk Test Statistic	0.299				**Normal GOF Test on Detected Observations Only**		
913					5% Shapiro Wilk P Value	0				Detected Data Not Normal at 5% Significance Level		
914					Lilliefors Test Statistic	0.437				**Lilliefors GOF Test**		
915					5% Lilliefors Critical Value	0.0869				Detected Data Not Normal at 5% Significance Level		
916					**Detected Data Not Normal at 5% Significance Level**							
917												
918					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
919					Mean	4.837				Standard Error of Mean		1.732
920					SD	20.82				95% KM (BCA) UCL		8.174
921					95% KM (t) UCL	7.704				95% KM (Percentile Bootstrap) UCL		7.861
922					95% KM (z) UCL	7.685				95% KM Bootstrap t UCL		10.12
923					90% KM Chebyshev UCL	10.03				95% KM Chebyshev UCL		12.39
924					97.5% KM Chebyshev UCL	15.65				99% KM Chebyshev UCL		22.07
925												
926					**Gamma GOF Tests on Detected Observations Only**							
927					A-D Test Statistic	14.84				**Anderson-Darling GOF Test**		
928					5% A-D Critical Value	0.856				Detected Data Not Gamma Distributed at 5% Significance Level		
929					K-S Test Statistic	0.317				**Kolmogrov-Smirnoff GOF**		
930					5% K-S Critical Value	0.0954				Detected Data Not Gamma Distributed at 5% Significance Level		
931					**Detected Data Not Gamma Distributed at 5% Significance Level**							
932												
933					**Gamma Statistics on Detected Data Only**							
934					k hat (MLE)	0.346				k star (bias corrected MLE)		0.343
935					Theta hat (MLE)	19.49				Theta star (bias corrected MLE)		19.7
936					nu hat (MLE)	72.06				nu star (bias corrected)		71.32

	A	B	C	D	E	F	G	H	I	J	K	L
937					MLE Mean (bias corrected)	6.753				MLE Sd (bias corrected)		11.53
938												
939					Gamma Kaplan-Meier (KM) Statistics							
940					k hat (KM)	0.054				nu hat (KM)		15.75
941					Approximate Chi Square Value (15.75, α)	7.789				Adjusted Chi Square Value (15.75, β)		7.733
942					95% Gamma Approximate KM-UCL (use when n>=50)	9.783				95% Gamma Adjusted KM-UCL (use when n<50)		9.854
943					Gamma (KM) may not be used when k hat (KM) is < 0.1							
944												
945					Gamma ROS Statistics using Imputed Non-Detects							
946					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
947					GROS may not be used when kstar of detected data is small such as < 0.1							
948					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
949					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
950					Minimum	0.01				Mean		4.813
951					Maximum	170				Median		0.36
952					SD	20.9				CV		4.342
953					k hat (MLE)	0.244				k star (bias corrected MLE)		0.244
954					Theta hat (MLE)	19.72				Theta star (bias corrected MLE)		19.75
955					nu hat (MLE)	71.29				nu star (bias corrected)		71.16
956					MLE Mean (bias corrected)	4.813				MLE Sd (bias corrected)		9.751
957										Adjusted Level of Significance (β)		0.0484
958					Approximate Chi Square Value (71.16, α)	52.74				Adjusted Chi Square Value (71.16, β)		52.58
959					95% Gamma Approximate UCL (use when n>=50)	6.495				95% Gamma Adjusted UCL (use when n<50)		6.514
960												
961					Lognormal GOF Test on Detected Observations Only							
962					Lilliefors Test Statistic	0.128				Lilliefors GOF Test		
963					5% Lilliefors Critical Value	0.0869				Detected Data Not Lognormal at 5% Significance Level		
964					Detected Data Not Lognormal at 5% Significance Level							
965												
966					Lognormal ROS Statistics Using Imputed Non-Detects							
967					Mean in Original Scale	4.822				Mean in Log Scale		-1.055
968					SD in Original Scale	20.9				SD in Log Scale		2.131
969					95% t UCL (assumes normality of ROS data)	7.685				95% Percentile Bootstrap UCL		7.9
970					95% BCA Bootstrap UCL	8.442				95% Bootstrap t UCL		10.41
971					95% H-UCL (Log ROS)	6.215						
972												
973					DL/2 Statistics							
974					DL/2 Normal					DL/2 Log-Transformed		
975					Mean in Original Scale	4.829				Mean in Log Scale		-0.822
976					SD in Original Scale	20.9				SD in Log Scale		1.801
977					95% t UCL (Assumes normality)	7.692				95% H-Stat UCL		3.512
978					DL/2 is not a recommended method, provided for comparisons and historical reasons							
979												
980					Nonparametric Distribution Free UCL Statistics							
981					Data do not follow a Discernible Distribution at 5% Significance Level							
982												
983					Suggested UCL to Use							
984					97.5% KM (Chebyshev) UCL	15.65						
985												
986					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
987					Recommendations are based upon data size, data distribution, and skewness.							
988					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Value (trichloroethene)

General Statistics

Total Number of Observations	146	Number of Distinct Observations	88
Number of Detects	114	Number of Non-Detects	32
Number of Distinct Detects	87	Number of Distinct Non-Detects	2
Minimum Detect	0.13	Minimum Non-Detect	0.09
Maximum Detect	310	Maximum Non-Detect	0.18
Variance Detects	2637	Percent Non-Detects	21.92%
Mean Detects	43.79	SD Detects	51.35
Median Detects	21	CV Detects	1.173
Skewness Detects	1.919	Kurtosis Detects	5.84
Mean of Logged Detects	2.558	SD of Logged Detects	2.106

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.804	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.083	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	34.21	Standard Error of Mean	4.045
SD	48.66	95% KM (BCA) UCL	41.13
95% KM (t) UCL	40.91	95% KM (Percentile Bootstrap) UCL	41.08
95% KM (z) UCL	40.86	95% KM Bootstrap t UCL	42.16
90% KM Chebyshev UCL	46.35	95% KM Chebyshev UCL	51.84
97.5% KM Chebyshev UCL	59.47	99% KM Chebyshev UCL	74.46

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.608	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.817	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.104	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.0907	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.517	k star (bias corrected MLE)	0.51
Theta hat (MLE)	84.64	Theta star (bias corrected MLE)	85.93
nu hat (MLE)	118	nu star (bias corrected)	116.2
MLE Mean (bias corrected)	43.79	MLE Sd (bias corrected)	61.34

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.494	nu hat (KM)	144.3
Approximate Chi Square Value (144.34, α)	117.6	Adjusted Chi Square Value (144.34, β)	117.3
95% Gamma Approximate KM-UCL (use when n>=50)	42	95% Gamma Adjusted KM-UCL (use when n<50)	42.08

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

	A	B	C	D	E	F	G	H	I	J	K	L
1041	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1042	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1043					Minimum	0.01					Mean	34.19
1044					Maximum	310					Median	11.5
1045					SD	48.84					CV	1.428
1046					k hat (MLE)	0.277					k star (bias corrected MLE)	0.276
1047					Theta hat (MLE)	123.4					Theta star (bias corrected MLE)	123.9
1048					nu hat (MLE)	80.94					nu star (bias corrected)	80.61
1049					MLE Mean (bias corrected)	34.19					MLE Sd (bias corrected)	65.08
1050											Adjusted Level of Significance (β)	0.0484
1051					Approximate Chi Square Value (80.61, α)	60.92					Adjusted Chi Square Value (80.61, β)	60.75
1052					95% Gamma Approximate UCL (use when n>=50)	45.24					95% Gamma Adjusted UCL (use when n<50)	45.37
1053												
1054	**Lognormal GOF Test on Detected Observations Only**											
1055					Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**					
1056					5% Lilliefors Critical Value	0.083	Detected Data Not Lognormal at 5% Significance Level					
1057	**Detected Data Not Lognormal at 5% Significance Level**											
1058												
1059	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1060					Mean in Original Scale	34.24					Mean in Log Scale	1.597
1061					SD in Original Scale	48.8					SD in Log Scale	2.647
1062					95% t UCL (assumes normality of ROS data)	40.93					95% Percentile Bootstrap UCL	40.65
1063					95% BCA Bootstrap UCL	41.83					95% Bootstrap t UCL	41.73
1064					95% H-UCL (Log ROS)	403.7						
1065												
1066	**DL/2 Statistics**											
1067		**DL/2 Normal**					**DL/2 Log-Transformed**					
1068					Mean in Original Scale	34.21					Mean in Log Scale	1.403
1069					SD in Original Scale	48.83					SD in Log Scale	2.875
1070					95% t UCL (Assumes normality)	40.9					95% H-Stat UCL	724.6
1071	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1072												
1073	**Nonparametric Distribution Free UCL Statistics**											
1074	**Data do not follow a Discernible Distribution at 5% Significance Level**											
1075												
1076	**Suggested UCL to Use**											
1077					97.5% KM (Chebyshev) UCL	59.47						
1078												
1079	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1080	Recommendations are based upon data size, data distribution, and skewness.											
1081	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1082	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1083												
1084	**Value (vinyl chloride)**											
1085												
1086	**General Statistics**											
1087					Total Number of Observations	146					Number of Distinct Observations	7
1088					Number of Detects	5					Number of Non-Detects	141
1089					Number of Distinct Detects	5					Number of Distinct Non-Detects	2
1090					Minimum Detect	0.29					Minimum Non-Detect	0.13
1091					Maximum Detect	4.2					Maximum Non-Detect	0.14
1092					Variance Detects	3.523					Percent Non-Detects	96.58%

	A	B	C	D	E	F	G	H	I	J	K	L
1093					Mean Detects	1.964					SD Detects	1.877
1094					Median Detects	0.91					CV Detects	0.956
1095					Skewness Detects	0.572					Kurtosis Detects	-3.093
1096					Mean of Logged Detects	0.192					SD of Logged Detects	1.165
1097												
1098					**Normal GOF Test on Detects Only**							
1099					Shapiro Wilk Test Statistic	0.804	**Shapiro Wilk GOF Test**					
1100					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level					
1101					Lilliefors Test Statistic	0.313	**Lilliefors GOF Test**					
1102					5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level					
1103					**Detected Data appear Normal at 5% Significance Level**							
1104												
1105					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
1106					Mean	0.193					Standard Error of Mean	0.0422
1107					SD	0.456					95% KM (BCA) UCL	0.268
1108					95% KM (t) UCL	0.263					95% KM (Percentile Bootstrap) UCL	0.269
1109					95% KM (z) UCL	0.262					95% KM Bootstrap t UCL	0.404
1110					90% KM Chebyshev UCL	0.319					95% KM Chebyshev UCL	0.377
1111					97.5% KM Chebyshev UCL	0.456					99% KM Chebyshev UCL	0.612
1112												
1113					**Gamma GOF Tests on Detected Observations Only**							
1114					A-D Test Statistic	0.441	**Anderson-Darling GOF Test**					
1115					5% A-D Critical Value	0.69	Detected data appear Gamma Distributed at 5% Significance Level					
1116					K-S Test Statistic	0.264	**Kolmogrov-Smirnoff GOF**					
1117					5% K-S Critical Value	0.363	Detected data appear Gamma Distributed at 5% Significance Level					
1118					**Detected data appear Gamma Distributed at 5% Significance Level**							
1119												
1120					**Gamma Statistics on Detected Data Only**							
1121					k hat (MLE)	1.174					k star (bias corrected MLE)	0.603
1122					Theta hat (MLE)	1.673					Theta star (bias corrected MLE)	3.258
1123					nu hat (MLE)	11.74					nu star (bias corrected)	6.029
1124					MLE Mean (bias corrected)	1.964					MLE Sd (bias corrected)	2.53
1125												
1126					**Gamma Kaplan-Meier (KM) Statistics**							
1127					k hat (KM)	0.179					nu hat (KM)	52.25
1128					Approximate Chi Square Value (52.25, α)	36.65					Adjusted Chi Square Value (52.25, β)	36.52
1129					95% Gamma Approximate KM-UCL (use when n>=50)	0.275					95% Gamma Adjusted KM-UCL (use when n<50)	0.276
1130												
1131					**Gamma ROS Statistics using Imputed Non-Detects**							
1132					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
1133					GROS may not be used when kstar of detected data is small such as < 0.1							
1134					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
1135					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
1136					Minimum	0.01					Mean	0.0769
1137					Maximum	4.2					Median	0.01
1138					SD	0.474					CV	6.158
1139					k hat (MLE)	0.357					k star (bias corrected MLE)	0.354
1140					Theta hat (MLE)	0.215					Theta star (bias corrected MLE)	0.217
1141					nu hat (MLE)	104.3					nu star (bias corrected)	103.5
1142					MLE Mean (bias corrected)	0.0769					MLE Sd (bias corrected)	0.129
1143											Adjusted Level of Significance (β)	0.0484
1144					Approximate Chi Square Value (103.51, α)	81.04					Adjusted Chi Square Value (103.51, β)	80.84

	A	B	C	D	E	F	G	H	I	J	K	L
1145	95% Gamma Approximate UCL (use when n>=50)					0.0983	95% Gamma Adjusted UCL (use when n<50)					0.0985
1146												
1147	Lognormal GOF Test on Detected Observations Only											
1148	Shapiro Wilk Test Statistic					0.903	Shapiro Wilk GOF Test					
1149	5% Shapiro Wilk Critical Value					0.762	Detected Data appear Lognormal at 5% Significance Level					
1150	Lilliefors Test Statistic					0.237	Lilliefors GOF Test					
1151	5% Lilliefors Critical Value					0.396	Detected Data appear Lognormal at 5% Significance Level					
1152	Detected Data appear Lognormal at 5% Significance Level											
1153												
1154	Lognormal ROS Statistics Using Imputed Non-Detects											
1155	Mean in Original Scale					0.0728	Mean in Log Scale					-9.372
1156	SD in Original Scale					0.475	SD in Log Scale					4.275
1157	95% t UCL (assumes normality of ROS data)					0.138	95% Percentile Bootstrap UCL					0.147
1158	95% BCA Bootstrap UCL					0.185	95% Bootstrap t UCL					0.398
1159	95% H-UCL (Log ROS)					7.32						
1160												
1161	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
1162	KM Mean (logged)					-1.964	95% H-UCL (KM -Log)					0.166
1163	KM SD (logged)					0.449	95% Critical H Value (KM-Log)					1.801
1164	KM Standard Error of Mean (logged)					0.0416						
1165												
1166	DL/2 Statistics											
1167	DL/2 Normal						DL/2 Log-Transformed					
1168	Mean in Original Scale					0.134	Mean in Log Scale					-2.576
1169	SD in Original Scale					0.466	SD in Log Scale					0.559
1170	95% t UCL (Assumes normality)					0.198	95% H-Stat UCL					0.0969
1171	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1172												
1173	Nonparametric Distribution Free UCL Statistics											
1174	Detected Data appear Normal Distributed at 5% Significance Level											
1175												
1176	Suggested UCL to Use											
1177	95% KM (t) UCL					0.263	95% KM (Percentile Bootstrap) UCL					0.269
1178												
1179	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1180	Recommendations are based upon data size, data distribution, and skewness.											
1181	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1182	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1183												

	A	B	C	D	E	F	G	H	I	J	K	L
1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3	User Selected Options											
4	Date/Time of Computation			6/2/2016 1:40:10 PM								
5	From File			SIP-GW Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**1,4Dioxane**											
11												
12	**General Statistics**											
13	Total Number of Observations					70	Number of Distinct Observations					26
14	Number of Detects					26	Number of Non-Detects					44
15	Number of Distinct Detects					22	Number of Distinct Non-Detects					6
16	Minimum Detect					0.5	Minimum Non-Detect					0.31
17	Maximum Detect					74	Maximum Non-Detect					8.4
18	Variance Detects					375.7	Percent Non-Detects					62.86%
19	Mean Detects					9.075	SD Detects					19.38
20	Median Detects					2.15	CV Detects					2.136
21	Skewness Detects					2.955	Kurtosis Detects					8.02
22	Mean of Logged Detects					0.998	SD of Logged Detects					1.386
23												
24	**Normal GOF Test on Detects Only**											
25	Shapiro Wilk Test Statistic					0.468	**Shapiro Wilk GOF Test**					
26	5% Shapiro Wilk Critical Value					0.92	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.421	**Lilliefors GOF Test**					
28	5% Lilliefors Critical Value					0.174	Detected Data Not Normal at 5% Significance Level					
29	**Detected Data Not Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32	Mean					3.591	Standard Error of Mean					1.503
33	SD					12.33	95% KM (BCA) UCL					6.573
34	95% KM (t) UCL					6.096	95% KM (Percentile Bootstrap) UCL					6.383
35	95% KM (z) UCL					6.063	95% KM Bootstrap t UCL					13.41
36	90% KM Chebyshev UCL					8.099	95% KM Chebyshev UCL					10.14
37	97.5% KM Chebyshev UCL					12.98	99% KM Chebyshev UCL					18.54
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40	A-D Test Statistic					2.771	**Anderson-Darling GOF Test**					
41	5% A-D Critical Value					0.806	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.307	**Kolmogrov-Smirnoff GOF**					
43	5% K-S Critical Value					0.181	Detected Data Not Gamma Distributed at 5% Significance Level					
44	**Detected Data Not Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47	k hat (MLE)					0.522	k star (bias corrected MLE)					0.488
48	Theta hat (MLE)					17.37	Theta star (bias corrected MLE)					18.61
49	nu hat (MLE)					27.16	nu star (bias corrected)					25.36
50	MLE Mean (bias corrected)					9.075	MLE Sd (bias corrected)					12.99
51												
52	**Gamma Kaplan-Meier (KM) Statistics**											

	A	B	C	D	E	F	G	H	I	J	K	L
53					k hat (KM)	0.0848					nu hat (KM)	11.88
54					Approximate Chi Square Value (11.88, α)	5.147					Adjusted Chi Square Value (11.88, β)	5.054
55					95% Gamma Approximate KM-UCL (use when n>=50)	8.287					95% Gamma Adjusted KM-UCL (use when n<50)	8.44
56					Gamma (KM) may not be used when k hat (KM) is < 0.1							
57												
58					**Gamma ROS Statistics using Imputed Non-Detects**							
59					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
60					GROS may not be used when kstar of detected data is small such as < 0.1							
61					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
62					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
63					Minimum	0.01					Mean	3.377
64					Maximum	74					Median	0.01
65					SD	12.47					CV	3.694
66					k hat (MLE)	0.197					k star (bias corrected MLE)	0.198
67					Theta hat (MLE)	17.13					Theta star (bias corrected MLE)	17.04
68					nu hat (MLE)	27.6					nu star (bias corrected)	27.75
69					MLE Mean (bias corrected)	3.377					MLE Sd (bias corrected)	7.585
70											Adjusted Level of Significance (β)	0.0466
71					Approximate Chi Square Value (27.75, α)	16.74					Adjusted Chi Square Value (27.75, β)	16.55
72					95% Gamma Approximate UCL (use when n>=50)	5.6					95% Gamma Adjusted UCL (use when n<50)	5.661
73												
74					**Lognormal GOF Test on Detected Observations Only**							
75					Shapiro Wilk Test Statistic	0.883			**Shapiro Wilk GOF Test**			
76					5% Shapiro Wilk Critical Value	0.92			Detected Data Not Lognormal at 5% Significance Level			
77					Lilliefors Test Statistic	0.188			**Lilliefors GOF Test**			
78					5% Lilliefors Critical Value	0.174			Detected Data Not Lognormal at 5% Significance Level			
79					**Detected Data Not Lognormal at 5% Significance Level**							
80												
81					**Lognormal ROS Statistics Using Imputed Non-Detects**							
82					Mean in Original Scale	3.444					Mean in Log Scale	-1.42
83					SD in Original Scale	12.46					SD in Log Scale	2.324
84					95% t UCL (assumes normality of ROS data)	5.926					95% Percentile Bootstrap UCL	6.209
85					95% BCA Bootstrap UCL	7.288					95% Bootstrap t UCL	12.89
86					95% H-UCL (Log ROS)	8.33						
87												
88					**DL/2 Statistics**							
89					**DL/2 Normal**				**DL/2 Log-Transformed**			
90					Mean in Original Scale	3.649					Mean in Log Scale	-0.402
91					SD in Original Scale	12.41					SD in Log Scale	1.504
92					95% t UCL (Assumes normality)	6.122					95% H-Stat UCL	3.156
93					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
94												
95					**Nonparametric Distribution Free UCL Statistics**							
96					**Data do not follow a Discernible Distribution at 5% Significance Level**							
97												
98					**Suggested UCL to Use**							
99					95% KM (BCA) UCL	6.573						
100												
101					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
102					Recommendations are based upon data size, data distribution, and skewness.							
103					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
104					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

	A	B	C	D	E	F	G	H	I	J	K	L
105												
106	Formaldehyde											
107												
108	General Statistics											
109					Total Number of Observations	84			Number of Distinct Observations			23
110					Number of Detects	22			Number of Non-Detects			62
111					Number of Distinct Detects	22			Number of Distinct Non-Detects			1
112					Minimum Detect	5.1			Minimum Non-Detect			5
113					Maximum Detect	125			Maximum Non-Detect			5
114					Variance Detects	1061			Percent Non-Detects			73.81%
115					Mean Detects	31.25			SD Detects			32.57
116					Median Detects	18.75			CV Detects			1.042
117					Skewness Detects	1.677			Kurtosis Detects			2.453
118					Mean of Logged Detects	2.962			SD of Logged Detects			1.01
119												
120	Normal GOF Test on Detects Only											
121					Shapiro Wilk Test Statistic	0.785			Shapiro Wilk GOF Test			
122					5% Shapiro Wilk Critical Value	0.911			Detected Data Not Normal at 5% Significance Level			
123					Lilliefors Test Statistic	0.222			Lilliefors GOF Test			
124					5% Lilliefors Critical Value	0.189			Detected Data Not Normal at 5% Significance Level			
125	Detected Data Not Normal at 5% Significance Level											
126												
127	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
128					Mean	11.87			Standard Error of Mean			2.229
129					SD	19.96			95% KM (BCA) UCL			15.6
130					95% KM (t) UCL	15.58			95% KM (Percentile Bootstrap) UCL			15.62
131					95% KM (z) UCL	15.54			95% KM Bootstrap t UCL			17.5
132					90% KM Chebyshev UCL	18.56			95% KM Chebyshev UCL			21.59
133					97.5% KM Chebyshev UCL	25.79			99% KM Chebyshev UCL			34.05
134												
135	Gamma GOF Tests on Detected Observations Only											
136					A-D Test Statistic	0.612			Anderson-Darling GOF Test			
137					5% A-D Critical Value	0.766			Detected data appear Gamma Distributed at 5% Significance Level			
138					K-S Test Statistic	0.146			Kolmogrov-Smirnoff GOF			
139					5% K-S Critical Value	0.19			Detected data appear Gamma Distributed at 5% Significance Level			
140	Detected data appear Gamma Distributed at 5% Significance Level											
141												
142	Gamma Statistics on Detected Data Only											
143					k hat (MLE)	1.181			k star (bias corrected MLE)			1.051
144					Theta hat (MLE)	26.45			Theta star (bias corrected MLE)			29.74
145					nu hat (MLE)	51.98			nu star (bias corrected)			46.23
146					MLE Mean (bias corrected)	31.25			MLE Sd (bias corrected)			30.49
147												
148	Gamma Kaplan-Meier (KM) Statistics											
149					k hat (KM)	0.354			nu hat (KM)			59.46
150					Approximate Chi Square Value (59.46, α)	42.73			Adjusted Chi Square Value (59.46, β)			42.48
151					95% Gamma Approximate KM-UCL (use when n>=50)	16.52			95% Gamma Adjusted KM-UCL (use when n<50)			16.62
152												
153	Gamma ROS Statistics using Imputed Non-Detects											
154	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
155	GROS may not be used when kstar of detected data is small such as < 0.1											
156	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											

	A	B	C	D	E	F	G	H	I	J	K	L
157	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
158					Minimum	0.01					Mean	8.191
159					Maximum	125					Median	0.01
160					SD	21.43					CV	2.616
161					k hat (MLE)	0.161					k star (bias corrected MLE)	0.163
162					Theta hat (MLE)	50.89					Theta star (bias corrected MLE)	50.21
163					nu hat (MLE)	27.04					nu star (bias corrected)	27.41
164					MLE Mean (bias corrected)	8.191					MLE Sd (bias corrected)	20.28
165											Adjusted Level of Significance (β)	0.0471
166					Approximate Chi Square Value (27.41, α)	16.47					Adjusted Chi Square Value (27.41, β)	16.32
167					95% Gamma Approximate UCL (use when n>=50)	13.63					95% Gamma Adjusted UCL (use when n<50)	13.76
168												
169	**Lognormal GOF Test on Detected Observations Only**											
170					Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**					
171					5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level					
172					Lilliefors Test Statistic	0.116	**Lilliefors GOF Test**					
173					5% Lilliefors Critical Value	0.189	Detected Data appear Lognormal at 5% Significance Level					
174	**Detected Data appear Lognormal at 5% Significance Level**											
175												
176	**Lognormal ROS Statistics Using Imputed Non-Detects**											
177					Mean in Original Scale	9.014					Mean in Log Scale	0.239
178					SD in Original Scale	21.14					SD in Log Scale	2.167
179					95% t UCL (assumes normality of ROS data)	12.85					95% Percentile Bootstrap UCL	13.22
180					95% BCA Bootstrap UCL	14.16					95% Bootstrap t UCL	14.66
181					95% H-UCL (Log ROS)	31.12						
182												
183	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
184					KM Mean (logged)	1.964					95% H-UCL (KM -Log)	11.52
185					KM SD (logged)	0.78					95% Critical H Value (KM-Log)	2.051
186					KM Standard Error of Mean (logged)	0.0871						
187												
188	**DL/2 Statistics**											
189	**DL/2 Normal**						**DL/2 Log-Transformed**					
190					Mean in Original Scale	10.03					Mean in Log Scale	1.452
191					SD in Original Scale	20.74					SD in Log Scale	1.038
192					95% t UCL (Assumes normality)	13.79					95% H-Stat UCL	9.483
193	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
194												
195	**Nonparametric Distribution Free UCL Statistics**											
196	**Detected Data appear Gamma Distributed at 5% Significance Level**											
197												
198	**Suggested UCL to Use**											
199					95% KM (t) UCL	15.58		95% GROS Approximate Gamma UCL				13.63
200					95% Approximate Gamma KM-UCL	16.52						
201												
202	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
203	Recommendations are based upon data size, data distribution, and skewness.											
204	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
205	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
206												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			11/20/2014 10:31:43 AM								
5	From File			AA-GW ProUCL Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Value (1,4-dioxane)											
11												
12	General Statistics											
13	Total Number of Observations					43	Number of Distinct Observations					9
14	Number of Detects					5	Number of Non-Detects					38
15	Number of Distinct Detects					5	Number of Distinct Non-Detects					5
16	Minimum Detect					0.5	Minimum Non-Detect					0.14
17	Maximum Detect					0.85	Maximum Non-Detect					8.4
18	Variance Detects					0.0178	Percent Non-Detects					88.37%
19	Mean Detects					0.642	SD Detects					0.133
20	Median Detects					0.61	CV Detects					0.208
21	Skewness Detects					1.017	Kurtosis Detects					1.138
22	Mean of Logged Detects					-0.46	SD of Logged Detects					0.2
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.945	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.762	Detected Data appear Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.195	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.396	Detected Data appear Normal at 5% Significance Level					
29	Detected Data appear Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	Mean					0.206	Standard Error of Mean					0.0318
33	SD					0.175	95% KM (BCA) UCL					0.262
34	95% KM (t) UCL					0.259	95% KM (Percentile Bootstrap) UCL					0.259
35	95% KM (z) UCL					0.258	95% KM Bootstrap t UCL					0.228
36	90% KM Chebyshev UCL					0.301	95% KM Chebyshev UCL					0.344
37	97.5% KM Chebyshev UCL					0.404	99% KM Chebyshev UCL					0.522
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.227	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.679	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.187	Kolmogrov-Smirnoff GOF					
43	5% K-S Critical Value					0.357	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					30.69	k star (bias corrected MLE)					12.41
48	Theta hat (MLE)					0.0209	Theta star (bias corrected MLE)					0.0517
49	nu hat (MLE)					306.9	nu star (bias corrected)					124.1
50	MLE Mean (bias corrected)					0.642	MLE Sd (bias corrected)					0.182
51												
52	Gamma Kaplan-Meier (KM) Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
53					k hat (KM)	1.385					nu hat (KM)	119.1
54					Approximate Chi Square Value (119.07, α)	94.87					Adjusted Chi Square Value (119.07, β)	94.12
55					95% Gamma Approximate KM-UCL (use when n>=50)	0.259					95% Gamma Adjusted KM-UCL (use when n<50)	0.261
56												
57					**Gamma ROS Statistics using Imputed Non-Detects**							
58					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
59					GROS may not be used when kstar of detected data is small such as < 0.1							
60					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
61					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
62					Minimum	0.01					Mean	0.155
63					Maximum	0.85					Median	0.0286
64					SD	0.215					CV	1.388
65					k hat (MLE)	0.533					k star (bias corrected MLE)	0.512
66					Theta hat (MLE)	0.291					Theta star (bias corrected MLE)	0.303
67					nu hat (MLE)	45.86					nu star (bias corrected)	43.99
68					MLE Mean (bias corrected)	0.155					MLE Sd (bias corrected)	0.217
69											Adjusted Level of Significance (β)	0.0444
70					Approximate Chi Square Value (43.99, α)	29.78					Adjusted Chi Square Value (43.99, β)	29.38
71					95% Gamma Approximate UCL (use when n>=50)	0.229					95% Gamma Adjusted UCL (use when n<50)	0.232
72												
73					**Lognormal GOF Test on Detected Observations Only**							
74					Shapiro Wilk Test Statistic	0.976			**Shapiro Wilk GOF Test**			
75					5% Shapiro Wilk Critical Value	0.762			Detected Data appear Lognormal at 5% Significance Level			
76					Lilliefors Test Statistic	0.169			**Lilliefors GOF Test**			
77					5% Lilliefors Critical Value	0.396			Detected Data appear Lognormal at 5% Significance Level			
78					**Detected Data appear Lognormal at 5% Significance Level**							
79												
80					**Lognormal ROS Statistics Using Imputed Non-Detects**							
81					Mean in Original Scale	0.273					Mean in Log Scale	-1.452
82					SD in Original Scale	0.167					SD in Log Scale	0.556
83					95% t UCL (assumes normality of ROS data)	0.316					95% Percentile Bootstrap UCL	0.315
84					95% BCA Bootstrap UCL	0.325					95% Bootstrap t UCL	0.325
85					95% H-UCL (Log ROS)	0.323						
86												
87					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
88					KM Mean (logged)	-1.768					95% H-UCL (KM -Log)	0.227
89					KM SD (logged)	0.513					95% Critical H Value (KM-Log)	1.91
90					KM Standard Error of Mean (logged)	0.0931						
91												
92					**DL/2 Statistics**							
93					**DL/2 Normal**				**DL/2 Log-Transformed**			
94					Mean in Original Scale	0.685					Mean in Log Scale	-1.341
95					SD in Original Scale	1.301					SD in Log Scale	1.166
96					95% t UCL (Assumes normality)	1.019					95% H-Stat UCL	0.817
97					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
98												
99					**Nonparametric Distribution Free UCL Statistics**							
100					**Detected Data appear Normal Distributed at 5% Significance Level**							
101												
102					**Suggested UCL to Use**							
103					95% KM (t) UCL	0.259					95% KM (Percentile Bootstrap) UCL	0.259
104												

	A	B	C	D	E	F	G	H	I	J	K	L
105	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
106	Recommendations are based upon data size, data distribution, and skewness.											
107	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
108	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
109												
110	**Value (benzene)**											
111												
112	**General Statistics**											
113	Total Number of Observations					97	Number of Distinct Observations					18
114	Number of Detects					24	Number of Non-Detects					73
115	Number of Distinct Detects					17	Number of Distinct Non-Detects					4
116	Minimum Detect					0.11	Minimum Non-Detect					0.08
117	Maximum Detect					0.94	Maximum Non-Detect					0.21
118	Variance Detects					0.0329	Percent Non-Detects					75.26%
119	Mean Detects					0.285	SD Detects					0.181
120	Median Detects					0.23	CV Detects					0.637
121	Skewness Detects					2.207	Kurtosis Detects					6.711
122	Mean of Logged Detects					-1.407	SD of Logged Detects					0.542
123												
124	**Normal GOF Test on Detects Only**											
125	Shapiro Wilk Test Statistic					0.791	**Shapiro Wilk GOF Test**					
126	5% Shapiro Wilk Critical Value					0.916	Detected Data Not Normal at 5% Significance Level					
127	Lilliefors Test Statistic					0.168	**Lilliefors GOF Test**					
128	5% Lilliefors Critical Value					0.181	Detected Data appear Normal at 5% Significance Level					
129	**Detected Data appear Approximate Normal at 5% Significance Level**											
130												
131	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
132	Mean					0.131	Standard Error of Mean					0.0129
133	SD					0.125	95% KM (BCA) UCL					0.153
134	95% KM (t) UCL					0.152	95% KM (Percentile Bootstrap) UCL					0.152
135	95% KM (z) UCL					0.152	95% KM Bootstrap t UCL					0.163
136	90% KM Chebyshev UCL					0.17	95% KM Chebyshev UCL					0.187
137	97.5% KM Chebyshev UCL					0.212	99% KM Chebyshev UCL					0.26
138												
139	**Gamma GOF Tests on Detected Observations Only**											
140	A-D Test Statistic					0.449	**Anderson-Darling GOF Test**					
141	5% A-D Critical Value					0.75	Detected data appear Gamma Distributed at 5% Significance Level					
142	K-S Test Statistic					0.139	**Kolmogrov-Smirnoff GOF**					
143	5% K-S Critical Value					0.179	Detected data appear Gamma Distributed at 5% Significance Level					
144	**Detected data appear Gamma Distributed at 5% Significance Level**											
145												
146	**Gamma Statistics on Detected Data Only**											
147	k hat (MLE)					3.48	k star (bias corrected MLE)					3.073
148	Theta hat (MLE)					0.0818	Theta star (bias corrected MLE)					0.0926
149	nu hat (MLE)					167	nu star (bias corrected)					147.5
150	MLE Mean (bias corrected)					0.285	MLE Sd (bias corrected)					0.162
151												
152	**Gamma Kaplan-Meier (KM) Statistics**											
153	k hat (KM)					1.1	nu hat (KM)					213.4
154	Approximate Chi Square Value (213.44, α)					180.6	Adjusted Chi Square Value (213.44, β)					180.2
155	95% Gamma Approximate KM-UCL (use when n>=50)					0.155	95% Gamma Adjusted KM-UCL (use when n<50)					0.155
156												

	A	B	C	D	E	F	G	H	I	J	K	L
157	**Gamma ROS Statistics using Imputed Non-Detects**											
158	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
159	GROS may not be used when kstar of detected data is small such as < 0.1											
160	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
161	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
162					Minimum	0.01				Mean		0.08
163					Maximum	0.94				Median		0.01
164					SD	0.148				CV		1.849
165					k hat (MLE)	0.524				k star (bias corrected MLE)		0.515
166					Theta hat (MLE)	0.152				Theta star (bias corrected MLE)		0.155
167					nu hat (MLE)	101.8				nu star (bias corrected)		99.94
168					MLE Mean (bias corrected)	0.08				MLE Sd (bias corrected)		0.111
169										Adjusted Level of Significance (β)		0.0475
170					Approximate Chi Square Value (99.94, α)	77.87				Adjusted Chi Square Value (99.94, β)		77.58
171					95% Gamma Approximate UCL (use when n>=50)	0.103				95% Gamma Adjusted UCL (use when n<50)		0.103
172												
173	**Lognormal GOF Test on Detected Observations Only**											
174					Shapiro Wilk Test Statistic	0.96				**Shapiro Wilk GOF Test**		
175					5% Shapiro Wilk Critical Value	0.916				Detected Data appear Lognormal at 5% Significance Level		
176					Lilliefors Test Statistic	0.111				**Lilliefors GOF Test**		
177					5% Lilliefors Critical Value	0.181				Detected Data appear Lognormal at 5% Significance Level		
178	**Detected Data appear Lognormal at 5% Significance Level**											
179												
180	**Lognormal ROS Statistics Using Imputed Non-Detects**											
181					Mean in Original Scale	0.104				Mean in Log Scale		-2.876
182					SD in Original Scale	0.139				SD in Log Scale		1.121
183					95% t UCL (assumes normality of ROS data)	0.128				95% Percentile Bootstrap UCL		0.129
184					95% BCA Bootstrap UCL	0.132				95% Bootstrap t UCL		0.136
185					95% H-UCL (Log ROS)	0.139						
186												
187	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
188					KM Mean (logged)	-2.246				95% H-UCL (KM -Log)		0.137
189					KM SD (logged)	0.55				95% Critical H Value (KM-Log)		1.884
190					KM Standard Error of Mean (logged)	0.0572						
191												
192	**DL/2 Statistics**											
193					**DL/2 Normal**					**DL/2 Log-Transformed**		
194					Mean in Original Scale	0.105				Mean in Log Scale		-2.692
195					SD in Original Scale	0.137				SD in Log Scale		0.807
196					95% t UCL (Assumes normality)	0.128				95% H-Stat UCL		0.111
197	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
198												
199	**Nonparametric Distribution Free UCL Statistics**											
200	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
201												
202	**Suggested UCL to Use**											
203					95% KM (t) UCL	0.152				95% KM (Percentile Bootstrap) UCL		0.152
204												
205	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
206	Recommendations are based upon data size, data distribution, and skewness.											
207	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
208	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
209												
210	Value (bromodichloromethane)											
211												
212	General Statistics											
213					Total Number of Observations	97			Number of Distinct Observations			5
214					Number of Detects	1			Number of Non-Detects			96
215					Number of Distinct Detects	1			Number of Distinct Non-Detects			4
216												
217	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
218	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
219												
220	The data set for variable Value (bromodichloromethane) was not processed!											
221												
222												
223	Value (carbon tetrachloride)											
224												
225	General Statistics											
226					Total Number of Observations	97			Number of Distinct Observations			15
227					Number of Detects	13			Number of Non-Detects			84
228					Number of Distinct Detects	12			Number of Distinct Non-Detects			4
229					Minimum Detect	0.1			Minimum Non-Detect			0.06
230					Maximum Detect	1.9			Maximum Non-Detect			0.27
231					Variance Detects	0.328			Percent Non-Detects			86.6%
232					Mean Detects	0.55			SD Detects			0.573
233					Median Detects	0.42			CV Detects			1.042
234					Skewness Detects	1.687			Kurtosis Detects			2.098
235					Mean of Logged Detects	-1.052			SD of Logged Detects			0.995
236												
237	Normal GOF Test on Detects Only											
238					Shapiro Wilk Test Statistic	0.753			Shapiro Wilk GOF Test			
239					5% Shapiro Wilk Critical Value	0.866			Detected Data Not Normal at 5% Significance Level			
240					Lilliefors Test Statistic	0.262			Lilliefors GOF Test			
241					5% Lilliefors Critical Value	0.246			Detected Data Not Normal at 5% Significance Level			
242	Detected Data Not Normal at 5% Significance Level											
243												
244	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
245					Mean	0.126			Standard Error of Mean			0.0277
246					SD	0.262			95% KM (BCA) UCL			0.178
247					95% KM (t) UCL	0.172			95% KM (Percentile Bootstrap) UCL			0.174
248					95% KM (z) UCL	0.172			95% KM Bootstrap t UCL			0.224
249					90% KM Chebyshev UCL	0.209			95% KM Chebyshev UCL			0.247
250					97.5% KM Chebyshev UCL	0.299			99% KM Chebyshev UCL			0.401
251												
252	Gamma GOF Tests on Detected Observations Only											
253					A-D Test Statistic	0.619			Anderson-Darling GOF Test			
254					5% A-D Critical Value	0.754			Detected data appear Gamma Distributed at 5% Significance Level			
255					K-S Test Statistic	0.206			Kolmogrov-Smirnoff GOF			
256					5% K-S Critical Value	0.242			Detected data appear Gamma Distributed at 5% Significance Level			
257	Detected data appear Gamma Distributed at 5% Significance Level											
258												
259	Gamma Statistics on Detected Data Only											
260					k hat (MLE)	1.241			k star (bias corrected MLE)			1.006

	A	B	C	D	E	F	G	H	I	J	K	L
261					Theta hat (MLE)	0.443					Theta star (bias corrected MLE)	0.547
262					nu hat (MLE)	32.26					nu star (bias corrected)	26.15
263					MLE Mean (bias corrected)	0.55					MLE Sd (bias corrected)	0.548
264												
265					Gamma Kaplan-Meier (KM) Statistics							
266					k hat (KM)	0.233					nu hat (KM)	45.2
267					Approximate Chi Square Value (45.20, α)	30.78					Adjusted Chi Square Value (45.20, β)	30.6
268					95% Gamma Approximate KM-UCL (use when n>=50)	0.185					95% Gamma Adjusted KM-UCL (use when n<50)	0.187
269												
270					Gamma ROS Statistics using Imputed Non-Detects							
271					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
272					GROS may not be used when kstar of detected data is small such as < 0.1							
273					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
274					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
275					Minimum	0.01					Mean	0.0824
276					Maximum	1.9					Median	0.01
277					SD	0.274					CV	3.33
278					k hat (MLE)	0.403					k star (bias corrected MLE)	0.397
279					Theta hat (MLE)	0.205					Theta star (bias corrected MLE)	0.207
280					nu hat (MLE)	78.12					nu star (bias corrected)	77.03
281					MLE Mean (bias corrected)	0.0824					MLE Sd (bias corrected)	0.131
282											Adjusted Level of Significance (β)	0.0475
283					Approximate Chi Square Value (77.03, α)	57.82					Adjusted Chi Square Value (77.03, β)	57.57
284					95% Gamma Approximate UCL (use when n>=50)	0.11					95% Gamma Adjusted UCL (use when n<50)	0.11
285												
286					Lognormal GOF Test on Detected Observations Only							
287					Shapiro Wilk Test Statistic	0.906					Shapiro Wilk GOF Test	
288					5% Shapiro Wilk Critical Value	0.866					Detected Data appear Lognormal at 5% Significance Level	
289					Lilliefors Test Statistic	0.205					Lilliefors GOF Test	
290					5% Lilliefors Critical Value	0.246					Detected Data appear Lognormal at 5% Significance Level	
291					Detected Data appear Lognormal at 5% Significance Level							
292												
293					Lognormal ROS Statistics Using Imputed Non-Detects							
294					Mean in Original Scale	0.0849					Mean in Log Scale	-5.018
295					SD in Original Scale	0.274					SD in Log Scale	2.397
296					95% t UCL (assumes normality of ROS data)	0.131					95% Percentile Bootstrap UCL	0.134
297					95% BCA Bootstrap UCL	0.151					95% Bootstrap t UCL	0.18
298					95% H-UCL (Log ROS)	0.306						
299												
300					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
301					KM Mean (logged)	-2.571					95% H-UCL (KM -Log)	0.112
302					KM SD (logged)	0.696					95% Critical H Value (KM-Log)	2.021
303					KM Standard Error of Mean (logged)	0.0739						
304												
305					DL/2 Statistics							
306					DL/2 Normal						DL/2 Log-Transformed	
307					Mean in Original Scale	0.109					Mean in Log Scale	-3.008
308					SD in Original Scale	0.268					SD in Log Scale	0.938
309					95% t UCL (Assumes normality)	0.154					95% H-Stat UCL	0.0946
310					DL/2 is not a recommended method, provided for comparisons and historical reasons							
311												
312					Nonparametric Distribution Free UCL Statistics							

	A	B	C	D	E	F	G	H	I	J	K	L
313	Detected Data appear Gamma Distributed at 5% Significance Level											
314												
315	Suggested UCL to Use											
316					95% KM (t) UCL	0.172			95% GROS Approximate Gamma UCL			0.11
317				95% Approximate Gamma KM-UCL		0.185						
318												
319	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
320	Recommendations are based upon data size, data distribution, and skewness.											
321	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
322	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
323												
324	Value (chloroform)											
325												
326	General Statistics											
327					Total Number of Observations	97			Number of Distinct Observations			32
328					Number of Detects	42			Number of Non-Detects			55
329					Number of Distinct Detects	30			Number of Distinct Non-Detects			4
330					Minimum Detect	0.089			Minimum Non-Detect			0.08
331					Maximum Detect	4.6			Maximum Non-Detect			0.34
332					Variance Detects	0.995			Percent Non-Detects			56.7%
333					Mean Detects	0.715			SD Detects			0.998
334					Median Detects	0.375			CV Detects			1.395
335					Skewness Detects	2.489			Kurtosis Detects			6.048
336					Mean of Logged Detects	-0.948			SD of Logged Detects			1.035
337												
338	Normal GOF Test on Detects Only											
339					Shapiro Wilk Test Statistic	0.616			Shapiro Wilk GOF Test			
340					5% Shapiro Wilk Critical Value	0.942			Detected Data Not Normal at 5% Significance Level			
341					Lilliefors Test Statistic	0.308			Lilliefors GOF Test			
342					5% Lilliefors Critical Value	0.137			Detected Data Not Normal at 5% Significance Level			
343	Detected Data Not Normal at 5% Significance Level											
344												
345	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
346					Mean	0.356			Standard Error of Mean			0.0741
347					SD	0.721			95% KM (BCA) UCL			0.487
348					95% KM (t) UCL	0.479			95% KM (Percentile Bootstrap) UCL			0.485
349					95% KM (z) UCL	0.478			95% KM Bootstrap t UCL			0.537
350					90% KM Chebyshev UCL	0.578			95% KM Chebyshev UCL			0.679
351					97.5% KM Chebyshev UCL	0.819			99% KM Chebyshev UCL			1.093
352												
353	Gamma GOF Tests on Detected Observations Only											
354					A-D Test Statistic	2.361			Anderson-Darling GOF Test			
355					5% A-D Critical Value	0.78			Detected Data Not Gamma Distributed at 5% Significance Level			
356					K-S Test Statistic	0.192			Kolmogrov-Smirnoff GOF			
357					5% K-S Critical Value	0.141			Detected Data Not Gamma Distributed at 5% Significance Level			
358	Detected Data Not Gamma Distributed at 5% Significance Level											
359												
360	Gamma Statistics on Detected Data Only											
361					k hat (MLE)	0.949			k star (bias corrected MLE)			0.897
362					Theta hat (MLE)	0.753			Theta star (bias corrected MLE)			0.797
363					nu hat (MLE)	79.71			nu star (bias corrected)			75.35
364					MLE Mean (bias corrected)	0.715			MLE Sd (bias corrected)			0.755

	A	B	C	D	E	F	G	H	I	J	K	L
365												
366	**Gamma Kaplan-Meier (KM) Statistics**											
367					k hat (KM)	0.244					nu hat (KM)	47.38
368					Approximate Chi Square Value (47.38, α)	32.58					Adjusted Chi Square Value (47.38, β)	32.4
369					95% Gamma Approximate KM-UCL (use when n>=50)	0.518					95% Gamma Adjusted KM-UCL (use when n<50)	0.521
370												
371	**Gamma ROS Statistics using Imputed Non-Detects**											
372	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
373	GROS may not be used when kstar of detected data is small such as < 0.1											
374	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
375	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
376					Minimum	0.01					Mean	0.315
377					Maximum	4.6					Median	0.01
378					SD	0.741					CV	2.349
379					k hat (MLE)	0.359					k star (bias corrected MLE)	0.354
380					Theta hat (MLE)	0.879					Theta star (bias corrected MLE)	0.889
381					nu hat (MLE)	69.59					nu star (bias corrected)	68.77
382					MLE Mean (bias corrected)	0.315					MLE Sd (bias corrected)	0.529
383											Adjusted Level of Significance (β)	0.0475
384					Approximate Chi Square Value (68.77, α)	50.68					Adjusted Chi Square Value (68.77, β)	50.45
385					95% Gamma Approximate UCL (use when n>=50)	0.428					95% Gamma Adjusted UCL (use when n<50)	0.43
386												
387	**Lognormal GOF Test on Detected Observations Only**											
388					Shapiro Wilk Test Statistic	0.884					**Shapiro Wilk GOF Test**	
389					5% Shapiro Wilk Critical Value	0.942					Detected Data Not Lognormal at 5% Significance Level	
390					Lilliefors Test Statistic	0.122					**Lilliefors GOF Test**	
391					5% Lilliefors Critical Value	0.137					Detected Data appear Lognormal at 5% Significance Level	
392	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
393												
394	**Lognormal ROS Statistics Using Imputed Non-Detects**											
395					Mean in Original Scale	0.328					Mean in Log Scale	-2.588
396					SD in Original Scale	0.736					SD in Log Scale	1.779
397					95% t UCL (assumes normality of ROS data)	0.452					95% Percentile Bootstrap UCL	0.462
398					95% BCA Bootstrap UCL	0.489					95% Bootstrap t UCL	0.504
399					95% H-UCL (Log ROS)	0.646						
400												
401	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
402					KM Mean (logged)	-1.831					95% H-UCL (KM -Log)	0.345
403					KM SD (logged)	1.027					95% Critical H Value (KM-Log)	2.28
404					KM Standard Error of Mean (logged)	0.106						
405												
406	**DL/2 Statistics**											
407	**DL/2 Normal**						**DL/2 Log-Transformed**					
408					Mean in Original Scale	0.339					Mean in Log Scale	-2.118
409					SD in Original Scale	0.731					SD in Log Scale	1.257
410					95% t UCL (Assumes normality)	0.463					95% H-Stat UCL	0.366
411	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
412												
413	**Nonparametric Distribution Free UCL Statistics**											
414	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**											
415												
416	**Suggested UCL to Use**											

	A	B	C	D	E	F	G	H	I	J	K	L
417					95% KM (BCA) UCL	0.487						
418												
419	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
420	Recommendations are based upon data size, data distribution, and skewness.											
421	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
422	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
423												
424	Value (iron)											
425												
426	General Statistics											
427					Total Number of Observations	9	Number of Distinct Observations					9
428					Number of Detects	8	Number of Non-Detects					1
429					Number of Distinct Detects	8	Number of Distinct Non-Detects					1
430					Minimum Detect	0.322	Minimum Non-Detect					0.0736
431					Maximum Detect	46	Maximum Non-Detect					0.0736
432					Variance Detects	234.7	Percent Non-Detects					11.11%
433					Mean Detects	11.96	SD Detects					15.32
434					Median Detects	6.645	CV Detects					1.28
435					Skewness Detects	1.863	Kurtosis Detects					3.764
436					Mean of Logged Detects	1.513	SD of Logged Detects					1.732
437												
438	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
439	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
440	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
441	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
442												
443	Normal GOF Test on Detects Only											
444					Shapiro Wilk Test Statistic	0.772	Shapiro Wilk GOF Test					
445					5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level					
446					Lilliefors Test Statistic	0.256	Lilliefors GOF Test					
447					5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level					
448	Detected Data appear Approximate Normal at 5% Significance Level											
449												
450	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
451					Mean	10.64	Standard Error of Mean					4.996
452					SD	14.02	95% KM (BCA) UCL					20.09
453					95% KM (t) UCL	19.93	95% KM (Percentile Bootstrap) UCL					18.61
454					95% KM (z) UCL	18.86	95% KM Bootstrap t UCL					29.18
455					90% KM Chebyshev UCL	25.63	95% KM Chebyshev UCL					32.42
456					97.5% KM Chebyshev UCL	41.84	99% KM Chebyshev UCL					60.35
457												
458	Gamma GOF Tests on Detected Observations Only											
459					A-D Test Statistic	0.264	Anderson-Darling GOF Test					
460					5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level					
461					K-S Test Statistic	0.182	Kolmogrov-Smirnoff GOF					
462					5% K-S Critical Value	0.306	Detected data appear Gamma Distributed at 5% Significance Level					
463	Detected data appear Gamma Distributed at 5% Significance Level											
464												
465	Gamma Statistics on Detected Data Only											
466					k hat (MLE)	0.633	k star (bias corrected MLE)					0.479
467					Theta hat (MLE)	18.9	Theta star (bias corrected MLE)					24.98
468					nu hat (MLE)	10.13	nu star (bias corrected)					7.662

	A	B	C	D	E	F	G	H	I	J	K	L
469					MLE Mean (bias corrected)	11.96				MLE Sd (bias corrected)		17.29
470												
471					Gamma Kaplan-Meier (KM) Statistics							
472					k hat (KM)	0.576				nu hat (KM)		10.38
473					Approximate Chi Square Value (10.38, α)	4.178				Adjusted Chi Square Value (10.38, β)		3.389
474					95% Gamma Approximate KM-UCL (use when n>=50)	26.43				95% Gamma Adjusted KM-UCL (use when n<50)		32.59
475												
476					Gamma ROS Statistics using Imputed Non-Detects							
477					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
478					GROS may not be used when kstar of detected data is small such as < 0.1							
479					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
480					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
481					Minimum	0.01				Mean		10.64
482					Maximum	46				Median		6.43
483					SD	14.87				CV		1.398
484					k hat (MLE)	0.426				k star (bias corrected MLE)		0.358
485					Theta hat (MLE)	24.99				Theta star (bias corrected MLE)		29.73
486					nu hat (MLE)	7.661				nu star (bias corrected)		6.44
487					MLE Mean (bias corrected)	10.64				MLE Sd (bias corrected)		17.78
488										Adjusted Level of Significance (β)		0.0231
489					Approximate Chi Square Value (6.44, α)	1.869				Adjusted Chi Square Value (6.44, β)		1.396
490					95% Gamma Approximate UCL (use when n>=50)	36.65				95% Gamma Adjusted UCL (use when n<50)		49.06
491												
492					Lognormal GOF Test on Detected Observations Only							
493					Shapiro Wilk Test Statistic	0.942				Shapiro Wilk GOF Test		
494					5% Shapiro Wilk Critical Value	0.818				Detected Data appear Lognormal at 5% Significance Level		
495					Lilliefors Test Statistic	0.205				Lilliefors GOF Test		
496					5% Lilliefors Critical Value	0.313				Detected Data appear Lognormal at 5% Significance Level		
497					Detected Data appear Lognormal at 5% Significance Level							
498												
499					Lognormal ROS Statistics Using Imputed Non-Detects							
500					Mean in Original Scale	10.64				Mean in Log Scale		1.042
501					SD in Original Scale	14.87				SD in Log Scale		2.15
502					95% t UCL (assumes normality of ROS data)	19.86				95% Percentile Bootstrap UCL		18.9
503					95% BCA Bootstrap UCL	22.59				95% Bootstrap t UCL		28.57
504					95% H-UCL (Log ROS)	2960						
505												
506					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
507					KM Mean (logged)	1.055				95% H-UCL (KM -Log)		1222
508					KM SD (logged)	2.003				95% Critical H Value (KM-Log)		5.717
509					KM Standard Error of Mean (logged)	0.714						
510												
511					DL/2 Statistics							
512					DL/2 Normal					DL/2 Log-Transformed		
513					Mean in Original Scale	10.64				Mean in Log Scale		0.978
514					SD in Original Scale	14.87				SD in Log Scale		2.28
515					95% t UCL (Assumes normality)	19.86				95% H-Stat UCL		6450
516					DL/2 is not a recommended method, provided for comparisons and historical reasons							
517												
518					Nonparametric Distribution Free UCL Statistics							
519					Detected Data appear Approximate Normal Distributed at 5% Significance Level							
520												

	A	B	C	D	E	F	G	H	I	J	K	L
521	**Suggested UCL to Use**											
522					95% KM (t) UCL	19.93			95% KM (Percentile Bootstrap) UCL			18.61
523												
524	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
525	Recommendations are based upon data size, data distribution, and skewness.											
526	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
527	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
528												
529	**Value (trichloroethene)**											
530												
531	**General Statistics**											
532					Total Number of Observations	97			Number of Distinct Observations			60
533					Number of Detects	78			Number of Non-Detects			19
534					Number of Distinct Detects	57			Number of Distinct Non-Detects			3
535					Minimum Detect	0.12			Minimum Non-Detect			0.09
536					Maximum Detect	86			Maximum Non-Detect			0.18
537					Variance Detects	530.6			Percent Non-Detects			19.59%
538					Mean Detects	24.83			SD Detects			23.04
539					Median Detects	19			CV Detects			0.928
540					Skewness Detects	1.148			Kurtosis Detects			0.756
541					Mean of Logged Detects	2.51			SD of Logged Detects			1.543
542												
543	**Normal GOF Test on Detects Only**											
544					Shapiro Wilk Test Statistic	0.858			**Normal GOF Test on Detected Observations Only**			
545					5% Shapiro Wilk P Value	3.872E-10			Detected Data Not Normal at 5% Significance Level			
546					Lilliefors Test Statistic	0.143			**Lilliefors GOF Test**			
547					5% Lilliefors Critical Value	0.1			Detected Data Not Normal at 5% Significance Level			
548	**Detected Data Not Normal at 5% Significance Level**											
549												
550	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
551					Mean	19.98			Standard Error of Mean			2.325
552					SD	22.75			95% KM (BCA) UCL			24.15
553					95% KM (t) UCL	23.85			95% KM (Percentile Bootstrap) UCL			23.88
554					95% KM (z) UCL	23.81			95% KM Bootstrap t UCL			24.13
555					90% KM Chebyshev UCL	26.96			95% KM Chebyshev UCL			30.12
556					97.5% KM Chebyshev UCL	34.5			99% KM Chebyshev UCL			43.12
557												
558	**Gamma GOF Tests on Detected Observations Only**											
559					A-D Test Statistic	0.69			**Anderson-Darling GOF Test**			
560					5% A-D Critical Value	0.789			Detected data appear Gamma Distributed at 5% Significance Level			
561					K-S Test Statistic	0.0938			**Kolmogrov-Smirnoff GOF**			
562					5% K-S Critical Value	0.105			Detected data appear Gamma Distributed at 5% Significance Level			
563	**Detected data appear Gamma Distributed at 5% Significance Level**											
564												
565	**Gamma Statistics on Detected Data Only**											
566					k hat (MLE)	0.84			k star (bias corrected MLE)			0.816
567					Theta hat (MLE)	29.56			Theta star (bias corrected MLE)			30.42
568					nu hat (MLE)	131			nu star (bias corrected)			127.3
569					MLE Mean (bias corrected)	24.83			MLE Sd (bias corrected)			27.48
570												
571	**Gamma Kaplan-Meier (KM) Statistics**											
572					k hat (KM)	0.772			nu hat (KM)			149.7

	A	B	C	D	E	F	G	H	I	J	K	L
573	Approximate Chi Square Value (149.67, α)					122.4	Adjusted Chi Square Value (149.67, β)					122
574	95% Gamma Approximate KM-UCL (use when n>=50)					24.44	95% Gamma Adjusted KM-UCL (use when n<50)					24.51
575												
576	**Gamma ROS Statistics using Imputed Non-Detects**											
577	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
578	GROS may not be used when kstar of detected data is small such as < 0.1											
579	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
580	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
581	Minimum					0.01	Mean					20.02
582	Maximum					86	Median					13
583	SD					22.84	CV					1.141
584	k hat (MLE)					0.415	k star (bias corrected MLE)					0.409
585	Theta hat (MLE)					48.28	Theta star (bias corrected MLE)					48.99
586	nu hat (MLE)					80.45	nu star (bias corrected)					79.29
587	MLE Mean (bias corrected)					20.02	MLE Sd (bias corrected)					31.32
588							Adjusted Level of Significance (β)					0.0475
589	Approximate Chi Square Value (79.29, α)					59.78	Adjusted Chi Square Value (79.29, β)					59.52
590	95% Gamma Approximate UCL (use when n>=50)					26.56	95% Gamma Adjusted UCL (use when n<50)					26.67
591												
592	**Lognormal GOF Test on Detected Observations Only**											
593	Lilliefors Test Statistic					0.147	**Lilliefors GOF Test**					
594	5% Lilliefors Critical Value					0.1	Detected Data Not Lognormal at 5% Significance Level					
595	**Detected Data Not Lognormal at 5% Significance Level**											
596												
597	**Lognormal ROS Statistics Using Imputed Non-Detects**											
598	Mean in Original Scale					20.09	Mean in Log Scale					1.899
599	SD in Original Scale					22.78	SD in Log Scale					1.881
600	95% t UCL (assumes normality of ROS data)					23.93	95% Percentile Bootstrap UCL					24.16
601	95% BCA Bootstrap UCL					24.11	95% Bootstrap t UCL					24.38
602	95% H-UCL (Log ROS)					73.23						
603												
604	**DL/2 Statistics**											
605	**DL/2 Normal**						**DL/2 Log-Transformed**					
606	Mean in Original Scale					19.98	Mean in Log Scale					1.456
607	SD in Original Scale					22.88	SD in Log Scale					2.557
608	95% t UCL (Assumes normality)					23.84	95% H-Stat UCL					332.9
609	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
610												
611	**Nonparametric Distribution Free UCL Statistics**											
612	**Detected Data appear Gamma Distributed at 5% Significance Level**											
613												
614	**Suggested UCL to Use**											
615	95% KM (Chebyshev) UCL					30.12	95% GROS Approximate Gamma UCL					26.56
616	95% Approximate Gamma KM-UCL					24.44						
617												
618	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
619	Recommendations are based upon data size, data distribution, and skewness.											
620	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
621	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
622												
623	**Value (vinyl chloride)**											
624												

	A	B	C	D	E	F	G	H	I	J	K	L
625	General Statistics											
626					Total Number of Observations	97				Number of Distinct Observations		4
627					Number of Detects	1				Number of Non-Detects		96
628					Number of Distinct Detects	1				Number of Distinct Non-Detects		4
629												
630	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
631	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
632												
633	The data set for variable Value (vinyl chloride) was not processed!											
634												
635												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			6/2/2016 1:53:53 PM								
5	From File			AA-GW Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Acrolein											
11												
12	General Statistics											
13	Total Number of Observations					75	Number of Distinct Observations					4
14	Number of Detects					2	Number of Non-Detects					73
15	Number of Distinct Detects					2	Number of Distinct Non-Detects					2
16	Minimum Detect					3	Minimum Non-Detect					1.3
17	Maximum Detect					130	Maximum Non-Detect					1.9
18	Variance Detects					8065	Percent Non-Detects					97.33%
19	Mean Detects					66.5	SD Detects					89.8
20	Median Detects					66.5	CV Detects					1.35
21	Skewness Detects					N/A	Kurtosis Detects					N/A
22	Mean of Logged Detects					2.983	SD of Logged Detects					2.665
23												
24	Warning: Data set has only 2 Detected Values.											
25	This is not enough to compute meaningful or reliable statistics and estimates.											
26												
27												
28	Normal GOF Test on Detects Only											
29	Not Enough Data to Perform GOF Test											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	Mean					3.039	Standard Error of Mean					2.41
33	SD					14.76	95% KM (BCA) UCL					N/A
34	95% KM (t) UCL					7.054	95% KM (Percentile Bootstrap) UCL					N/A
35	95% KM (z) UCL					7.003	95% KM Bootstrap t UCL					N/A
36	90% KM Chebyshev UCL					10.27	95% KM Chebyshev UCL					13.55
37	97.5% KM Chebyshev UCL					18.09	99% KM Chebyshev UCL					27.02
38												
39	Gamma GOF Tests on Detected Observations Only											
40	Not Enough Data to Perform GOF Test											
41												
42	Gamma Statistics on Detected Data Only											
43	k hat (MLE)					0.52	k star (bias corrected MLE)					N/A
44	Theta hat (MLE)					127.9	Theta star (bias corrected MLE)					N/A
45	nu hat (MLE)					2.08	nu star (bias corrected)					N/A
46	MLE Mean (bias corrected)					N/A	MLE Sd (bias corrected)					N/A
47												
48	Gamma Kaplan-Meier (KM) Statistics											
49	k hat (KM)					0.0424	nu hat (KM)					6.357
50							Adjusted Level of Significance (β)					0.0468
51	Approximate Chi Square Value (6.36, α)					1.825	Adjusted Chi Square Value (6.36, β)					1.778
52	95% Gamma Approximate KM-UCL (use when n>=50)					10.58	95% Gamma Adjusted KM-UCL (use when n<50)					10.86

	A	B	C	D	E	F	G	H	I	J	K	L
53	Gamma (KM) may not be used when k hat (KM) is < 0.1											
54												
55	**Lognormal GOF Test on Detected Observations Only**											
56	**Not Enough Data to Perform GOF Test**											
57												
58	**Lognormal ROS Statistics Using Imputed Non-Detects**											
59	Mean in Original Scale					1.774	Mean in Log Scale					-27.86
60	SD in Original Scale					15.01	SD in Log Scale					12.45
61	95% t UCL (assumes normality of ROS data)					4.661	95% Percentile Bootstrap UCL					5.24
62	95% BCA Bootstrap UCL					7.015	95% Bootstrap t UCL					12533
63	95% H-UCL (Log ROS)					N/A						
64												
65	**DL/2 Statistics**											
66	**DL/2 Normal**						**DL/2 Log-Transformed**					
67	Mean in Original Scale					2.43	Mean in Log Scale					-0.309
68	SD in Original Scale					14.93	SD in Log Scale					0.639
69	95% t UCL (Assumes normality)					5.302	95% H-Stat UCL					1.04
70	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
71												
72	**Nonparametric Distribution Free UCL Statistics**											
73	**Data do not follow a Discernible Distribution at 5% Significance Level**											
74												
75	**Suggested UCL to Use**											
76	97.5% KM (Chebyshev) UCL					18.09						
77												
78	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
79	Recommendations are based upon data size, data distribution, and skewness.											
80	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
81	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
82												
83	**Bromodichloromethane**											
84												
85	**General Statistics**											
86	Total Number of Observations					97	Number of Distinct Observations					5
87	Number of Detects					1	Number of Non-Detects					96
88	Number of Distinct Detects					1	Number of Distinct Non-Detects					4
89												
90	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
91	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
92												
93	**The data set for variable Bromodichloromethane was not processed!**											
94												
95												

FORMER FWEC FACILITY - WWTP RETENTION POND - SEDIMENT

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:56:50 PM
From File	ProUCL Input Files_h.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (benzo[a]pyrene)

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.13	Mean	14.74
Maximum	110	Median	1
SD	36.12	Std. Error of Mean	12.04
Coefficient of Variation	2.451	Skewness	2.883

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.471	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.424	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37.13	95% Adjusted-CLT UCL (Chen-1995)	46.91
		95% Modified-t UCL (Johnson-1978)	39.06

Gamma GOF Test

A-D Test Statistic	1.41	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.804	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.429	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.301	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.317	k star (bias corrected MLE)	0.285
Theta hat (MLE)	46.55	Theta star (bias corrected MLE)	51.69
nu hat (MLE)	5.699	nu star (bias corrected)	5.133
MLE Mean (bias corrected)	14.74	MLE Sd (bias corrected)	27.6
		Approximate Chi Square Value (0.05)	1.214
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	0.862

	A	B	C	D	E	F	G	H	I	J	K	L
53												
54						Assuming Gamma Distribution						
55					95% Approximate Gamma UCL (use when n>=50))	62.31				95% Adjusted Gamma UCL (use when n<50)		87.76
56												
57						Lognormal GOF Test						
58					Shapiro Wilk Test Statistic	0.838			Shapiro Wilk Lognormal GOF Test			
59					5% Shapiro Wilk Critical Value	0.829			Data appear Lognormal at 5% Significance Level			
60					Lilliefors Test Statistic	0.347			Lilliefors Lognormal GOF Test			
61					5% Lilliefors Critical Value	0.295			Data Not Lognormal at 5% Significance Level			
62						Data appear Approximate Lognormal at 5% Significance Level						
63												
64						Lognormal Statistics						
65					Minimum of Logged Data	-2.04			Mean of logged Data			0.531
66					Maximum of Logged Data	4.7			SD of logged Data			2.008
67												
68						Assuming Lognormal Distribution						
69					95% H-UCL	746.5			90% Chebyshev (MVUE) UCL			24.21
70					95% Chebyshev (MVUE) UCL	31.51			97.5% Chebyshev (MVUE) UCL			41.65
71					99% Chebyshev (MVUE) UCL	61.58						
72												
73						Nonparametric Distribution Free UCL Statistics						
74						Data appear to follow a Discernible Distribution at 5% Significance Level						
75												
76						Nonparametric Distribution Free UCLs						
77					95% CLT UCL	34.54			95% Jackknife UCL			37.13
78					95% Standard Bootstrap UCL	33.29			95% Bootstrap-t UCL			1489
79					95% Hall's Bootstrap UCL	800.1			95% Percentile Bootstrap UCL			37.33
80					95% BCA Bootstrap UCL	49.42						
81					90% Chebyshev(Mean, Sd) UCL	50.86			95% Chebyshev(Mean, Sd) UCL			67.22
82					97.5% Chebyshev(Mean, Sd) UCL	89.94			99% Chebyshev(Mean, Sd) UCL			134.5
83												
84						Suggested UCL to Use						
85					95% Hall's Bootstrap UCL	800.1						
86												
87						Recommended UCL exceeds the maximum observation						
88												
89						In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL						
90												
91						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
92						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
93						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
94						For additional insight the user may want to consult a statistician.						
95												
96												
97	Value (benzo[a]anthracene)											
98												
99						General Statistics						
100					Total Number of Observations	9			Number of Distinct Observations			9
101									Number of Missing Observations			0
102					Minimum	0.093			Mean			18.74
103					Maximum	140			Median			0.86
104					SD	46.12			Std. Error of Mean			15.37

	A	B	C	D	E	F	G	H	I	J	K	L
105					Coefficient of Variation	2.461					Skewness	2.853
106												
107	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
108	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
109	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
110	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
111												
112	Normal GOF Test											
113					Shapiro Wilk Test Statistic	0.477	Shapiro Wilk GOF Test					
114					5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level					
115					Lilliefors Test Statistic	0.428	Lilliefors GOF Test					
116					5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level					
117	Data Not Normal at 5% Significance Level											
118												
119	Assuming Normal Distribution											
120	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
121					95% Student's-t UCL	47.33					95% Adjusted-CLT UCL (Chen-1995)	59.65
122											95% Modified-t UCL (Johnson-1978)	49.77
123												
124	Gamma GOF Test											
125					A-D Test Statistic	1.407	Anderson-Darling Gamma GOF Test					
126					5% A-D Critical Value	0.816	Data Not Gamma Distributed at 5% Significance Level					
127					K-S Test Statistic	0.435	Kolmogrov-Smirnoff Gamma GOF Test					
128					5% K-S Critical Value	0.303	Data Not Gamma Distributed at 5% Significance Level					
129	Data Not Gamma Distributed at 5% Significance Level											
130												
131	Gamma Statistics											
132					k hat (MLE)	0.279					k star (bias corrected MLE)	0.26
133					Theta hat (MLE)	67.25					Theta star (bias corrected MLE)	72.12
134					nu hat (MLE)	5.016					nu star (bias corrected)	4.677
135					MLE Mean (bias corrected)	18.74					MLE Sd (bias corrected)	36.76
136											Approximate Chi Square Value (0.05)	1.006
137					Adjusted Level of Significance	0.0231					Adjusted Chi Square Value	0.698
138												
139	Assuming Gamma Distribution											
140					95% Approximate Gamma UCL (use when n>=50))	87.12					95% Adjusted Gamma UCL (use when n<50)	125.5
141												
142	Lognormal GOF Test											
143					Shapiro Wilk Test Statistic	0.834	Shapiro Wilk Lognormal GOF Test					
144					5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level					
145					Lilliefors Test Statistic	0.354	Lilliefors Lognormal GOF Test					
146					5% Lilliefors Critical Value	0.295	Data Not Lognormal at 5% Significance Level					
147	Data appear Approximate Lognormal at 5% Significance Level											
148												
149	Lognormal Statistics											
150					Minimum of Logged Data	-2.375					Mean of logged Data	0.426
151					Maximum of Logged Data	4.942					SD of logged Data	2.228
152												
153	Assuming Lognormal Distribution											
154					95% H-UCL	2633					90% Chebyshev (MVUE) UCL	31.41
155					95% Chebyshev (MVUE) UCL	41.14					97.5% Chebyshev (MVUE) UCL	54.64
156					99% Chebyshev (MVUE) UCL	81.16						

	A	B	C	D	E	F	G	H	I	J	K	L
157												
158					Nonparametric Distribution Free UCL Statistics							
159					Data appear to follow a Discernible Distribution at 5% Significance Level							
160												
161					Nonparametric Distribution Free UCLs							
162					95% CLT UCL	44.03				95% Jackknife UCL		47.33
163					95% Standard Bootstrap UCL	41.85				95% Bootstrap-t UCL		2913
164					95% Hall's Bootstrap UCL	1267				95% Percentile Bootstrap UCL		47.16
165					95% BCA Bootstrap UCL	62.71						
166					90% Chebyshev(Mean, Sd) UCL	64.86				95% Chebyshev(Mean, Sd) UCL		85.76
167					97.5% Chebyshev(Mean, Sd) UCL	114.8				99% Chebyshev(Mean, Sd) UCL		171.7
168												
169					Suggested UCL to Use							
170					95% Hall's Bootstrap UCL	1267						
171												
172					Recommended UCL exceeds the maximum observation							
173												
174					In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL							
175												
176					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
177					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
178					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
179					For additional insight the user may want to consult a statistician.							
180												
181												
182	Value (benzo[b]fluoranthene)											
183												
184					General Statistics							
185					Total Number of Observations	9				Number of Distinct Observations		8
186										Number of Missing Observations		0
187					Minimum	0.18				Mean		15.04
188					Maximum	110				Median		1.4
189					SD	35.95				Std. Error of Mean		11.98
190					Coefficient of Variation	2.39				Skewness		2.9
191												
192					Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use							
193					guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.							
194					For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).							
195					Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0							
196												
197					Normal GOF Test							
198					Shapiro Wilk Test Statistic	0.474				Shapiro Wilk GOF Test		
199					5% Shapiro Wilk Critical Value	0.829				Data Not Normal at 5% Significance Level		
200					Lilliefors Test Statistic	0.413				Lilliefors GOF Test		
201					5% Lilliefors Critical Value	0.295				Data Not Normal at 5% Significance Level		
202					Data Not Normal at 5% Significance Level							
203												
204					Assuming Normal Distribution							
205					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
206					95% Student's-t UCL	37.32				95% Adjusted-CLT UCL (Chen-1995)		47.13
207										95% Modified-t UCL (Johnson-1978)		39.25
208												

	A	B	C	D	E	F	G	H	I	J	K	L
209	**Gamma GOF Test**											
210					A-D Test Statistic	1.153	**Anderson-Darling Gamma GOF Test**					
211					5% A-D Critical Value	0.796	Data Not Gamma Distributed at 5% Significance Level					
212					K-S Test Statistic	0.372	**Kolmogrov-Smirnoff Gamma GOF Test**					
213					5% K-S Critical Value	0.299	Data Not Gamma Distributed at 5% Significance Level					
214	**Data Not Gamma Distributed at 5% Significance Level**											
215												
216	**Gamma Statistics**											
217					k hat (MLE)	0.362				k star (bias corrected MLE)		0.315
218					Theta hat (MLE)	41.59				Theta star (bias corrected MLE)		47.73
219					nu hat (MLE)	6.508				nu star (bias corrected)		5.672
220					MLE Mean (bias corrected)	15.04				MLE Sd (bias corrected)		26.79
221										Approximate Chi Square Value (0.05)		1.475
222					Adjusted Level of Significance	0.0231				Adjusted Chi Square Value		1.072
223												
224	**Assuming Gamma Distribution**											
225					95% Approximate Gamma UCL (use when n>=50))	57.85				95% Adjusted Gamma UCL (use when n<50)		79.58
226												
227	**Lognormal GOF Test**											
228					Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk Lognormal GOF Test**					
229					5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level					
230					Lilliefors Test Statistic	0.258	**Lilliefors Lognormal GOF Test**					
231					5% Lilliefors Critical Value	0.295	Data appear Lognormal at 5% Significance Level					
232	**Data appear Lognormal at 5% Significance Level**											
233												
234	**Lognormal Statistics**											
235					Minimum of Logged Data	-1.715				Mean of logged Data		0.861
236					Maximum of Logged Data	4.7				SD of logged Data		1.867
237												
238	**Assuming Lognormal Distribution**											
239					95% H-UCL	465.7				90% Chebyshev (MVUE) UCL		26.76
240					95% Chebyshev (MVUE) UCL	34.68				97.5% Chebyshev (MVUE) UCL		45.67
241					99% Chebyshev (MVUE) UCL	67.25						
242												
243	**Nonparametric Distribution Free UCL Statistics**											
244	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
245												
246	**Nonparametric Distribution Free UCLs**											
247					95% CLT UCL	34.75				95% Jackknife UCL		37.32
248					95% Standard Bootstrap UCL	33.87				95% Bootstrap-t UCL		678.8
249					95% Hall's Bootstrap UCL	256.4				95% Percentile Bootstrap UCL		38.77
250					95% BCA Bootstrap UCL	49.68						
251					90% Chebyshev(Mean, Sd) UCL	50.99				95% Chebyshev(Mean, Sd) UCL		67.27
252					97.5% Chebyshev(Mean, Sd) UCL	89.87				99% Chebyshev(Mean, Sd) UCL		134.3
253												
254	**Suggested UCL to Use**											
255					99% Chebyshev (Mean, Sd) UCL	134.3						
256												
257	**Recommended UCL exceeds the maximum observation**											
258												
259	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
260	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											

	A	B	C	D	E	F	G	H	I	J	K	L
261	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
262	For additional insight the user may want to consult a statistician.											
263												
264												
265	**Value (benzo[k]fluoranthene)**											
266												
267	**General Statistics**											
268					Total Number of Observations	9			Number of Distinct Observations			9
269									Number of Missing Observations			0
270					Minimum	0.088			Mean			8.51
271					Maximum	51			Median			1.2
272					SD	17.03			Std. Error of Mean			5.676
273					Coefficient of Variation	2.001			Skewness			2.434
274												
275	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
276	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
277	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
278	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
279												
280	**Normal GOF Test**											
281					Shapiro Wilk Test Statistic	0.572			**Shapiro Wilk GOF Test**			
282					5% Shapiro Wilk Critical Value	0.829			Data Not Normal at 5% Significance Level			
283					Lilliefors Test Statistic	0.424			**Lilliefors GOF Test**			
284					5% Lilliefors Critical Value	0.295			Data Not Normal at 5% Significance Level			
285	**Data Not Normal at 5% Significance Level**											
286												
287	**Assuming Normal Distribution**											
288			**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**			
289					95% Student's-t UCL	19.06			95% Adjusted-CLT UCL (Chen-1995)			22.77
290									95% Modified-t UCL (Johnson-1978)			19.83
291												
292	**Gamma GOF Test**											
293					A-D Test Statistic	0.852			**Anderson-Darling Gamma GOF Test**			
294					5% A-D Critical Value	0.791			Data Not Gamma Distributed at 5% Significance Level			
295					K-S Test Statistic	0.335			**Kolmogrov-Smirnoff Gamma GOF Test**			
296					5% K-S Critical Value	0.298			Data Not Gamma Distributed at 5% Significance Level			
297	**Data Not Gamma Distributed at 5% Significance Level**											
298												
299	**Gamma Statistics**											
300					k hat (MLE)	0.386			k star (bias corrected MLE)			0.332
301					Theta hat (MLE)	22.02			Theta star (bias corrected MLE)			25.65
302					nu hat (MLE)	6.956			nu star (bias corrected)			5.971
303					MLE Mean (bias corrected)	8.51			MLE Sd (bias corrected)			14.78
304									Approximate Chi Square Value (0.05)			1.625
305					Adjusted Level of Significance	0.0231			Adjusted Chi Square Value			1.195
306												
307	**Assuming Gamma Distribution**											
308					95% Approximate Gamma UCL (use when n>=50))	31.27			95% Adjusted Gamma UCL (use when n<50)			42.53
309												
310	**Lognormal GOF Test**											
311					Shapiro Wilk Test Statistic	0.936			**Shapiro Wilk Lognormal GOF Test**			
312					5% Shapiro Wilk Critical Value	0.829			Data appear Lognormal at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
313					Lilliefors Test Statistic	0.214	**Lilliefors Lognormal GOF Test**					
314					5% Lilliefors Critical Value	0.295	Data appear Lognormal at 5% Significance Level					
315	**Data appear Lognormal at 5% Significance Level**											
316												
317	**Lognormal Statistics**											
318					Minimum of Logged Data	-2.43				Mean of logged Data		0.429
319					Maximum of Logged Data	3.932				SD of logged Data		1.958
320												
321	**Assuming Lognormal Distribution**											
322					95% H-UCL	503.9				90% Chebyshev (MVUE) UCL		20.14
323					95% Chebyshev (MVUE) UCL	26.17				97.5% Chebyshev (MVUE) UCL		34.55
324					99% Chebyshev (MVUE) UCL	51.02						
325												
326	**Nonparametric Distribution Free UCL Statistics**											
327	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
328												
329	**Nonparametric Distribution Free UCLs**											
330					95% CLT UCL	17.85				95% Jackknife UCL		19.06
331					95% Standard Bootstrap UCL	17.65				95% Bootstrap-t UCL		200.8
332					95% Hall's Bootstrap UCL	100.4				95% Percentile Bootstrap UCL		18.01
333					95% BCA Bootstrap UCL	23.7						
334					90% Chebyshev(Mean, Sd) UCL	25.54				95% Chebyshev(Mean, Sd) UCL		33.25
335					97.5% Chebyshev(Mean, Sd) UCL	43.96				99% Chebyshev(Mean, Sd) UCL		64.98
336												
337	**Suggested UCL to Use**											
338					99% Chebyshev (Mean, Sd) UCL	64.98						
339												
340	**Recommended UCL exceeds the maximum observation**											
341												
342	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
343	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
344	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
345	For additional insight the user may want to consult a statistician.											
346												
347												
348	**Value (chrysene)**											
349												
350	**General Statistics**											
351					Total Number of Observations	9				Number of Distinct Observations		9
352										Number of Missing Observations		0
353					Minimum	0.17				Mean		20.43
354					Maximum	150				Median		1.4
355					SD	49.28				Std. Error of Mean		16.43
356					Coefficient of Variation	2.413				Skewness		2.853
357												
358	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
359	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
360	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
361	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
362												
363	**Normal GOF Test**											
364					Shapiro Wilk Test Statistic	0.48	**Shapiro Wilk GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
365					5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level					
366					Lilliefors Test Statistic	0.426	**Lilliefors GOF Test**					
367					5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level					
368	**Data Not Normal at 5% Significance Level**											
369												
370	**Assuming Normal Distribution**											
371	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
372					95% Student's-t UCL	50.98	95% Adjusted-CLT UCL (Chen-1995)					64.14
373							95% Modified-t UCL (Johnson-1978)					53.58
374												
375	**Gamma GOF Test**											
376					A-D Test Statistic	1.361	**Anderson-Darling Gamma GOF Test**					
377					5% A-D Critical Value	0.804	Data Not Gamma Distributed at 5% Significance Level					
378					K-S Test Statistic	0.427	**Kolmogrov-Smirnoff Gamma GOF Test**					
379					5% K-S Critical Value	0.301	Data Not Gamma Distributed at 5% Significance Level					
380	**Data Not Gamma Distributed at 5% Significance Level**											
381												
382	**Gamma Statistics**											
383					k hat (MLE)	0.317	k star (bias corrected MLE)					0.285
384					Theta hat (MLE)	64.51	Theta star (bias corrected MLE)					71.63
385					nu hat (MLE)	5.699	nu star (bias corrected)					5.133
386					MLE Mean (bias corrected)	20.43	MLE Sd (bias corrected)					38.25
387							Approximate Chi Square Value (0.05)					1.214
388					Adjusted Level of Significance	0.0231	Adjusted Chi Square Value					0.862
389												
390	**Assuming Gamma Distribution**											
391				95% Approximate Gamma UCL (use when n>=50))		86.36	95% Adjusted Gamma UCL (use when n<50)					121.6
392												
393	**Lognormal GOF Test**											
394					Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk Lognormal GOF Test**					
395					5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level					
396					Lilliefors Test Statistic	0.342	**Lilliefors Lognormal GOF Test**					
397					5% Lilliefors Critical Value	0.295	Data Not Lognormal at 5% Significance Level					
398	**Data appear Approximate Lognormal at 5% Significance Level**											
399												
400	**Lognormal Statistics**											
401					Minimum of Logged Data	-1.772	Mean of logged Data					0.858
402					Maximum of Logged Data	5.011	SD of logged Data					2.031
403												
404	**Assuming Lognormal Distribution**											
405					95% H-UCL	1190	90% Chebyshev (MVUE) UCL					34.88
406					95% Chebyshev (MVUE) UCL	45.44	97.5% Chebyshev (MVUE) UCL					60.1
407					99% Chebyshev (MVUE) UCL	88.89						
408												
409	**Nonparametric Distribution Free UCL Statistics**											
410	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
411												
412	**Nonparametric Distribution Free UCLs**											
413					95% CLT UCL	47.45	95% Jackknife UCL					50.98
414					95% Standard Bootstrap UCL	45.75	95% Bootstrap-t UCL					1922
415					95% Hall's Bootstrap UCL	925.8	95% Percentile Bootstrap UCL					50.89
416					95% BCA Bootstrap UCL	70.01						

	A	B	C	D	E	F	G	H	I	J	K	L
417					90% Chebyshev(Mean, Sd) UCL	69.71				95% Chebyshev(Mean, Sd) UCL		92.03
418					97.5% Chebyshev(Mean, Sd) UCL	123				99% Chebyshev(Mean, Sd) UCL		183.9
419												
420					Suggested UCL to Use							
421					95% Hall's Bootstrap UCL	925.8						
422												
423					Recommended UCL exceeds the maximum observation							
424												
425					In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL						
426												
427					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
428					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
429					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
430					For additional insight the user may want to consult a statistician.							
431												
432	Value (delta-bhc)											
433												
434					General Statistics							
435					Total Number of Observations	8				Number of Distinct Observations		8
436					Number of Detects	2				Number of Non-Detects		6
437					Number of Distinct Detects	2				Number of Distinct Non-Detects		6
438					Minimum Detect	4.5000E-4				Minimum Non-Detect		1.6000E-4
439					Maximum Detect	0.014				Maximum Non-Detect		0.036
440					Variance Detects	9.1801E-5				Percent Non-Detects		75%
441					Mean Detects	0.00723				SD Detects		0.00958
442					Median Detects	0.00723				CV Detects		1.326
443					Skewness Detects	N/A				Kurtosis Detects		N/A
444					Mean of Logged Detects	-5.987				SD of Logged Detects		2.431
445												
446					Warning: Data set has only 2 Detected Values.							
447					This is not enough to compute meaningful or reliable statistics and estimates.							
448												
449												
450					Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use							
451					guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.							
452					For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).							
453					Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0							
454												
455					Normal GOF Test on Detects Only							
456					Not Enough Data to Perform GOF Test							
457												
458					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
459					Mean	0.00301				Standard Error of Mean		0.00348
460					SD	0.0055				95% KM (BCA) UCL		N/A
461					95% KM (t) UCL	0.00959				95% KM (Percentile Bootstrap) UCL		N/A
462					95% KM (z) UCL	0.00873				95% KM Bootstrap t UCL		N/A
463					90% KM Chebyshev UCL	0.0134				95% KM Chebyshev UCL		0.0182
464					97.5% KM Chebyshev UCL	0.0247				99% KM Chebyshev UCL		0.0376
465												
466					Gamma GOF Tests on Detected Observations Only							
467					Not Enough Data to Perform GOF Test							
468												

	A	B	C	D	E	F	G	H	I	J	K	L
469	Gamma Statistics on Detected Data Only											
470					k hat (MLE)	0.586				k star (bias corrected MLE)		N/A
471					Theta hat (MLE)	0.0123				Theta star (bias corrected MLE)		N/A
472					nu hat (MLE)	2.346				nu star (bias corrected)		N/A
473					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A
474												
475	Gamma Kaplan-Meier (KM) Statistics											
476					k hat (KM)	0.299				nu hat (KM)		4.78
477										Adjusted Level of Significance (β)		0.0195
478					Approximate Chi Square Value (4.78, α)	1.052				Adjusted Chi Square Value (4.78, β)		0.68
479					95% Gamma Approximate KM-UCL (use when n>=50)	0.0137				95% Gamma Adjusted KM-UCL (use when n<50)		0.0211
480												
481	Lognormal GOF Test on Detected Observations Only											
482	Not Enough Data to Perform GOF Test											
483												
484	Lognormal ROS Statistics Using Imputed Non-Detects											
485					Mean in Original Scale	0.00184				Mean in Log Scale		-9.339
486					SD in Original Scale	0.00492				SD in Log Scale		2.492
487					95% t UCL (assumes normality of ROS data)	0.00513				95% Percentile Bootstrap UCL		0.00528
488					95% BCA Bootstrap UCL	0.00707				95% Bootstrap t UCL		0.261
489					95% H-UCL (Log ROS)	2.377						
490												
491	DL/2 Statistics											
492	DL/2 Normal						DL/2 Log-Transformed					
493					Mean in Original Scale	0.00755				Mean in Log Scale		-6.279
494					SD in Original Scale	0.00787				SD in Log Scale		2.302
495					95% t UCL (Assumes normality)	0.0128				95% H-Stat UCL		11.64
496	DL/2 is not a recommended method, provided for comparisons and historical reasons											
497												
498	Nonparametric Distribution Free UCL Statistics											
499	Data do not follow a Discernible Distribution at 5% Significance Level											
500												
501	Suggested UCL to Use											
502					99% KM (Chebyshev) UCL	0.0376						
503	Warning: Recommended UCL exceeds the maximum observation											
504												
505	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
506	Recommendations are based upon data size, data distribution, and skewness.											
507	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
508	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
509												
510	Value (dibenz(a,h)anthracene)											
511												
512	General Statistics											
513					Total Number of Observations	9				Number of Distinct Observations		9
514					Number of Detects	7				Number of Non-Detects		2
515					Number of Distinct Detects	7				Number of Distinct Non-Detects		2
516					Minimum Detect	0.026				Minimum Non-Detect		0.62
517					Maximum Detect	32				Maximum Non-Detect		0.97
518					Variance Detects	142.4				Percent Non-Detects		22.22%
519					Mean Detects	4.985				SD Detects		11.93
520					Median Detects	0.26				CV Detects		2.394

	A	B	C	D	E	F	G	H	I	J	K	L
521					Skewness Detects	2.628					Kurtosis Detects	6.925
522					Mean of Logged Detects	-0.839					SD of Logged Detects	2.296
523												
524	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
525	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
526	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
527	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
528												
529	Normal GOF Test on Detects Only											
530					Shapiro Wilk Test Statistic	0.493	Shapiro Wilk GOF Test					
531					5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level					
532					Lilliefors Test Statistic	0.456	Lilliefors GOF Test					
533					5% Lilliefors Critical Value	0.335	Detected Data Not Normal at 5% Significance Level					
534	Detected Data Not Normal at 5% Significance Level											
535												
536	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
537					Mean	3.917					Standard Error of Mean	3.581
538					SD	9.945					95% KM (BCA) UCL	10.9
539					95% KM (t) UCL	10.58					95% KM (Percentile Bootstrap) UCL	10.81
540					95% KM (z) UCL	9.807					95% KM Bootstrap t UCL	364.8
541					90% KM Chebyshev UCL	14.66					95% KM Chebyshev UCL	19.53
542					97.5% KM Chebyshev UCL	26.28					99% KM Chebyshev UCL	39.55
543												
544	Gamma GOF Tests on Detected Observations Only											
545					A-D Test Statistic	0.921	Anderson-Darling GOF Test					
546					5% A-D Critical Value	0.79	Detected Data Not Gamma Distributed at 5% Significance Level					
547					K-S Test Statistic	0.36	Kolmogrov-Smirnoff GOF					
548					5% K-S Critical Value	0.336	Detected Data Not Gamma Distributed at 5% Significance Level					
549	Detected Data Not Gamma Distributed at 5% Significance Level											
550												
551	Gamma Statistics on Detected Data Only											
552					k hat (MLE)	0.284					k star (bias corrected MLE)	0.258
553					Theta hat (MLE)	17.52					Theta star (bias corrected MLE)	19.34
554					nu hat (MLE)	3.983					nu star (bias corrected)	3.609
555					MLE Mean (bias corrected)	4.985					MLE Sd (bias corrected)	9.818
556												
557	Gamma Kaplan-Meier (KM) Statistics											
558					k hat (KM)	0.155					nu hat (KM)	2.792
559					Approximate Chi Square Value (2.79, α)	0.314					Adjusted Chi Square Value (2.79, β)	0.198
560					95% Gamma Approximate KM-UCL (use when n>=50)	34.87					95% Gamma Adjusted KM-UCL (use when n<50)	55.33
561												
562	Gamma ROS Statistics using Imputed Non-Detects											
563	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
564	GROS may not be used when kstar of detected data is small such as < 0.1											
565	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
566	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
567					Minimum	0.01					Mean	3.88
568					Maximum	32					Median	0.17
569					SD	10.56					CV	2.723
570					k hat (MLE)	0.236					k star (bias corrected MLE)	0.232
571					Theta hat (MLE)	16.41					Theta star (bias corrected MLE)	16.74
572					nu hat (MLE)	4.256					nu star (bias corrected)	4.171

	A	B	C	D	E	F	G	H	I	J	K	L
573					MLE Mean (bias corrected)	3.88					MLE Sd (bias corrected)	8.06
574											Adjusted Level of Significance (β)	0.0231
575					Approximate Chi Square Value (4.17, α)	0.79					Adjusted Chi Square Value (4.17, β)	0.533
576					95% Gamma Approximate UCL (use when n>=50)	20.48					95% Gamma Adjusted UCL (use when n<50)	30.37
577												
578					**Lognormal GOF Test on Detected Observations Only**							
579					Shapiro Wilk Test Statistic	0.914			**Shapiro Wilk GOF Test**			
580					5% Shapiro Wilk Critical Value	0.803			Detected Data appear Lognormal at 5% Significance Level			
581					Lilliefors Test Statistic	0.266			**Lilliefors GOF Test**			
582					5% Lilliefors Critical Value	0.335			Detected Data appear Lognormal at 5% Significance Level			
583					**Detected Data appear Lognormal at 5% Significance Level**							
584												
585					**Lognormal ROS Statistics Using Imputed Non-Detects**							
586					Mean in Original Scale	3.914					Mean in Log Scale	-1.054
587					SD in Original Scale	10.55					SD in Log Scale	2.034
588					95% t UCL (assumes normality of ROS data)	10.45					95% Percentile Bootstrap UCL	10.79
589					95% BCA Bootstrap UCL	14.53					95% Bootstrap t UCL	466.7
590					95% H-UCL (Log ROS)	178.6						
591												
592					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
593					KM Mean (logged)	-1.098					95% H-UCL (KM -Log)	125.5
594					KM SD (logged)	1.982					95% Critical H Value (KM-Log)	5.662
595					KM Standard Error of Mean (logged)	0.735						
596												
597					**DL/2 Statistics**							
598					**DL/2 Normal**				**DL/2 Log-Transformed**			
599					Mean in Original Scale	3.966					Mean in Log Scale	-0.863
600					SD in Original Scale	10.53					SD in Log Scale	1.992
601					95% t UCL (Assumes normality)	10.49					95% H-Stat UCL	169.1
602					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
603												
604					**Nonparametric Distribution Free UCL Statistics**							
605					**Detected Data appear Lognormal Distributed at 5% Significance Level**							
606												
607					**Suggested UCL to Use**							
608					99% KM (Chebyshev) UCL	39.55						
609					**Warning: Recommended UCL exceeds the maximum observation**							
610												
611					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
612					Recommendations are based upon data size, data distribution, and skewness.							
613					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
614					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
615												
616												
617	**Value (indeno[1,2,3-cd]pyrene)**											
618												
619					**General Statistics**							
620					Total Number of Observations	9					Number of Distinct Observations	9
621											Number of Missing Observations	0
622					Minimum	0.12					Mean	8.488
623					Maximum	67					Median	0.48
624					SD	22.02					Std. Error of Mean	7.341

	A	B	C	D	E	F	G	H	I	J	K	L
625					Coefficient of Variation	2.595					Skewness	2.96
626												
627	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
628	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
629	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
630	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
631												
632	Normal GOF Test											
633					Shapiro Wilk Test Statistic	0.44	Shapiro Wilk GOF Test					
634					5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level					
635					Lilliefors Test Statistic	0.432	Lilliefors GOF Test					
636					5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level					
637	Data Not Normal at 5% Significance Level											
638												
639	Assuming Normal Distribution											
640	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
641					95% Student's-t UCL	22.14					95% Adjusted-CLT UCL (Chen-1995)	28.3
642											95% Modified-t UCL (Johnson-1978)	23.35
643												
644	Gamma GOF Test											
645					A-D Test Statistic	1.606	Anderson-Darling Gamma GOF Test					
646					5% A-D Critical Value	0.804	Data Not Gamma Distributed at 5% Significance Level					
647					K-S Test Statistic	0.407	Kolmogrov-Smirnoff Gamma GOF Test					
648					5% K-S Critical Value	0.301	Data Not Gamma Distributed at 5% Significance Level					
649	Data Not Gamma Distributed at 5% Significance Level											
650												
651	Gamma Statistics											
652					k hat (MLE)	0.317					k star (bias corrected MLE)	0.286
653					Theta hat (MLE)	26.76					Theta star (bias corrected MLE)	29.73
654					nu hat (MLE)	5.709					nu star (bias corrected)	5.14
655					MLE Mean (bias corrected)	8.488					MLE Sd (bias corrected)	15.88
656											Approximate Chi Square Value (0.05)	1.217
657					Adjusted Level of Significance	0.0231					Adjusted Chi Square Value	0.865
658												
659	Assuming Gamma Distribution											
660					95% Approximate Gamma UCL (use when n>=50))	35.84					95% Adjusted Gamma UCL (use when n<50)	50.45
661												
662	Lognormal GOF Test											
663					Shapiro Wilk Test Statistic	0.795	Shapiro Wilk Lognormal GOF Test					
664					5% Shapiro Wilk Critical Value	0.829	Data Not Lognormal at 5% Significance Level					
665					Lilliefors Test Statistic	0.309	Lilliefors Lognormal GOF Test					
666					5% Lilliefors Critical Value	0.295	Data Not Lognormal at 5% Significance Level					
667	Data Not Lognormal at 5% Significance Level											
668												
669	Lognormal Statistics											
670					Minimum of Logged Data	-2.12					Mean of logged Data	-0.0156
671					Maximum of Logged Data	4.205					SD of logged Data	1.888
672												
673	Assuming Lognormal Distribution											
674					95% H-UCL	218.2					90% Chebyshev (MVUE) UCL	11.53
675					95% Chebyshev (MVUE) UCL	14.96					97.5% Chebyshev (MVUE) UCL	19.71
676					99% Chebyshev (MVUE) UCL	29.04						

	A	B	C	D	E	F	G	H	I	J	K	L
677												
678						**Nonparametric Distribution Free UCL Statistics**						
679						**Data do not follow a Discernible Distribution (0.05)**						
680												
681						**Nonparametric Distribution Free UCLs**						
682					95% CLT UCL	20.56				95% Jackknife UCL		22.14
683					95% Standard Bootstrap UCL	19.74				95% Bootstrap-t UCL		950.1
684					95% Hall's Bootstrap UCL	330.3				95% Percentile Bootstrap UCL		22.73
685					95% BCA Bootstrap UCL	30.01						
686					90% Chebyshev(Mean, Sd) UCL	30.51				95% Chebyshev(Mean, Sd) UCL		40.48
687					97.5% Chebyshev(Mean, Sd) UCL	54.33				99% Chebyshev(Mean, Sd) UCL		81.53
688												
689						**Suggested UCL to Use**						
690					95% Hall's Bootstrap UCL	330.3						
691												
692						**Recommended UCL exceeds the maximum observation**						
693												
694						**In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL**						
695												
696						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
697						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
698						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
699						For additional insight the user may want to consult a statistician.						
700												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			6/6/2016 9:51:26 AM								
5	From File			RetPond-Sed.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Arsenic											
12												
13	General Statistics											
14	Total Number of Observations					9	Number of Distinct Observations					9
15							Number of Missing Observations					0
16	Minimum					0.0037	Mean					4.714
17	Maximum					12	Median					5.2
18	SD					4.91	Std. Error of Mean					1.637
19	Coefficient of Variation					1.042	Skewness					0.297
20												
21	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
22	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
23	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
24	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
25												
26	Normal GOF Test											
27	Shapiro Wilk Test Statistic					0.834	Shapiro Wilk GOF Test					
28	5% Shapiro Wilk Critical Value					0.829	Data appear Normal at 5% Significance Level					
29	Lilliefors Test Statistic					0.275	Lilliefors GOF Test					
30	5% Lilliefors Critical Value					0.295	Data appear Normal at 5% Significance Level					
31	Data appear Normal at 5% Significance Level											
32												
33	Assuming Normal Distribution											
34	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
35	95% Student's-t UCL					7.758	95% Adjusted-CLT UCL (Chen-1995)					7.58
36							95% Modified-t UCL (Johnson-1978)					7.785
37												
38	Gamma GOF Test											
39	A-D Test Statistic					1.199	Anderson-Darling Gamma GOF Test					
40	5% A-D Critical Value					0.821	Data Not Gamma Distributed at 5% Significance Level					
41	K-S Test Statistic					0.309	Kolmogrov-Smirnoff Gamma GOF Test					
42	5% K-S Critical Value					0.304	Data Not Gamma Distributed at 5% Significance Level					
43	Data Not Gamma Distributed at 5% Significance Level											
44												
45	Gamma Statistics											
46	k hat (MLE)					0.265	k star (bias corrected MLE)					0.251
47	Theta hat (MLE)					17.79	Theta star (bias corrected MLE)					18.8
48	nu hat (MLE)					4.769	nu star (bias corrected)					4.513
49	MLE Mean (bias corrected)					4.714	MLE Sd (bias corrected)					9.415
50							Approximate Chi Square Value (0.05)					0.934
51	Adjusted Level of Significance					0.0231	Adjusted Chi Square Value					0.642
52												

	A	B	C	D	E	F	G	H	I	J	K	L
53	**Assuming Gamma Distribution**											
54	95% Approximate Gamma UCL (use when n>=50))					22.77	95% Adjusted Gamma UCL (use when n<50)					33.11
55												
56	**Lognormal GOF Test**											
57	Shapiro Wilk Test Statistic					0.73	**Shapiro Wilk Lognormal GOF Test**					
58	5% Shapiro Wilk Critical Value					0.829	Data Not Lognormal at 5% Significance Level					
59	Lilliefors Test Statistic					0.321	**Lilliefors Lognormal GOF Test**					
60	5% Lilliefors Critical Value					0.295	Data Not Lognormal at 5% Significance Level					
61	**Data Not Lognormal at 5% Significance Level**											
62												
63	**Lognormal Statistics**											
64	Minimum of Logged Data					-5.599	Mean of logged Data					-1.105
65	Maximum of Logged Data					2.485	SD of logged Data					3.801
66												
67	**Assuming Lognormal Distribution**											
68	95% H-UCL					6.060E+8	90% Chebyshev (MVUE) UCL					117.2
69	95% Chebyshev (MVUE) UCL					156.4	97.5% Chebyshev (MVUE) UCL					210.8
70	99% Chebyshev (MVUE) UCL					317.6						
71												
72	**Nonparametric Distribution Free UCL Statistics**											
73	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
74												
75	**Nonparametric Distribution Free UCLs**											
76	95% CLT UCL					7.406	95% Jackknife UCL					7.758
77	95% Standard Bootstrap UCL					7.298	95% Bootstrap-t UCL					7.987
78	95% Hall's Bootstrap UCL					6.983	95% Percentile Bootstrap UCL					7.291
79	95% BCA Bootstrap UCL					7.313						
80	90% Chebyshev(Mean, Sd) UCL					9.624	95% Chebyshev(Mean, Sd) UCL					11.85
81	97.5% Chebyshev(Mean, Sd) UCL					14.94	99% Chebyshev(Mean, Sd) UCL					21
82												
83	**Suggested UCL to Use**											
84	95% Student's-t UCL					7.758						
85												
86	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
87	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
88	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
89	For additional insight the user may want to consult a statistician.											
90												
91												
92	**Manganese**											
93												
94	**General Statistics**											
95	Total Number of Observations					9	Number of Distinct Observations					9
96							Number of Missing Observations					0
97	Minimum					0.0697	Mean					277.3
98	Maximum					2000	Median					75
99	SD					649.5	Std. Error of Mean					216.5
100	Coefficient of Variation					2.342	Skewness					2.939
101												
102	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
103	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
104	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											

	A	B	C	D	E	F	G	H	I	J	K	L
105	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
106												
107	Normal GOF Test											
108					Shapiro Wilk Test Statistic	0.479	Shapiro Wilk GOF Test					
109					5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level					
110					Lilliefors Test Statistic	0.448	Lilliefors GOF Test					
111					5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level					
112	Data Not Normal at 5% Significance Level											
113												
114	Assuming Normal Distribution											
115			95% Normal UCL				95% UCLs (Adjusted for Skewness)					
116					95% Student's-t UCL	679.9				95% Adjusted-CLT UCL (Chen-1995)		860
117										95% Modified-t UCL (Johnson-1978)		715.2
118												
119	Gamma GOF Test											
120					A-D Test Statistic	0.657	Anderson-Darling Gamma GOF Test					
121					5% A-D Critical Value	0.845	Detected data appear Gamma Distributed at 5% Significance Level					
122					K-S Test Statistic	0.27	Kolmogrov-Smirnoff Gamma GOF Test					
123					5% K-S Critical Value	0.308	Detected data appear Gamma Distributed at 5% Significance Level					
124	Detected data appear Gamma Distributed at 5% Significance Level											
125												
126	Gamma Statistics											
127					k hat (MLE)	0.206				k star (bias corrected MLE)		0.211
128					Theta hat (MLE)	1347				Theta star (bias corrected MLE)		1312
129					nu hat (MLE)	3.705				nu star (bias corrected)		3.803
130					MLE Mean (bias corrected)	277.3				MLE Sd (bias corrected)		603.2
131										Approximate Chi Square Value (0.05)		0.645
132					Adjusted Level of Significance	0.0231				Adjusted Chi Square Value		0.425
133												
134	Assuming Gamma Distribution											
135					95% Approximate Gamma UCL (use when n>=50)	1634				95% Adjusted Gamma UCL (use when n<50)		2479
136												
137	Lognormal GOF Test											
138					Shapiro Wilk Test Statistic	0.827	Shapiro Wilk Lognormal GOF Test					
139					5% Shapiro Wilk Critical Value	0.829	Data Not Lognormal at 5% Significance Level					
140					Lilliefors Test Statistic	0.271	Lilliefors Lognormal GOF Test					
141					5% Lilliefors Critical Value	0.295	Data appear Lognormal at 5% Significance Level					
142	Data appear Approximate Lognormal at 5% Significance Level											
143												
144	Lognormal Statistics											
145					Minimum of Logged Data	-2.664				Mean of logged Data		2.065
146					Maximum of Logged Data	7.601				SD of logged Data		3.996
147												
148	Assuming Lognormal Distribution											
149					95% H-UCL	1.331E+11				90% Chebyshev (MVUE) UCL		4070
150					95% Chebyshev (MVUE) UCL	5435				97.5% Chebyshev (MVUE) UCL		7329
151					99% Chebyshev (MVUE) UCL	11050						
152												
153	Nonparametric Distribution Free UCL Statistics											
154	Data appear to follow a Discernible Distribution at 5% Significance Level											
155												
156	Nonparametric Distribution Free UCLs											

	A	B	C	D	E	F	G	H	I	J	K	L
157					95% CLT UCL	633.4				95% Jackknife UCL		679.9
158					95% Standard Bootstrap UCL	605.3				95% Bootstrap-t UCL		2965
159					95% Hall's Bootstrap UCL	2456				95% Percentile Bootstrap UCL		701.2
160					95% BCA Bootstrap UCL	908.9						
161					90% Chebyshev(Mean, Sd) UCL	926.8				95% Chebyshev(Mean, Sd) UCL		1221
162					97.5% Chebyshev(Mean, Sd) UCL	1629				99% Chebyshev(Mean, Sd) UCL		2432
163												
164					**Suggested UCL to Use**							
165					95% Adjusted Gamma UCL	2479						
166												
167					**Recommended UCL exceeds the maximum observation**							
168												
169					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
170					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
171					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
172					For additional insight the user may want to consult a statistician.							
173												

WATERING RUN - SEDIMENT

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	8/13/2014 3:59:08 PM
From File	ProUCL Input Files_i.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Value (arsenic)

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2.1	Mean	11.55
Maximum	28	Median	5.85
SD	11.38	Std. Error of Mean	4.645
Coefficient of Variation	0.985	Skewness	0.937

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.79	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.322	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	20.91	95% Adjusted-CLT UCL (Chen-1995)	21.09
		95% Modified-t UCL (Johnson-1978)	21.21

Gamma GOF Test

A-D Test Statistic	0.473	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.711	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.249	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.339	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.259	k star (bias corrected MLE)	0.741
Theta hat (MLE)	9.172	Theta star (bias corrected MLE)	15.59
nu hat (MLE)	15.11	nu star (bias corrected)	8.889
MLE Mean (bias corrected)	11.55	MLE Sd (bias corrected)	13.42
		Approximate Chi Square Value (0.05)	3.26

	A	B	C	D	E	F	G	H	I	J	K	L
52					Adjusted Level of Significance	0.0122					Adjusted Chi Square Value	2.158
53												
54					**Assuming Gamma Distribution**							
55					95% Approximate Gamma UCL (use when n>=50))	31.49					95% Adjusted Gamma UCL (use when n<50)	47.57
56												
57					**Lognormal GOF Test**							
58					Shapiro Wilk Test Statistic	0.911			**Shapiro Wilk Lognormal GOF Test**			
59					5% Shapiro Wilk Critical Value	0.788			Data appear Lognormal at 5% Significance Level			
60					Lilliefors Test Statistic	0.202			**Lilliefors Lognormal GOF Test**			
61					5% Lilliefors Critical Value	0.362			Data appear Lognormal at 5% Significance Level			
62					**Data appear Lognormal at 5% Significance Level**							
63												
64					**Lognormal Statistics**							
65					Minimum of Logged Data	0.742					Mean of logged Data	2
66					Maximum of Logged Data	3.332					SD of logged Data	1.05
67												
68					**Assuming Lognormal Distribution**							
69					95% H-UCL	96.66					90% Chebyshev (MVUE) UCL	25.74
70					95% Chebyshev (MVUE) UCL	32.24					97.5% Chebyshev (MVUE) UCL	41.27
71					99% Chebyshev (MVUE) UCL	58.99						
72												
73					**Nonparametric Distribution Free UCL Statistics**							
74					**Data appear to follow a Discernible Distribution at 5% Significance Level**							
75												
76					**Nonparametric Distribution Free UCLs**							
77					95% CLT UCL	19.19					95% Jackknife UCL	20.91
78					95% Standard Bootstrap UCL	18.37					95% Bootstrap-t UCL	51.1
79					95% Hall's Bootstrap UCL	87.03					95% Percentile Bootstrap UCL	18.9
80					95% BCA Bootstrap UCL	19.08						
81					90% Chebyshev(Mean, Sd) UCL	25.49					95% Chebyshev(Mean, Sd) UCL	31.8
82					97.5% Chebyshev(Mean, Sd) UCL	40.56					99% Chebyshev(Mean, Sd) UCL	57.77
83												
84					**Suggested UCL to Use**							
85					95% Student's-t UCL	20.91						
86												
87					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
88					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
89					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
90					For additional insight the user may want to consult a statistician.							
91												
92												
93	**Value (cobalt)**											
94												
95					**General Statistics**							
96					Total Number of Observations	6					Number of Distinct Observations	6
97											Number of Missing Observations	0
98					Minimum	3.5					Mean	21.4
99					Maximum	58					Median	10.1
100					SD	22					Std. Error of Mean	8.981
101					Coefficient of Variation	1.028					Skewness	1.213
102												

	A	B	C	D	E	F	G	H	I	J	K	L
103	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
104	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
105	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
106	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
107												
108	Normal GOF Test											
109					Shapiro Wilk Test Statistic	0.806	Shapiro Wilk GOF Test					
110					5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level					
111					Lilliefors Test Statistic	0.332	Lilliefors GOF Test					
112					5% Lilliefors Critical Value	0.362	Data appear Normal at 5% Significance Level					
113	Data appear Normal at 5% Significance Level											
114												
115	Assuming Normal Distribution											
116	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
117					95% Student's-t UCL	39.5				95% Adjusted-CLT UCL (Chen-1995)		40.92
118										95% Modified-t UCL (Johnson-1978)		40.24
119												
120	Gamma GOF Test											
121					A-D Test Statistic	0.436	Anderson-Darling Gamma GOF Test					
122					5% A-D Critical Value	0.712	Detected data appear Gamma Distributed at 5% Significance Level					
123					K-S Test Statistic	0.272	Kolmogrov-Smirnoff Gamma GOF Test					
124					5% K-S Critical Value	0.339	Detected data appear Gamma Distributed at 5% Significance Level					
125	Detected data appear Gamma Distributed at 5% Significance Level											
126												
127	Gamma Statistics											
128					k hat (MLE)	1.221				k star (bias corrected MLE)		0.722
129					Theta hat (MLE)	17.52				Theta star (bias corrected MLE)		29.65
130					nu hat (MLE)	14.66				nu star (bias corrected)		8.662
131					MLE Mean (bias corrected)	21.4				MLE Sd (bias corrected)		25.19
132										Approximate Chi Square Value (0.05)		3.124
133					Adjusted Level of Significance	0.0122				Adjusted Chi Square Value		2.053
134												
135	Assuming Gamma Distribution											
136					95% Approximate Gamma UCL (use when n>=50))	59.33				95% Adjusted Gamma UCL (use when n<50)		90.31
137												
138	Lognormal GOF Test											
139					Shapiro Wilk Test Statistic	0.931	Shapiro Wilk Lognormal GOF Test					
140					5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level					
141					Lilliefors Test Statistic	0.21	Lilliefors Lognormal GOF Test					
142					5% Lilliefors Critical Value	0.362	Data appear Lognormal at 5% Significance Level					
143	Data appear Lognormal at 5% Significance Level											
144												
145	Lognormal Statistics											
146					Minimum of Logged Data	1.253				Mean of logged Data		2.601
147					Maximum of Logged Data	4.06				SD of logged Data		1.063
148												
149	Assuming Lognormal Distribution											
150					95% H-UCL	187.5				90% Chebyshev (MVUE) UCL		47.77
151					95% Chebyshev (MVUE) UCL	59.89				97.5% Chebyshev (MVUE) UCL		76.73
152					99% Chebyshev (MVUE) UCL	109.8						
153												

	A	B	C	D	E	F	G	H	I	J	K	L
154	**Nonparametric Distribution Free UCL Statistics**											
155	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
156												
157	**Nonparametric Distribution Free UCLs**											
158					95% CLT UCL	36.17	95% Jackknife UCL					39.5
159					95% Standard Bootstrap UCL	34.77	95% Bootstrap-t UCL					116.6
160					95% Hall's Bootstrap UCL	171.5	95% Percentile Bootstrap UCL					35.7
161					95% BCA Bootstrap UCL	38.08						
162					90% Chebyshev(Mean, Sd) UCL	48.34	95% Chebyshev(Mean, Sd) UCL					60.55
163					97.5% Chebyshev(Mean, Sd) UCL	77.49	99% Chebyshev(Mean, Sd) UCL					110.8
164												
165	**Suggested UCL to Use**											
166					95% Student's-t UCL	39.5						
167												
168	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
169	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
170	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
171	For additional insight the user may want to consult a statistician.											
172												
173												
174	**Value (manganese)**											
175												
176	**General Statistics**											
177					Total Number of Observations	6	Number of Distinct Observations					5
178							Number of Missing Observations					0
179					Minimum	490	Mean					6142
180					Maximum	26000	Median					965
181					SD	10089	Std. Error of Mean					4119
182					Coefficient of Variation	1.643	Skewness					2.114
183												
184	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
185	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
186	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
187	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
188												
189	**Normal GOF Test**											
190					Shapiro Wilk Test Statistic	0.655	**Shapiro Wilk GOF Test**					
191					5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level					
192					Lilliefors Test Statistic	0.362	**Lilliefors GOF Test**					
193					5% Lilliefors Critical Value	0.362	Data appear Normal at 5% Significance Level					
194	**Data appear Approximate Normal at 5% Significance Level**											
195												
196	**Assuming Normal Distribution**											
197	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
198					95% Student's-t UCL	14441	95% Adjusted-CLT UCL (Chen-1995)					16714
199							95% Modified-t UCL (Johnson-1978)					15033
200												
201	**Gamma GOF Test**											
202					A-D Test Statistic	0.77	**Anderson-Darling Gamma GOF Test**					
203					5% A-D Critical Value	0.731	Data Not Gamma Distributed at 5% Significance Level					
204					K-S Test Statistic	0.389	**Kolmogrov-Smirnoff Gamma GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
205					5% K-S Critical Value	0.347	Data Not Gamma Distributed at 5% Significance Level					
206	**Data Not Gamma Distributed at 5% Significance Level**											
207												
208	**Gamma Statistics**											
209					k hat (MLE)	0.576			k star (bias corrected MLE)			0.399
210					Theta hat (MLE)	10664			Theta star (bias corrected MLE)			15389
211					nu hat (MLE)	6.911			nu star (bias corrected)			4.789
212					MLE Mean (bias corrected)	6142			MLE Sd (bias corrected)			9722
213									Approximate Chi Square Value (0.05)			1.056
214					Adjusted Level of Significance	0.0122			Adjusted Chi Square Value			0.557
215												
216	**Assuming Gamma Distribution**											
217					95% Approximate Gamma UCL (use when n>=50))	27853			95% Adjusted Gamma UCL (use when n<50)			52816
218												
219	**Lognormal GOF Test**											
220					Shapiro Wilk Test Statistic	0.829			**Shapiro Wilk Lognormal GOF Test**			
221					5% Shapiro Wilk Critical Value	0.788			Data appear Lognormal at 5% Significance Level			
222					Lilliefors Test Statistic	0.35			**Lilliefors Lognormal GOF Test**			
223					5% Lilliefors Critical Value	0.362			Data appear Lognormal at 5% Significance Level			
224	**Data appear Lognormal at 5% Significance Level**											
225												
226	**Lognormal Statistics**											
227					Minimum of Logged Data	6.194			Mean of logged Data			7.644
228					Maximum of Logged Data	10.17			SD of logged Data			1.546
229												
230	**Assuming Lognormal Distribution**											
231					95% H-UCL	449808			90% Chebyshev (MVUE) UCL			14018
232					95% Chebyshev (MVUE) UCL	18077			97.5% Chebyshev (MVUE) UCL			23711
233					99% Chebyshev (MVUE) UCL	34778						
234												
235	**Nonparametric Distribution Free UCL Statistics**											
236	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
237												
238	**Nonparametric Distribution Free UCLs**											
239					95% CLT UCL	12916			95% Jackknife UCL			14441
240					95% Standard Bootstrap UCL	12263			95% Bootstrap-t UCL			233521
241					95% Hall's Bootstrap UCL	168537			95% Percentile Bootstrap UCL			13392
242					95% BCA Bootstrap UCL	15655						
243					90% Chebyshev(Mean, Sd) UCL	18498			95% Chebyshev(Mean, Sd) UCL			24094
244					97.5% Chebyshev(Mean, Sd) UCL	31863			99% Chebyshev(Mean, Sd) UCL			47122
245												
246	**Suggested UCL to Use**											
247					95% Student's-t UCL	14441						
248												
249	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
250	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
251	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
252	For additional insight the user may want to consult a statistician.											
253												
254	**Value (thallium)**											
255												

	A	B	C	D	E	F	G	H	I	J	K	L
256	General Statistics											
257					Total Number of Observations	6				Number of Distinct Observations		5
258					Number of Detects	2				Number of Non-Detects		4
259					Number of Distinct Detects	2				Number of Distinct Non-Detects		3
260					Minimum Detect	0.14				Minimum Non-Detect		0.13
261					Maximum Detect	1.8				Maximum Non-Detect		6
262					Variance Detects	1.378				Percent Non-Detects		66.67%
263					Mean Detects	0.97				SD Detects		1.174
264					Median Detects	0.97				CV Detects		1.21
265					Skewness Detects	N/A				Kurtosis Detects		N/A
266					Mean of Logged Detects	-0.689				SD of Logged Detects		1.806
267												
268	Warning: Data set has only 2 Detected Values.											
269	This is not enough to compute meaningful or reliable statistics and estimates.											
270												
271												
272	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
273	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
274	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
275	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
276												
277	Normal GOF Test on Detects Only											
278	Not Enough Data to Perform GOF Test											
279												
280	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
281					Mean	0.467				Standard Error of Mean		0.422
282					SD	0.667				95% KM (BCA) UCL		N/A
283					95% KM (t) UCL	1.316				95% KM (Percentile Bootstrap) UCL		N/A
284					95% KM (z) UCL	1.16				95% KM Bootstrap t UCL		N/A
285					90% KM Chebyshev UCL	1.732				95% KM Chebyshev UCL		2.305
286					97.5% KM Chebyshev UCL	3.1				99% KM Chebyshev UCL		4.662
287												
288	Gamma GOF Tests on Detected Observations Only											
289	Not Enough Data to Perform GOF Test											
290												
291	Gamma Statistics on Detected Data Only											
292					k hat (MLE)	0.889				k star (bias corrected MLE)		N/A
293					Theta hat (MLE)	1.091				Theta star (bias corrected MLE)		N/A
294					nu hat (MLE)	3.556				nu star (bias corrected)		N/A
295					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A
296												
297	Gamma Kaplan-Meier (KM) Statistics											
298					k hat (KM)	0.49				nu hat (KM)		5.88
299										Adjusted Level of Significance (β)		0.0122
300					Approximate Chi Square Value (5.88, α)	1.579				Adjusted Chi Square Value (5.88, β)		0.907
301					95% Gamma Approximate KM-UCL (use when n>=50)	1.738				95% Gamma Adjusted KM-UCL (use when n<50)		3.024
302												
303	Lognormal GOF Test on Detected Observations Only											
304	Not Enough Data to Perform GOF Test											
305												
306	Lognormal ROS Statistics Using Imputed Non-Detects											

	A	B	C	D	E	F	G	H	I	J	K	L
307					Mean in Original Scale	0.335					Mean in Log Scale	-3.177
308					SD in Original Scale	0.719					SD in Log Scale	2.277
309				95% t UCL (assumes normality of ROS data)		0.927					95% Percentile Bootstrap UCL	0.693
310					95% BCA Bootstrap UCL	0.947					95% Bootstrap t UCL	16.51
311					95% H-UCL (Log ROS)	4025						
312												
313						DL/2 Statistics						
314				DL/2 Normal						DL/2 Log-Transformed		
315					Mean in Original Scale	0.863					Mean in Log Scale	-1.333
316					SD in Original Scale	1.25					SD in Log Scale	1.719
317					95% t UCL (Assumes normality)	1.891					95% H-Stat UCL	195
318						DL/2 is not a recommended method, provided for comparisons and historical reasons						
319												
320						Nonparametric Distribution Free UCL Statistics						
321						Data do not follow a Discernible Distribution at 5% Significance Level						
322												
323						Suggested UCL to Use						
324					97.5% KM (Chebyshev) UCL	3.1						
325						Warning: Recommended UCL exceeds the maximum observation						
326												
327						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
328						Recommendations are based upon data size, data distribution, and skewness.						
329						These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).						
330						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
331												

ATTACHMENT C

USEPA JOHNSON AND ETTINGER SCREENING MODEL OUTPUTS FOR ATTENUATION FACTOR CALCULATION

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:31:40 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: 1,1-Dichloroethane CAS Number: 75343
Molecular Weight: 98.96[g/mole] Henrys Constant: 0.2205948[unitless]
Diffusivity in Air: 7.420e-2[cm^2/sec] Diffusivity in Water: 1.050e-5[cm^2/sec]
Unit Risk Factor: 0[($\mu g/m^3$)$^{-1}$] Reference Concentration: 0.5[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.012[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.001721[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.003402
Ground Water Attenuation Factor (α_{GW}): 0.001198
Target Concentrations are based on NON-CANCER risk.
Target Indoor Air Concentration: 500[$\mu g/m^3$] or 123.6[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 1.520e5[$\mu g/m^3$] or 3.759e4[ppbv]; Ground Water: 1915.[µg/L]

Best Estimate Target Concentrations
Soil Gas: 1.470e5[$\mu g/m^3$] or 3.634e4[ppbv]; Ground Water: 1893.[µg/L]

[2]More Protective Target Concentrations
Soil Gas: 1.420e5[µg/m^3] or 3.511e4[ppbv]; Ground Water: 1871.[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:34:01 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: 1,1-Dichloroethylene CAS Number: 75354
Molecular Weight: 96.94[g/mole] Henrys Constant: 1.030278[unitless]
Diffusivity in Air: 9.000e-2[cm^2/sec] Diffusivity in Water: 1.040e-5[cm^2/sec]
Unit Risk Factor: 0[($\mu g/m^3$)$^{-1}$] Reference Concentration: 0.2[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01455[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.002076[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.003597
Ground Water Attenuation Factor (α_{GW}): 0.001376
Target Concentrations are based on NON-CANCER risk.
Target Indoor Air Concentration: 200[$\mu g/m^3$] or 50.48[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 5.727e4[$\mu g/m^3$] or 1.446e4[ppbv]; Ground Water: 142.7[µg/L]

Best Estimate Target Concentrations
Soil Gas: 5.561e4[$\mu g/m^3$] or 1.403e4[ppbv]; Ground Water: 141.1[µg/L]

[2]More Protective Target Concentrations
Soil Gas: 5.398e4[µg/m^3] or 1.362e4[ppbv]; Ground Water: 139.6[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:40:25 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: 1,1,1-Trichloroethane CAS Number: 71556
Molecular Weight: 133.4[g/mole] Henrys Constant: 0.6734519[unitless]
Diffusivity in Air: 7.800e-2[cm^2/sec] Diffusivity in Water: 8.800e-6[cm^2/sec]
Unit Risk Factor: 0[($\mu g/m^3$)$^{-1}$] Reference Concentration: 2.2[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01261[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.0018[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.003454
Ground Water Attenuation Factor (α_{GW}): 0.001239
Target Concentrations are based on NON-CANCER risk.
Target Indoor Air Concentration: 2200[$\mu g/m^3$] or 403.5[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 6.581e5[$\mu g/m^3$] or 1.207e5[ppbv]; Ground Water: 2667.[µg/L]

Best Estimate Target Concentrations
Soil Gas: 6.370e5[$\mu g/m^3$] or 1.168e5[ppbv]; Ground Water: 2637.[µg/L]

[2]More Protective Target Concentrations
Soil Gas: 6.163e5[µg/m^3] or 1.130e5[ppbv]; Ground Water: 2607.[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:26:33 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: 1,1,2-Trichloroethane CAS Number: 79005
Molecular Weight: 133.41[g/mole] Henrys Constant: 0.03540693[unitless]
Diffusivity in Air: 7.800e-2[cm^2/sec] Diffusivity in Water: 8.800e-6[cm^2/sec]
Unit Risk Factor: 0.000016[$(\mu g/m^3)^{-1}$] Reference Concentration: 0.014[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01261[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.001855[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.003454
Ground Water Attenuation Factor (α_{GW}): 0.001267
Target Concentrations are based on CANCER risk.
Target Indoor Air Concentration: 0.1521[$\mu g/m^3$] or 0.02789[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 45.50[$\mu g/m^3$] or 8.343[ppbv]; Ground Water: 3.431[$\mu g/L$]

Best Estimate Target Concentrations
Soil Gas: 44.03[$\mu g/m^3$] or 8.075[ppbv]; Ground Water: 3.390[$\mu g/L$]

[2]More Protective Target Concentrations
Soil Gas: 42.60[µg/m^3] or 7.813[ppbv]; Ground Water: 3.351[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:37:00 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: Ethylbenzene CAS Number: 100414
Molecular Weight: 106.17[g/mole] Henrys Constant: 0.3045974[unitless]
Diffusivity in Air: 7.500e-2[cm^2/sec] Diffusivity in Water: 7.800e-6[cm^2/sec]
Unit Risk Factor: 0.0000011[$(\mu g/m^3)^{-1}$] Reference Concentration: 1[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01212[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.001734[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.003413
Ground Water Attenuation Factor (α_{GW}): 0.001204
Target Concentrations are based on CANCER risk.
Target Indoor Air Concentration: 2.212[$\mu g/m^3$] or 0.5098[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 670.2[$\mu g/m^3$] or 154.4[ppbv]; Ground Water: 6.100[µg/L]

Best Estimate Target Concentrations
Soil Gas: 648.1[$\mu g/m^3$] or 149.4[ppbv]; Ground Water: 6.029[µg/L]

[2]More Protective Target Concentrations
Soil Gas: 626.5[µg/m^3] or 144.4[ppbv]; Ground Water: 5.960[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:42:34 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: m-Xylene CAS Number: 108383
Molecular Weight: 106.17[g/mole] Henrys Constant: 0.2835683[unitless]
Diffusivity in Air: 7.000e-2[cm^2/sec] Diffusivity in Water: 7.800e-6[cm^2/sec]
Unit Risk Factor: 0[($\mu g/m^3$)$^{-1}$] Reference Concentration: 7[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01132[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.001619[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.00334
Ground Water Attenuation Factor (α_{GW}): 0.001143
Target Concentrations are based on NON-CANCER risk.
Target Indoor Air Concentration: 7000[$\mu g/m^3$] or 1613[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 2.171e6[$\mu g/m^3$] or 5.002e5[ppbv]; Ground Water: 2.185e4[µg/L]

Best Estimate Target Concentrations
Soil Gas: 2.096e6[$\mu g/m^3$] or 4.829e5[ppbv]; Ground Water: 2.159e4[µg/L]

[2]More Protective Target Concentrations
Soil Gas: 2.022e6[µg/m^3] or 4.660e5[ppbv]; Ground Water: 2.134e4[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:41:36 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: Tetrachloroethylene CAS Number: 127184
Molecular Weight: 165.83[g/mole] Henrys Constant: 0.7136031[unitless]
Diffusivity in Air: 7.200e-2[cm^2/sec] Diffusivity in Water: 8.200e-6[cm^2/sec]
Unit Risk Factor: 0.000003[$(\mu g/m^3)^{-1}$] Reference Concentration: 0[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01164[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.001662[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.00337
Ground Water Attenuation Factor (α_{GW}): 0.001166
Target Concentrations are based on CANCER risk.
Target Indoor Air Concentration: 0.8111[$\mu g/m^3$] or 0.1197[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 249.1[$\mu g/m^3$] or 36.75[ppbv]; Ground Water: 0.9863[µg/L]

Best Estimate Target Concentrations
Soil Gas: 240.7[$\mu g/m^3$] or 35.51[ppbv]; Ground Water: 0.9747[µg/L]

[2]More Protective Target Concentrations
Soil Gas: 232.4[µg/m^3] or 34.29[ppbv]; Ground Water: 0.9634[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Mt. Top
Report Date: Tue Sep 9 22:38:58 EDT 2014
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 0.68m +/- 0.068m
Average ground water temperature: 24C

CHEMICAL PROPERTIES
Chemical of Concern: Trichloroethylene CAS Number: 79016
Molecular Weight: 131.39[g/mole] Henrys Constant: 0.4018023[unitless]
Diffusivity in Air: 7.900e-2[cm^2/sec] Diffusivity in Water: 9.100e-6[cm^2/sec]
Unit Risk Factor: 0.00011[$(\mu g/m^3)^{-1}$] Reference Concentration: 0.04[mg/m^3]

SOIL PROPERTIES
Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES
Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS
Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS
Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01277[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.001825[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.003467
Ground Water Attenuation Factor (α_{GW}): 0.001252
Target Concentrations are based on CANCER risk.
Target Indoor Air Concentration: 0.02212[$\mu g/m^3$] or 0.004119[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 6.591[$\mu g/m^3$] or 1.227[ppbv]; Ground Water: 0.04449[µg/L]

Best Estimate Target Concentrations
Soil Gas: 6.381[$\mu g/m^3$] or 1.188[ppbv]; Ground Water: 0.04398[µg/L]

[2]More Protective Target Concentrations
Soil Gas: 6.175[µg/m^3] or 1.150[ppbv]; Ground Water: 0.04348[µg/L]

Based on parameter analysis: Advection is the dominant mechanism across foundation.

[1]"Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.
[2]"More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

ATTACHMENT D

DETAILED VAPOR INTRUSION ANALYSIS FOR THE AFFECTED AREA

VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA

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Supplement 2 Reports of Vapor Intrusion Mitigation for 175 and 194 Church Road

Acronyms and Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
BASE	basement/crawl space
BHHRA	Baseline Human Health Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemical of potential concern
COPIAC	contaminant of potential indoor air concern
FS	Feasibility Study
FWEC	Foster Wheeler Energy Corporation
GW-MW	shallow groundwater monitoring well data
GW-VI	shallow groundwater vapor intrusion investigation data
IA	indoor air
mg/L	milligrams per liter
OA	outdoor air
OSWER	Office of Solid Waste and Emergency Response
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PADOH	Pennsylvania Department of Health
RBL	Risk-Based Screening Level
RI	Remedial Investigation
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SS	sub-slab
SSG	external soil gas
TCE	trichloroethene
TCR	Target Cancer Risk
THQ	Target Hazard Quotient
TIC	tentatively identified compound
ug/L	micrograms per liter
USEPA	United States Environmental Protection Agency
VI	vapor intrusion
VISL	Vapor Intrusion Screening Level

Introduction

Potential indoor air vapor intrusion (VI) concerns at the Affected Area of the Site have previously been evaluated and monitored by multiple groups, including the Pennsylvania Department of Health (PADOH), the Pennsylvania Department of Environmental Resources (PADER) (now the Pennsylvania Department of Environmental Protection (PADEP)), the United States Environmental Protection Agency (USEPA), and the Agency for Toxic Substances and Disease Registry (ATSDR) (PADOH, 2010). PADOH and ATSDR reviewed the groundwater sampling data, surface water sampling data, and limited residential indoor air/vapor intrusion sampling data. As a result, residents in the area of the down-gradient groundwater plume were provided alternate drinking water supplies (i.e., by point-of-use treatment systems, then connection to the municipal water supply system) and vapor intrusion mitigation systems (i.e., active venting) were installed at two residences associated with unique hydrogeologic conditions that indicated a potential risk associated with VI (Clean Vapor, 2011a, 2011b).

In addition, PADOH and ATSDR analyzed the cancer incidence data for the Mountain Top area to determine if the rates of cancer that are potentially associated with exposures to trichloroethene (TCE) are elevated compared to the Commonwealth of Pennsylvania as a whole. The cooperative Health Consultation was performed by PADOH and ATSDR to determine if site-related TCE could harm people's health (including through inhalation of potentially impacted indoor air). The Health Consultation concluded that "*Breathing the TCE levels detected in the residential indoor air samples (to date) is not expected to harm the public's health*" (PADOH, 2010). The Health Consultation noted that a baseline risk assessment would be developed as part of the Remedial Investigation/Feasibility Study (RI/FS) to identify the existing or potential risks to human health and the environment based on the sampling conducted for the RI.

During this same timeframe, updated vapor intrusion assessment and management guidance was developed and proposed by USEPA (e.g., USEPA, 2012; USEPA, 2013) to replace and supplement the Draft Vapor Intrusion Guidance published in 2002 (USEPA, 2002), as were risk-based target screening values for indoor air, sub-slab or soil gas, and groundwater (USEPA, 2014a,b). This Attachment to the Baseline Human Health Risk Assessment (BHHRA) prepared for the RI Report presents an evaluation of the more recently collected RI VI investigation sampling data (that were collected since the assessment performed by PADOH and ATSDR), including a consideration of the building characteristics that are relevant to the potential vapor intrusion inhalation exposure pathway at a number of locations within the Affected Area. This VI evaluation was conducted in accordance with the USEPA-approved Work Plan that was developed to incorporate the newer VI guidance, screening values, and assessment approaches. Other recent VI guidance and best practices also were applied in this VI evaluation when the Work Plan did not specifically address some aspect of the evaluation.

Data and Information Used in the VI Evaluation of the Affected Area

This evaluation was performed on a building-by-building basis using the following information that was collected and compiled for each location. Table D-1 presents a matrix describing the data collected for the VI evaluation by building location within the Affected Area. This information was collected in accordance with the USEPA-approved Sampling and Analysis Plan (SAP) (TtEC, 2010). It should be noted that a VI investigation in this part of the country would ideally be conducted during the heating season of the year. However, given the eagerness of the public for information about the potential risks in their homes due to VI, a consensus was reached by FWEC and USEPA to investigate the potential for ongoing VI as quickly as possible. As such, the majority of the sampling was performed in short order prior to the recommended ideal time during the heating season.

- <u>Groundwater data for samples taken from the shallow monitoring wells installed in the Affected Area immediately up-gradient or cross-gradient to the building being evaluated.</u> The sampling at these monitoring wells was performed primarily to establish the nature and extent of the groundwater contamination in the Affected Area and the Site hydrogeology. The shallowest samples from the overall data set (i.e., from the wells that were screened relatively close to the water table at each location) also provide information relevant to an assessment of potential vapor intrusion at that location. The data that were collected at these monitoring wells that were screened at the relatively shallower depths are hereafter referred to as the "shallow monitoring well groundwater" data. Because the buildings in the Affected Area are somewhat clustered, it was found to be useful to group the shallow groundwater monitoring well results so that they could be associated with the clusters of buildings. These groupings were identified with the letters "A" through "H" for the VI evaluation. Figure D-1 shows the boundaries of these shallow monitoring well groupings. Accordingly, each building that was evaluated for potential VI was associated with the shallow monitoring well sampling results from one of these groupings or zones. Figure D-2A through Figure D-2H show breakouts of the individual shallow groundwater monitoring well zones and the VI sampling locations within them. Table D-2 identifies the eight shallow groundwater monitoring well zones and which building locations and shallow groundwater monitoring well identifiers are associated with them. The sampling results from these shallow monitoring wells are referred to in Table D-1 as the "GW-MW" data for that location. The most recent and representative shallow groundwater data from the monitoring wells in these zones were collected during the period from 2010 to 2014. More details on the collection of these samples are provided elsewhere in the RI Report.

  As described in the RI Report, the residences and buildings in the Affected Area were categorized into groups based on the concentration of TCE measured in the groundwater at that location according to the following ranges:

  - Group 1: Locations with groundwater TCE concentrations greater than 130 micrograms per liter (ug/L);

- Group 2: Locations with TCE concentrations between 50 and 130 ug/L; and
- Group 3: Locations with TCE concentrations between 5 and 50 ug/L.

The lower limit for the Group 3 Locations (i.e., 5 ug/L) was the published groundwater screening value for TCE from the USEPA vapor intrusion guidance at the time of the Work Plan development. Had the current USEPA groundwater screening value (i.e., 1.2 ug/L) been used to identify residences for inclusion in Group 3, there would have been no change to the list of residences in that category. The USEPA-approved Work Plan specified that all of the Group 1 locations be sampled where access could be obtained. Shallow groundwater samples collected near the groundwater table, sub-slab vapor samples, and indoor air and outdoor air samples (and their associated quality control samples) were to be collected at the Group 1 locations. The Work Plan also specified that all of the Group 2 locations be sampled where access could be obtained. Shallow groundwater samples collected near the groundwater table and sub-slab vapor or external soil gas samples (depending on the circumstance) were to be collected at the Group 2 locations. The associated quality control samples also were to be collected at the Group 2 locations. The USEPA-approved Work Plan also specified that a percentage (i.e., 25%) of the Group 3 locations be sampled using the same approach as for the Group 2 locations. The reduced sampling at the Group 3 locations was determined to be appropriate for the RI given the reduced potential and likelihood for VI concerns at these locations. This sampling strategy was statistically developed in Section 3.1.7 of the Work Plan and was approved by USEPA. The strategy was robust and included the potential to sample additional properties if potential VI concerns were indicated in the sampled properties. No such concerns arose during the VI investigation. Table D-1 shows the data collected for the VI investigation by location using these Group categories.

- <u>Shallow groundwater sampling results from the hydropunch sampling performed in close proximity to the Group 1, 2 and 3 locations within the Affected Area</u>. These samples were collected specifically for the RI VI evaluation and targeted the shallow groundwater near the water table. The sampling results for these samples are referred to in Table D-2 as the "VI investigation" results and are designated as the "GW-VI" data on Table D-1. These groundwater samples were typically collected at shallower depths (on the order of 10 feet below ground surface (bgs)) than were associated with the shallow monitoring well sampling (i.e., GW-MW) results. The VI investigation groundwater data were collected in 2010. More details on the collection of these hydropunch samples are provided elsewhere in the RI Report. The results for the VI investigation groundwater samples and the shallow monitoring well groundwater samples described above comprise the shallow groundwater data used in this VI evaluation. The VI investigation groundwater sampling results were used (along with the sub-slab sampling results) to determine whether additional indoor or outdoor air sampling at that location was warranted at the Group 2 and Group 3 locations.
- <u>Measurements of the sub-slab vapor constituent concentrations or external soil gas data that were collected in relation to that building/location</u>. This data is referred to as the "SS"

data for the sub-slab samples and as the "SSG" for the external soil gas samples, respectively (see Table D-1). These data were collected in May through September of 2010, depending on the location. More details on the collection of these samples are provided elsewhere in the RI Report. Sub-slab sampling was the preferred sampling for the VI investigation and was performed at the selected locations that were accessible for sub-slab sampling. Sub-slab sampling was not feasible at a small number of locations, so soil gas sampling was performed instead at a point as close as possible to the structure as provided in the USEPA-approved Work Plan.

- Measurements of the indoor air constituent concentrations at the buildings. Typically, these measurements included the results of sampling of the basement or crawl space indoor air (designated as "BASE") and/or the indoor air on the first floor of the building (designated "IA") in Table D-1. The most recent indoor air sampling data were collected in May through September of 2010, depending on the location.
- Concurrent measurements of the outdoor (ambient) air constituent concentrations at the buildings. These data are referred to as the "OA" data in Table D-1. The OA data also were collected in 2010. More details on the collection of these samples are provided elsewhere in the RI Report.

The information summarized in Table D-1 constitutes a robust data set with which to perform the VI evaluation consistent with the USEPA-approved Work Plan. Some of the sampling specified in the Work Plan could not be performed at particular locations during the VI investigation because access to the property for sampling was not granted by the property owner. This resulted in some locations where a complete set of sampling results (e.g., co-located shallow groundwater, sub-slab vapor or external soil gas, basement IA and/or first floor IA, and OA for the buildings with the highest TCE concentrations in the local groundwater) could not be collected where proposed. It also should be noted that the VI investigation sampling program established in the USEPA-approved Work Plan specified the most complete multi-media sampling effort for the Area 1 locations. Initial sampling of only the shallow groundwater and sub-slab vapor was planned for the Area 2 and Area 3 locations, with additional sampling performed only if deemed necessary based on the shallow groundwater and/or sub-slab vapor results.

In addition to the environmental media sampling performed in 2010, a 13-page "Indoor Air Quality and Building Assessment / Inventory Questionnaire" was completed for each sampled building. The questionnaire contained 59 questions pertaining to the following information:

- Building Location and Date;
- Occupant Contact Information;
- General Building Description;
- Basement/Crawl Space Description;
- Additional Building Details/Occupant Use; and
- Sketches of the Floor Plans on Each Level of the Building.

These questionnaires were completed in the spring and summer of 2010.

Tiered Sequence of the VI Evaluation

The VI evaluation performed was designed to apply the tiered assessment protocol recommended in the USEPA and Region 3 VI guidance, consider aspects of VI assessment recommended by PADEP, and identify chemicals of potential concern (COPCs) that may be due to possible VI from the groundwater. Accordingly, a three step process was applied:

Step I: Assess the Completeness of the Vapor Intrusion Inhalation Exposure Pathway at Each Building/Location;

Step II: Assess the Potential Risk-Related Significance of the Measured Shallow Groundwater, Sub-Slab Vapor/External Soil Gas, and (if available) the Indoor Air Constituent Concentrations Associated with Each Building/Location; and

Step III: Assess the Strength of the Linkage of the Presence of the Detected Constituents in the Indoor Air or Sub-Slab Vapor to the Releases from the Former Foster Wheeler Energy Corporation (FWEC) Facility Using a "Multiple Lines of Evidence" Approach.

Each of these sequential steps is further described below.

Step I: Assessment of the Completeness of the VI Inhalation Exposure Pathway

The potential completeness of the VI inhalation exposure pathway was assessed by first identifying the list of constituents present in the local VI investigation shallow groundwater samples and were detected in the corresponding soil gas (either SS or SSG). When available, the indoor air measurements (either BASE or IA) at that location were then also considered to see if the subsurface contaminants also were present in the indoor air and at what concentrations relative to the target VI risk-based screening level associated with that medium. For indoor air, this constituent-specific risk-based screening level was the USEPA Regional Screening Level (RSL) Residential Air screening level dated June 2015 (USEPA, 2015a). This screening level is the same as the Target Indoor Air Concentration published in association with the USEPA's Office of Solid Waste and Emergency Response (OSWER) Vapor Intrusion Assessment Vapor Intrusion Screening Level (VISL) Residential Exposure Scenario Risk-Based Screening Level (RBL) Calculator Version 3.4 dated June 2015 (USEPA, 2015b). These published values are based on a single chemical Target Cancer Risk (TCR) of 1E-6 or a Target Hazard Quotient (THQ) for the constituent of 0.1. In accordance with the USEPA's Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) protocol for COPC selection, the risk-based screening level should be based on a THQ for the constituent of 0.1 to account for the possibility

of multiple constituents at a site affecting the same target organ or biological system of an individual who could be exposed to a group of contaminants. For the sub-slab vapor or soil gas, this constituent-specific screening level was the VISL Target Sub-Slab and Exterior Soil Gas Concentration dated June 2015 (USEPA, 2015b) using a TCR of 1E-6 and THQ of 0.1. Only those constituents that were present in the local shallow groundwater and had measured indoor air, sub-slab vapor or soil gas concentrations exceeding their respective screening levels were further considered relative to judging the potential completeness of the VI inhalation exposure pathway.

A second check was then made to ensure that the constituents identified based on the comparison above were considered "sufficiently volatile and toxic by USEPA to pose an inhalation risk via vapor intrusion from a groundwater source" (USEPA, 2014a). The VISL Guidance lays out the volatility and toxicity thresholds used by USEPA to make this determination. The determination was based on the molecular weight, vapor pressure, Henry's Law Constant, and toxicity of the constituent. Constituents that met these requirements have been listed by USEPA in the VISL Guidance (USEPA, 2015a, Appendix A). Only those constituents that are sufficiently volatile and toxic to pose potential VI concerns relative to contaminated subsurface groundwater were retained for further consideration relative to assessing the potential completeness of the VI inhalation exposure pathway.

Following this check, the sampling results for each building/location were compiled and examined in relation to each other. The sampling data associated with the potential vapor migration pathway at that location (i.e., from the shallow groundwater through the subsurface soil and into the building) were evaluated to see if the constituent was measured and found to be present at each point along the migration route. A complete VI inhalation exposure pathway would require that the constituent or its degradation products be detected at a building/location in the shallow groundwater, the sub-slab vapor, and the indoor air (assuming that there were no elevated detection limits associated with the samples for a medium at that location). In addition, vapor intrusion into the building would require the sub-slab vapor concentration of a constituent to be higher than what is detected in the indoor air and that the indoor air concentration of the constituent is higher than the concentration of the same constituent in the outdoor air. The available data for these media for each building were examined to determine if this vertical VI gradient of detected constituent concentrations along the upward vapor migration route was in evidence. When concentrations for one or more media or analyte in that medium were not available for a particular location, the data and information that was available were examined and judgment was made about the potential completeness of the VI inhalation exposure pathway with uncertainty ascribed. If the VI inhalation exposure pathway could not be shown to be incomplete based on the data that were available, the pathway was conservatively assumed to be potentially complete and was evaluated further for that building/location.

Those constituents that were found to be present in the indoor air (or sub-slab vapor or external soil gas if no indoor air sampling was performed) at each building/location where the VI inhalation

exposure pathway was assessed to be complete or potentially complete were further evaluated in Step II.

Step II: Assessment of the Significance of the Measured Concentrations Relative to VI Inhalation Risk

Step II was an assessment of the potential significance of the measured groundwater and/or sub-slab vapor or soil gas at a building assuming that vapor migration from subsurface groundwater may be occurring. This assessment was done in two ways: (1) first by calculating the cumulative projected inhalation risk for each location based on the measured soil vapor (sub-slab or external soil gas) and indoor air concentrations; and (2) second on a constituent-specific basis by location using multiple lines of evidence relative to the potential completeness of the VI pathway in consideration of the measures groundwater, soil gas, indoor air and ambient air measurements.

Screening Level Cumulative Risk Projection by Location

The USEPA Vapor Intrusion Screening Level (VISL) Calculator (Version 3.4, June 2015 RSLs) was then applied in a second phase of the Step II assessment using the property-specific vapor intrusion sampling results for external soil gas, sub-slab soil gas and indoor air. These datasets were the same as those used in the Vapor Intrusion Evaluation that was performed as part of the Draft BHHRA and the first phase of the Step II assessment. These VISL Calculator runs provided estimates of the cumulative indoor air inhalation risk given a number of conservative default assumptions about the structures and the people occupying these structures. The risk estimates accounted for all measured air constituents in the:

(1) external soil gas and/or sub-slab soil gas (based on the available data); and
(2) indoor air when indoor air measurements were taken (regardless of source).

A total of 78 datasets were run through the USEPA VISL Calculator (i.e., 67 residential runs and 11 commercial runs). The outputs from these runs are included as Supplement 1) Residential runs were performed for the 26 residences for which there were data and the St. Jude's Parish Rectory, and commercial runs were performed for the St. Jude's Church, School and Parish Center locations. Most locations had more than one set of volatile constituent measurements (e.g., 2 sets of external soil gas measurements, 2 sets of indoor air measurements). Each dataset of TO-15 measurements was kept intact and run through the VISL Calculator as a set. The number of sets ranged from one (at a few residences and St. Jude's Church) to a maximum of seven (at St. Jude's School). For datasets with duplicate samples, the higher concentration of the duplicate and primary sample was selected as the input to the screening model as a conservative measure.

Three volatile constituents (i.e., 1,3,5-trimethylbenzene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene) were detected at some locations and listed in the VISL Calculator, but had no inhalation toxicity information included in the screening tool. Eleven additional chemicals (i.e.,

ethanol, n-heptane, 2,2,4-trimethylpentane, p-ethyltoluene, tert-butyl alcohol, alpha pinene, limonene, n-undecane, 1,3-dichlorobenzene, n-decane and Freon 114) were occasionally detected in the samples but were not listed in the VISL Calculator. For these reasons, these 14 chemicals are not reflected in the VISL Calculator runs and their potential contributions to the cumulative inhalation risk were not quantified. In addition, volatile constituents that were not detected or were tentatively identified (i.e., TICs) were not included in these screening runs.

The inhalation risk projections for all of the runs are summarized by address and modeling driver (i.e., soil gas or indoor air) in Table D-3RES for the residences and in Table D-3COM for the commercial structures (i.e., St. Jude's non-residential facilities). Sub-slab soil gas and external soil gas results are listed first, followed by the results driven by the indoor air measurements for that location. Moving left to right across Tables D-3RES and D-3COM, the projected vapor intrusion carcinogenic risk to human health is presented first, followed by a listing of the volatile constituents contributing the most to the cumulative risk, when applicable. The projected vapor intrusion non-cancer hazard is presented in the fifth column, followed by the listing of the volatile constituents contributing the most to the cumulative hazard, if applicable. The indoor air is presented in the same manner in the columns farther to the right.

The quantitative results of this screening assessment are presented In Tables D-3RES and D-3COM as follows:

- Projected cumulative vapor intrusion inhalation carcinogenic risks less than 1E-6 are not in bold font or highlighted in these tables. Projected vapor intrusion inhalation carcinogenic risks greater than 1E-6 but less than 1E-4 are indicated in bold font. Projected vapor intrusion inhalation carcinogenic risks greater than 1E-4 are indicated in bold font and highlighted in yellow.
- Projected vapor intrusion inhalation non-cancer hazards less than 1 are not in bold font or highlighted in these tables. Projected vapor intrusion non-cancer inhalation hazards greater than 1 but less than 10 are indicated in bold font. Projected vapor intrusion non-cancer hazards greater than 10 are indicated in bold font and highlighted in yellow.

All of the cumulative indoor air inhalation risks calculated from the indoor air measurements (i.e., 2 runs each at the 8 locations) exceeded the acceptable residential cancer risk threshold (all are bolded in Table D-3RES), and the non-cancer risk threshold also was exceeded at six of these eight locations. Volatile constituents contributing individually to the cumulative risks or hazards more than cancer 1.0E-6 and 1.0, respectively, were:

- benzene
- bromodichloromethane
- 1,3-butadiene
- carbon tetrachloride
- chloroform

- 1,2-dichloroethane
- 1,4-dichlorobenzene
- 1,4-dioxane
- ethylbenzene
- naphthalene
- 1,2,3-trimethylbenzene
- 1,2,4-trimethylbenzene
- trichloroethylene
- vinyl chloride

Many of these constituents are not associated with the TCE groundwater plume.

The cumulative inhalation risks associated with the migration of the external subsurface soil gas or sub-slab soil gas measurements at any location is considered to be a better indicator of the potential risks associated with subsurface sources such as the groundwater TCE plume than indoor air because of the many and varied potential indoor sources of volatiles contamination at these locations, as indicated by the many chemicals contributing to the risk exceedances. For the sub-slab and external soil gas runs, a total of 7 of the 27 residential locations had exceedances that were above the acceptable residential cancer risk threshold, and the non-cancer risk threshold was exceeded at only two locations. Only chloroform, naphthalene and trichloroethylene had contributions to the cumulative risk that exceeded the residential risk thresholds. Three of the locations tested (i.e., 171 Church Road, 175 Church Road and 194 Church Road) had exceedances of cumulative risk thresholds (i.e., risk=1E-6 and HI=1) in both the sub-slab/external soil gas and indoor air runs. Only two of these locations (i.e., 175 Church Road and 194 Church Road), had exceedances of the risk thresholds (risk=1E-6 and HI=1) due to the contributions from trichloroethylene. It is important to reiterate that both of these locations have subsequently (relative to the date of collection of the data used in this screening assessment) had vapor intrusion remediation systems installed and, thus, the potentially significant risk to the residents at these locations has been mitigated.

None of the cumulative risks calculated for the commercial structures at any of the sampling locations exceeded the acceptable residential cancer or non-cancer risk threshold (see Table D-3COM).

The VISL Calculator runs highlighted 8 residences with potential VI concerns based on the indoor air sampling results alone or the combination of the indoor air and sub-slab soil gas sampling results, but many of the identified highest contributors to these risks were petroleum-related compounds or compounds associated with the use of chlorinated municipal water or interior chemical product storage (as further detailed below). Only 3 residences were highlighted for potential vapor intrusion concerns based only on the sub-slab sampling results, but TCE was not associated with 2 of these residences and did not contribute to the projected cancer risk in excess

of 1E-6 or an HI=1 at the third. Only two residences (i.e., 175 Church Road and 194 Church Road) were highlighted for potential vapor intrusion concerns based on the VISL Calculator runs using both the indoor air and the sub-slab soil gas sampling results and indicated TCE as a risk driver. The VISL Calculator runs for 171 Church Road also were highlighted for potential vapor intrusion concerns based on runs using both the indoor air and the sub-slab soil gas sampling results, however the risk drivers at this location did not include TCE or its degradation products (the risk drivers were primarily the BTEX compounds and naphthalene). The VISL Calculator results did show that there may be ubiquitous indoor air inhalation concerns at the residences in the Affected Area that are not related to the TCE plume.

Screening Level Constituent-Specific Assessment by Location

The measured near-surface groundwater, soil gas and indoor air concentrations at each building location were compared to their constituent-specific VISL Target Groundwater Concentration, Target Sub-Slab and Exterior Soil Gas Concentration or Target Indoor Air Concentration dated June 2015 (USEPA, 2015), respectively. If neither the maximum detected groundwater or sub-slab vapor/soil gas concentration exceeded its respective risk-based target concentration, that constituent was screened out of the VI evaluation for that building/location as this would be evidence against there being a subsurface source of that volatile contaminant. If the maximum detected concentration of the constituent in either the shallow groundwater or the sub-slab vapor/soil gas samples exceeded its respective VISL risk-based target concentration for that medium, that constituent was retained for further evaluation at that location. Any constituents with basement (BASE) or indoor air (IA) measurements that exceeded the constituent's VISL Target Indoor Air Concentration (equivalent to the Residential Indoor Air RSL) also were not eliminated from the VI evaluation at that point. Table D-4 presents the results of Steps I and this part of Step II of this assessment on a location-by-location basis. Table D-4 also presents results of Step III of the assessment, as detailed below.

Taking the results of the first phase of Step II (running the existing VI data through the VISL Calculator) together with the second phase of the assessment (the Table D-4 comparisons to the target concentrations in the sampled media relative to vapor intrusion screening) revealed the following:

- The residences at 175 and 194 Church Road (Locations 11 and 16, respectively) showed evidence of a complete groundwater-to-indoor air TCE vapor intrusion pathway (based on the data collected <u>prior to</u> the installation of their VI mitigation systems) and the VISL projected indoor air inhalation risks that exceeded threshold levels.
- The residences at 224 and 242 Church Road (Locations 23 and 26, respectively) showed evidence of a potential groundwater-to-indoor air TCE vapor intrusion pathway. TCE was detected in the shallow groundwater at levels exceeding groundwater target concentrations, but was detected in the sub-slab soil gas at the

same location at levels not exceeding the target sub-slab or external soil gas concentrations. No indoor air sampling was conducted at these two residences. In the absence of indoor air sampling, it is unclear if the pathway is complete (i.e., detectable concentrations of COPCs in indoor air) and if complete, whether or not the risks / hazards exceed threshold values. While the non-exceedances of the target sub-slab or external soil gas concentrations would suggest that the vapor intrusion migration pathway does not present a significant risk at these locations, some level of uncertainty remains.

- The cumulative inhalation risk associated with the indoor air exceeded threshold risk levels at all of the residences where indoor air was sampled (including the residences at 175 and 194 Church Road that indicate a connection to the TCE plume). The indoor air at the residences other than 175 and 194 Church Road show clear indications of being impacted by constituents other than TCE and which would be associated with a variety of interior sources of volatiles release at these locations. Chloroform, naphthalene and other petroleum-related constituents were detected in the indoor air and in the sub-slab soil gas at various locations at levels that contribute significantly to the projected inhalation risks.

Step III: Assessment of the Potential Linkage of the Detected Volatile Constituents at the Affected Area to the Releases from the Former FWEC Facility

At this point in the evaluation, constituents were identified on a building-by-building basis that were "Sufficiently volatile and toxic by USEPA to pose an inhalation risk via vapor intrusion from a groundwater source", which were:

- Detected in either the shallow monitoring well/VI investigation groundwater samples or the sub-slab vapor/external soil gas samples at a concentration exceeding the conservative risk-based screening criteria for the medium; and
- Detected in the indoor air (BASE or IA) at a concentration exceeding the conservative risk-based screening criteria for residential indoor air.

Step III was an assessment of what the source or sources of the constituents that were detected in the indoor air was indicated to be, based on all available information about that location. The three primary sources of indoor air contaminants are:

1. Outdoor air;
2. Interior sources (e.g., stored chemicals and consumer products); and
3. VI from subsurface contamination.

A number of Lines of Evidence were examined to determine which source or sources may have generated the indoor air concentrations for a particular constituent at a particular building/location. Different Lines of Evidence suggest different potential sources:

Lines of Evidence suggesting source is Outdoor Air:

A. The measured outdoor air concentration of the constituent is similar to or higher than the measured indoor air concentration – The ventilation and mixing of outdoor air with the indoor air of a building is usually the most significant determinant of the indoor air concentration of a constituent when there are no large indoor sources. If the outdoor air concentration of a constituent is the same or higher than the indoor air concentration of that constituent, any potential contribution to the indoor air concentration from vapor intrusion would probably be indicated to be insignificant, if present at all.

Lines of Evidence suggesting source is Internal to the Building:

B. The building has a garage that is attached to the occupied space or is integral with the basement – Based on the Indoor Air Quality and Building Assessment/Inventory Questionnaires, many of the structures in the Affected Area have attached garages or integral garages located beneath the primary occupied space. This configuration allows volatile releases from motorized equipment, stored fuels, other stored automotive fluids, and solvents to more easily migrate into the basement and/or the first floor air.

C. Fuels, solvents and other chemicals are stored within the basement or attached garage – Based on the Indoor Air Quality and Building Assessment/Inventory Questionnaires completed, many of the structures in the Affected Area had paints, solvents, glues, oils, cleaners, and other chemicals stored in their basements where they could directly off-gas into the basement and first floor air.

D. The building is connected to the public water supply that disinfects its water with chlorine prior to distribution – Nearly all of the structures in the Affected Area are connected to the Crystal Lake Service Supply of Pennsylvania American Water Company (only one residence [Location 4 – 150 Church Road] is currently using groundwater with a point-of-use treatment system). The Crystal Lake Reservoir is the sole source of supply for this domestic water. The 2013 Annual Water Quality Report (PAW, 2013) indicates that this water source is considered most vulnerable to roadway run-off, well drilling, boating, run-off from golf courses and timbering, swamps, and salt storage. Chlorine is added to the drinking water supply as a disinfectant in the treatment process. The 2013 Annual Water Quality Report indicates that the concentration of chlorine in the water distribution system ranged between 0.8 and 1.2 milligrams per liter (mg/L) (800 – 1,200 ug/L) in 2013. In addition, the Report indicated that the concentration of Total Trihalomethanes in the water distribution system ranged between 14 and 17 ug/L in 2013. Trihalomethanes are a by-product of drinking water chlorination that result from the reaction of chlorine or bromine with the organic matter in the water being treated. Trihalomethanes include compounds such as bromodichloromethane, chloroform, and dibromochloromethane. Chloroform also is formed when chlorinated water reacts with organic substances such as urine, sweat, hair, and skin particles. As such, chloroform can off-gas during washing, doing laundry, or

bathing and can be discharged into the environment and shallow groundwater via septic systems. In addition, trihalomethanes can degrade in the environment and produce compounds such as bromomethane and chloromethane. Chlorine and the trihalomethanes are also released into the environment when chlorinated water is used for gardening and irrigation or is discharged to a private septic system.

E. The building has a septic system – As described above, the by-products of chlorinated water supply are directly released into the environment through discharges to a septic system and can quickly become part of the shallow groundwater. Similarly, household products may be disposed of down the drain and discharged to the septic system and shallow groundwater.

F. The building occupants engage in hobbies that make use of products with volatile constituents – Based on the Indoor Air Quality and Building Assessment/Inventory Questionnaires completed, some people who live or routinely access the Affected Area buildings have hobbies such as wood finishing and automotive maintenance that involve the storage of products containing some of the volatile compounds detected in the VI-related media at the site.

G. The building is occupied by individuals who smoke tobacco products indoors or burn coal or wood in fireplaces – A number of the constituents detected in the indoor air at the sampled locations are produced by the smoking of tobacco products. Other locations are noted to burn wood or coal in fireplaces, which also release certain of these constituents.

Lines of Evidence suggesting source is Vapor Intrusion from the Subsurface:

H. The measured sub-slab vapor concentration of the constituent at the structure was higher than the measured indoor air concentration – This is required if VI is a contributor to the indoor air concentrations of a constituent.

I. Constituent was detected in the shallow groundwater at or in near proximity to the building and was a COPC for the groundwater at the Former FWEC Facility – This condition suggests the possibility that the source of the subsurface contamination was a release of contamination from the Former FWEC Facility. However, the condition being true is not conclusive evidence that the Former FWEC Facility was the source.

J. The building has cracks in the basement floor or walls and/or has a sump or basement floor drain and the groundwater table is relatively close to the foundation or floor of the lowest occupied living space – This condition is an indication that there may be a preferential pathway for any subsurface contamination of volatile compounds to enter the living space if they were present in the shallow groundwater or soil gas.

Application and Results of the 3-Step VI Evaluation

Potential VI COPCs Remaining after Steps I and II

Table D-5 presents the list of constituents that were not eliminated via Steps I and II of the VI evaluation, as well as the locations of the buildings for which they were identified as a possible COPCs for VI. A total of 18 different constituents are listed for one or more locations within the Affected Area, partly due to the relatively broad set of reported analytes and the relatively low detection limits associated with the TO-15 air toxics analytical method. To add some perspective, the last two columns of Table D-5 show that few of these analytes that were detected in the indoor air of the Affected Area were generally considered to be contaminants of potential indoor air concern (COPIAC) relative to vapor intrusion from groundwater or soil by earlier state VI guidance (PADEP, 2002). A few of these potential COPCs are seen to be associated with multiple locations, widely distributed across the Affected Area. These constituents would be less likely to be associated with VI from a defined groundwater plume than other possible sources (e.g., outdoor air or interior sources).

Table D-6 shows the range of air sampling results for these same 18 constituents in the basement air, first floor indoor air, and outdoor air across the sampled locations and buildings in the Affected Area. Table D-6 shows the number of times each constituent was detected in the air for that sample location group in consideration of all of the locations and buildings (i.e., indicated by "# DET" – For example, bromodichloromethane was detected in 1 basement air sample, 1 first floor sample, and no outdoor air samples). Table D-5 also shows when a constituent that was detected in the air of one sample location group was not analyzed (NA) in the air sample for that same location or building from another location group (typically due to a lack of access allowed by the property owner) (indicated by "# NA" – For example, bromodichloromethane was not analyzed at one basement location where it was detected in either the first floor or outdoor air). The most frequently detected constituents were chloroform, benzene and naphthalene. None of these constituents has a strong or unique linkage to the release from the Former FWEC Facility.

Of the 18 constituents listed in Table D-6, five did not have typical indoor air concentrations published by USEPA (USEPA, 2011). Four of the remaining constituents had maximum basement air or first floor indoor air concentrations that were less than the 90th percentile typical indoor air concentration for that constituent from the USEPA database. These were: carbon tetrachloride; chloroform; 2-hexanone; and naphthalene. As such, it would be less likely that the presence of these constituents was due to a defined groundwater contamination plume than to other possible sources. The remaining nine constituents had maximum basement air or first floor indoor air concentrations that were greater than the 90th percentile typical indoor air concentration for that constituent from the USEPA database. These were: benzene; bromomethane; 1,3-butadiene; 1,2-dichloroethane; ethylbenzene; TCE; 1,2,4-trimethylbenzene; vinyl chloride; and m/p-xylenes. As such, it is somewhat more likely that the elevated concentrations of these constituents in the indoor air samples from the Affected Area may be due to VI.

The data summary of Table D-6 was examined to determine whether any of the detections of possible COPCs could be attributable to outdoor air contamination. The 69 combinations of building locations and potential COPCs were individually examined to determine which of four categories they fell into:

- **Category 1:** The measured IA concentration of the constituent was greater than the OA concentration at that location;
- **Category 2:** The measured OA concentration of the constituent was greater than the IA concentration at that location (i.e., Line of Evidence A above);
- **Category 3:** The IA and OA concentrations might not be distinguishable given that both reported concentrations were low and/or estimated or the estimated concentration of the constituent in one (i.e., IA or OA) was less than the reported non-detect concentration for the other; or
- **Category 4:** Sampling was not performed in the IA and OA at this location to allow a comparison to be made (typically because access was not granted by the property owners or the VI shallow groundwater sampling showed little evidence of a potential VI concern).

Upon review of the Table D-6 compilation, 30 of the 69 combinations had an IA concentration greater than an OA concentration for the constituent (Category #1 above). The presence of these constituents at these locations would not likely be due to outdoor air contamination.

Only 2 of the 69 location/constituent combinations had an OA concentration greater than an IA concentration for the constituent (Category #2 above). These combinations were:

- Location 12 – bromomethane
- Location 14 – bromomethane

Fourteen of the 69 location/potential COPC combinations had IA and OA concentrations that were too similar to discern (Category #3 above). These combinations were:

- Location 8 – 1,3-butadiene and chloroform
- Location 9 – bromodichloromethane, bromomethane and naphthalene
- Location 10 – 2-hexanone and chloroform
- Location 11 – 1,4-dioxane, carbon tetrachloride and naphthalene
- Location 13 – 1,2,4-trimethylbenzene, bromomethane and chloroform
- Location 16 – carbon tetrachloride

There were 22 cases associated with Category #4 above.

Given the relatively few instances of the presence of the constituent in the indoor air at a concentration of potential concern for inhalation exposure, the remainder of the Step III analysis

was aimed at determining if the presence of a constituent was more likely due to sources internal to the living space or due to VI. Table D-7 identifies some of the most common indoor residential sources of the volatile constituents highlighted by Table D-6. As can be seen, some constituents are fairly ubiquitous, while others are associated with a smaller number of product types or situations. Based on the listing in Table D-6, the information documented in the Indoor Air Quality and Building Assessment/Inventory Questionnaires was re-examined and a list of the most relevant questionnaire information to the assessment of whether the measured indoor air concentrations of the constituents may be due to interior sources was compiled. This compilation shows that:

- These locations/buildings are now connected to the public water supply;
- Approximately half of the buildings have a septic system;
- Most of the buildings were reported to have basement walls or floors with cracks or sumps that could facilitate VI;
- The majority of the structures have garages attached to the living space and/or garages on the basement level where a variety of chemicals and volatile-containing consumer products are stored;
- The occupants of only a few locations regularly use a dry cleaning service;
- Almost half of the locations are occupied or frequented by smokers; and
- A range of specific chemicals and consumer products, especially gasoline and other fuels and solvents, are stored at these locations.

Line of Evidence I above addressed the point that a constituent in the groundwater in the Affected Area was much more likely to be a COPC for VI associated with a release from the Former FWEC Facility if that constituent was otherwise identified as a COPC for other groundwater exposure pathways relative to the Former FWEC Facility property. The COPCs for the Former FWEC Facility property that were detected in the VI investigation or shallow monitoring well groundwater samples from the Affected Area were:

- 1,1,1-trichloroethane;
- 1,1,2-trichloroethane;
- 1,1-dichloroethane;
- 1,1-dichloroethene;
- 1,2,4-trichlorobenzene;
- 1,2-dichloroethane;
- 1,4-dioxane;
- 2-methylnaphthalene;
- acetone;
- benzene;
- chloroform;

- cis-1,2-dichloroethene;
- ethylbenzene;
- naphthalene;
- tetrachloroethene;
- TCE;
- vinyl chloride; and
- xylenes.

In consideration of this location-specific and constituent-specific information, each of the 69 combinations of building locations and potential VI COPCs was individually examined. Using a weight-of-evidence approach, a determination was made as to the likely source of the volatile contamination found in the indoor air at each location. Those constituents for which the lines-of-evidence indicated subsurface contamination as the source were identified as COPCs for that building/location for the VI inhalation exposure pathway. If there was reasonable uncertainty as to the source based on the weight-of-evidence, the constituent was conservatively retained as a COPC for the VI inhalation exposure pathway.

Results of the Step III of the VI Evaluation

The results of the 3-step VI evaluation are presented below by location. The discussions presented below are based on the information presented in Tables D-5 through D-7 and the Lines of Evidence A through J, as applicable, from Step III of the approach.

Location 3 – 146 Church Road

- **Acrolein** – The only constituent making it through Steps I and II of the VI evaluation process was acrolein. No sub-slab or indoor air samples were taken at this location due to access restrictions. Acrolein was not detected in the shallow monitoring well or VI investigation groundwater at this location and was only detected in the external soil gas sample at a low estimated concentration that was qualified by the Data Validator as a tentatively identified compound (TIC) based on a mass spectral identification. Acrolein was not a COPC for the Former FWEC Facility and was not detected in the groundwater there**.** Based on the combined weight of evidence, acrolein is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 3.**

Location 8 – 170 Church Road

- **1,2,4-Trimethylbenzene** – This constituent was not analyzed for in the shallow monitoring well or VI investigation groundwater samples. However, it also was not a COPC for the Former FWEC Facility. The concentration of 1,2,4-trimethylbenzene in the sub-slab

sample was lower than in the basement IA sample, which is evidence against a VI pathway. The first floor IA concentration was very similar to the measured OA concentration. The risk-based target sub-slab concentration relative to VI was not exceeded. The structure at this location had a garage and a storage area in the basement. The somewhat elevated concentration of this constituent in the basement IA suggests its presence there may be due to volatilization from materials being stored in the basement. Based on the collected data and the use or storage of products likely to contain this compound, 1,2,4-trimethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.

- **1,2-Dichloroethane** – This constituent was not detected in either the shallow groundwater monitoring well sample or the VI investigation groundwater sample. However, 1,2-dichloroethane was identified as a COPC for the Former FWEC Facility. The concentration of 1,2-dichloroethane in the sub-slab sample was a low estimated value that did not exceed the risk-based target sub-slab concentration relative to VI. The detected concentrations were so low in the samples from all media at this location that the typical gradient of concentrations along a vertical migration route was not present or could not be distinguished. 1,2-Dichloroethane is associated with a wide variety of fuels, solvents, paints, and adhesives. Based on the collected data and the use or storage of products likely to contain this compound, 1,2-dichloroethane is not considered to be a COPC relative to possible VI from the groundwater.
- **1,2-Dimethylbenzene (o-xylene)** – This constituent was not detected (individually as o-xylene) in the shallow groundwater monitoring well sample, was not analyzed individually in the VI investigation groundwater sample (only as part of total xylenes), and is not a COPC for the Former FWEC Facility. The concentration of 1,2-dimethylbenzene in the sub-slab sample was lower than in the basement IA, which is evidence against a VI pathway. The risk-based target sub-slab concentration relative to VI was not exceeded. The structure at this location had a garage and storage area in the basement. The somewhat elevated concentration of this constituent in the basement IA suggests its presence there may be due to volatilization from material being stored in the basement. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, 1,2-dimethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.
- **1,3-Butadiene** – This constituent was not analyzed in either the shallow monitoring well or the VI investigation groundwater samples. It also was not a COPC for the Former FWEC Facility. 1,3-Butadiene was not detected in the sub-slab sample and was reported as detected in the basement IA at an estimated concentration that was approximately one-half of the non-detect value reported for the sub-slab sample. The risk-based target sub-slab concentration relative to VI was not exceeded. The indicated concentration of 1,3-butadiene in the sub-slab sample, the basement IA, the first floor IA and the OA were too similar to confidently differentiate. The estimated concentration of 1,3-butadiene in the basement IA exceeded the risk-based target IA concentration relative to VI, but the

estimated concentration in the first floor IA did not. These sampling results do not suggest a VI pathway. Based on the combined weight of evidence, 1,3-butadiene is not considered to be a COPC relative to possible VI from the groundwater.

- **1,4-Dioxane** – This constituent was not analyzed for in the VI investigation groundwater sample, but was detected at a low estimated concentration in the shallow monitoring well sample from this location. 1,4-Dioxane was a COPC for the Former FWEC Facility. The concentration of 1,4-dioxane in the sub-slab vapor was an order of magnitude lower than its concentration in the basement IA, which is strong evidence against a VI pathway. The risk-based groundwater and sub-slab vapor target concentrations relative to VI were not exceeded. The concentrations of 1,4-dioxane in the basement IA and the first floor IA did exceed the risk-based target IA concentration relative to VI. Based on the collected data and these considerations, 1,4-dioxane is not considered to be a COPC relative to possible VI from the groundwater.
- **Benzene** – This constituent was not detected in the shallow monitoring well groundwater sample but was detected at a low estimated concentration in the VI investigation groundwater sample from this location. Benzene was a COPC for the Former FWEC Facility. The concentration of benzene in the sub-slab sample did not exceed the risk-based target sub-slab concentration relative to VI, and was lower than the concentration that was measured in the basement air, which is evidence against a VI pathway. The structure at this location had a garage and storage area in the basement. The somewhat elevated concentration of this constituent in the basement IA suggests its presence there may be due to volatilization from vehicles or gasoline being stored in the basement, which was documented in the "Indoor Air Quality and Building Assessment/Inventory Questionnaire" completed for this location (See Table D-7). Scented candles and air fresheners also may be a contributing source of the benzene that was detected in the IA at this location. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, benzene is not considered to be a COPC relative to possible VI from the groundwater.
- **Chloroform** – This constituent was detected at low estimated concentrations in the shallow monitoring well groundwater sample and the VI investigation groundwater sample from this location, but at concentrations that did not exceed the risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. Chloroform also was detected at a low estimated concentration in the sub-slab sample, which did not exceed the risk-based target sub-slab concentration relative to VI. Chloroform was not detected in the basement IA, but was reported at low estimated concentration in the first floor IA. The first floor IA concentration exceeded the risk-based target indoor air concentration. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of airborne chloroform such as these are typical of off-gassing of chloroform from the water into the air during water use. If the municipally-supplied water also is used for watering plants or lawns outdoors, the chloroform can penetrate the soil and get into the shallow

groundwater. The concentration of chloroform reported in the shallow groundwater and the sub-slab samples did not exceed the respective risk-based target concentrations relative to VI for those media. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

- **Ethylbenzene** – This constituent was not detected in either the shallow monitoring well or the VI investigation groundwater samples. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Ethylbenzene was a COPC for the Former FWEC Facility. The concentration of ethylbenzene in the sub-slab sample was lower than it was in the basement IA, which is evidence against a VI pathway. This sub-slab concentration did not exceed the risk-based target sub-slab concentration relative to VI, but the basement IA concentration did exceed the risk-based target IA concentration relative to VI. The structure at this location had a garage and storage area in the basement. The somewhat elevated concentration of this constituent in the basement IA suggests its presence there may be due to volatilization from vehicles or gasoline being stored in the basement. In addition, ethylbenzene is associated with certain paints and glues, and the burning of oil, gas or coal. The structure at this location also had a wood or coal fireplace that was used. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, ethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.
- **m/p-Xylenes** – This constituent was detected at a low estimated concentration in the shallow monitoring well groundwater sample, but was not detected in the VI investigation groundwater sample from this location. This concentration did not exceed the risk-based target groundwater concentration relative to VI. Total xylenes was a COPC for the Former FWEC Facility. The concentration of m/p-xylenes in the sub-slab sample was lower than it was in the basement air, which is evidence against a VI pathway. This sub-slab xylenes concentration did not exceed the risk-based target sub-slab concentration relative to VI. The structure at this location had a garage and storage area in the basement. The somewhat elevated concentration of this constituent in the basement IA suggests its presence there may be due to automobile exhaust or volatilization for stored gasoline. Xylene also is associated with solvents, paints, and other consumer products that were documented to be at this location. The concentration of m/p-xylenes in the basement IA exceeded the risk-based target indoor air concentration relative to VI, but the concentration measured in the first floor IA did not. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products and other products likely to contain this compound, m/p-xylenes are not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 8.**

Location 9 – 171 Church Road

- **1,2,4-Trimethylbenzene** – This constituent was not analyzed in either the shallow monitoring well or VI investigation groundwater samples. 1,2,4-Trimethylbenzene was not a COPC for the Former FWEC Facility. The measured sub-slab concentration did not exceed its risk-based target sub-slab concentration. The concentration of 1,2,4-trimethylbenzene in the sub-slab sample was lower than the concentration measured in the basement IA sample, which is evidence against a VI pathway. The first floor IA concentration was higher than the measured OA concentration. The basement and first floor IA concentrations both exceeded the risk-based target IA concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement. The somewhat elevated concentration of this constituent in the basement IA and first floor IA suggests its presence there may be due to volatilization from material being stored in these areas. Based on the collected data and the use or storage of products likely to contain this compound, 1,2,4-trimethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.

- **Benzene** – This constituent was not detected in the shallow monitoring well groundwater sample, but was detected at a low estimated concentration in the VI investigation groundwater sample. The detected groundwater concentration of benzene did not exceed its risk-based target groundwater concentration. Benzene was a COPC for the Former FWEC Facility. The concentration of benzene in the sub-slab sample was approximately the same as it was in the basement IA and first floor IA, which is evidence against a VI pathway. The measured sub-slab concentration did not exceed its risk-based target sub-slab concentration. The basement and first floor IA concentrations both exceeded the risk-based target IA concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of fuels and solvents were kept. The similar benzene concentrations that were measured in the basement IA and first floor IA may be due to volatilization from vehicles or gasoline being stored in the garage and basement. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, benzene is not considered to be a COPC relative to possible VI from the groundwater.

- **Bromodichloromethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Bromodichloromethane was not detected in the sub-slab sample, but was detected at similar low estimated concentrations in the basement IA and in the first floor IA. The basement and first floor IA estimated concentrations both exceeded the risk-based target IA concentration relative to VI. The concentrations of bromodichloromethane measured in the sub-slab sample, the basement IA, the first floor IA, and the OA were all too similar to confidently differentiate. These sampling results do not suggest a VI pathway. The building at this location is connected to the public water

system, which chlorinates its supply water. As was noted above, low concentrations of bromodichloromethane in IA are typical of the off-gassing of bromodichloromethane into the air during water use. Based on these factors and considerations, bromodichloromethane is not considered to be a COPC relative to possible VI from the groundwater.

- **Bromomethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Bromomethane was detected in the sub-slab sample at a concentration that did not exceed its risk-based target sub-slab concentration. The basement concentration did not exceed the risk-based target IA concentration relative to VI, but the first floor IA concentrations did. Bromomethane was detected at essentially the same low (often estimated) concentration in the sub-slab sample, the basement IA and first floor IA, which is not indicative of a VI pathway. As noted above, the building at this location is connected to the municipal water system which chlorinates its supply water to disinfect it. Low concentrations of bromomethane in IA are typically the result of off-gassing during water use. The concentration of bromomethane in the basement IA did not exceed its risk-based target indoor air concentration relative to VI, but the concentration measured in the first floor IA did. Based on these factors and considerations, bromomethane is not considered to be a COPC relative to possible VI from the groundwater.
- **Chloroform** – This constituent was detected at low estimated concentrations in both the shallow monitoring well groundwater and VI investigation groundwater samples. The measured concentrations for both groundwater samples were below the risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. Chloroform was detected in the sub-slab sample at a concentration that exceeded its risk-based target sub-slab concentration relative to VI. Chloroform was detected at essentially the same low concentration in the sub-slab sample, the basement IA and the first floor IA, which is not indicative of a VI pathway. The basement and first floor IA concentrations both exceeded the risk-based target IA concentration relative to VI. As noted above, the building at this location is connected to the municipal water system which chlorinates its supply water to disinfect it. Low concentrations of chloroform such as these are typical of off-gassing during water use. If the municipally-supplied water also is used for watering plants or lawns outdoors, the chloroform can penetrate the soil and get into the shallow groundwater. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.
- **Ethylbenzene** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Ethylbenzene was a COPC for the Former FWEC Facility. The concentration of ethylbenzene in the sub-slab sample did not exceed its risk-based target sub-slab concentration relative to VI and was lower than the concentration that was

measured in the basement IA, which is evidence against a VI pathway. The concentrations of ethylbenzene in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of fuels and solvents were kept. The similar concentrations of ethylbenzene measured in the basement IA and first floor IA may be due to volatilization from vehicles or gasoline or paints being stored in the garage and basement. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, ethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.

- **m/p-Xylenes** – This constituent was detected at a low estimated concentration in the shallow monitoring well groundwater sample, but not in the VI investigation groundwater sample from this location. The detected concentration and the reporting limit for the VI investigation groundwater sample were both below the risk-based target groundwater concentration relative to VI. Total xylenes were a COPC for the Former FWEC Facility. The concentration of xylenes measured in the sub-slab sample did not exceed the risk-based target sub-slab concentration relative to VI, and it was lower than the concentration measured in the basement IA, which is evidence against a VI pathway. The risk-based target sub-slab concentration was not exceeded. The concentrations of xylenes in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of fuels and solvents were kept. The somewhat elevated concentration of this constituent in the basement IA and first floor IA suggests its presence there may be due to volatilization from vehicles or gasoline being stored in the basement. Xylene is also associated with solvents, paints, and other consumer products reportedly used at this location. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products and other products likely to contain this compound, m/p-xylenes are not considered to be a COPC relative to possible VI from the groundwater.
- **Naphthalene** – This constituent was not analyzed in either the shallow monitoring well sample or the VI investigation groundwater sample. Naphthalene was a COPC for the Former FWEC Facility. The measured concentration of naphthalene in the sub-slab sample exceeded its risk-based target sub-slab concentration relative to VI. Naphthalene was detected at essentially the same low (often estimated) concentration in the sub-slab sample, the basement IA and first floor IA, which is not indicative of a VI pathway. The estimated concentrations of naphthalene in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of fuels and solvents are kept. The somewhat elevated concentration of this constituent in the basement IA and first floor IA suggests its presence there may be due to automotive exhaust, insecticides, or volatilization from vehicles or gasoline being stored. Based on

the collected data and the use or storage of petroleum hydrocarbon-containing products, naphthalene is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 9.**

Location 10 – 174 Church Road

- **1,2-Dichloroethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. 1,2,-Dichloroethane was a COPC for the Former FWEC Facility. The measured concentration of 1,2-dichloroethane in the sub-slab sample was a low estimated value that did not exceed the risk-based target sub-slab concentration. The detected concentrations were so low in the samples from all media at this location that the typical gradient of concentrations along a vertical migration route was not present or could not be distinguished. Both the basement and first floor IA concentrations exceeded the risk-based target IA concentration relative to VI for this constituent. 1,2-Dichloroethane is associated with a wide variety of fuels, solvents, paints, and adhesives. Based on the collected data, 1,2-dichloroethane is not considered to be a COPC relative to possible VI from the groundwater.

- **1,3-Butadiene** – This constituent was not analyzed for in either the shallow monitoring well sample or the VI investigation groundwater sample; however, it also was not identified as a COPC for the Former FWEC Facility. 1,3-Butadiene was detected in the sub-slab vapor sample at a low estimated concentration that did not exceed the risk-based target sub-slab concentration relative to VI. 1,3-Butadiene also was detected in the basement IA at a low estimated concentration. The concentration of 1,3-butadiene in the sub-slab sample was lower than in the basement IA, which is evidence against a VI pathway. The concentrations of 1,3-butadiene in the sub-slab vapor, basement IA, first floor IA, and OA were very similar. Again, these results do not suggest a VI pathway. Both the estimated basement IA and first floor IA concentrations exceeded the risk-based target IA concentration relative to VI for this constituent. A heavy smoker was reported to reside at this location which could be a significant interior source of 1,3-butadiene. Based on the collected data and these factors, 1,3-butadiene is not considered to be a COPC relative to possible VI from the groundwater.

- **1,4-Dioxane** – This constituent was detected at a low estimated concentration in the shallow groundwater monitoring well sample but was not analyzed for in the VI investigation groundwater sample. 1,4-Dioxane was identified as a COPC for the Former FWEC Facility. 1,4-Dioxane was not detected in either the sub-slab vapor or the basement IA. 1,4-Dioxane was detected in the first floor IA at a concentration that exceeded its risk-based target IA concentration relative to VI. Based on the collected data and these

considerations, 1,4-dioxane is not considered to be a COPC relative to possible VI from the groundwater.

- **2-Hexanone** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. 2-Hexanone was not a COPC for the Former FWEC Facility. 2-Hexanone was detected in the sub-slab vapor and first floor IA at low estimated concentrations, but was not detected in the sub-slab sample. The concentrations of 2-hexanone in the samples from all media were lower than their respective risk-based target concentrations relative to VI for those media. Both of these findings are evidence against a VI pathway. The detected concentrations and non-detect limits for 2-hexanone in the sub-slab vapor, the basement IA, the first floor IA, and the OA were very similar, which also does not suggest a VI pathway. 2-Hexanone is associated with paints and thinners like those that were noted on the pre-sampling Questionnaire for this structure. Based on these results, 2-hexanone is not considered to be a COPC relative to possible VI from the groundwater.
- **Benzene** – This constituent was not detected in the shallow groundwater monitoring well sample, but was detected at a low estimated concentration in the VI investigation groundwater sample. The detected concentration in the VI investigation sample and the reporting limit for the shallow groundwater monitoring well sample were both below the risk-based target groundwater concentration relative to VI. Benzene was, however, a COPC for the Former FWEC Facility. The concentration of benzene measured in the sub-slab sample did not exceed its risk-based target sub-slab concentration relative to VI. The concentration of benzene in the sub-slab vapor was lower but approximately the same magnitude as the concentrations measured in the basement IA and first floor IA, which is evidence against a VI pathway. The concentrations of benzene in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement. The elevated concentrations of this constituent in the basement IA and first floor IA suggest its presence there may be due to automobile exhaust or volatilization from gasoline being stored in these locations, which was documented in the Questionnaire. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, benzene is not considered to be a COPC relative to possible VI from the groundwater.
- **Chloroform** – This constituent was detected at low estimated concentrations in both the shallow monitoring well groundwater and VI investigation groundwater samples. The measured concentrations for both groundwater samples were below the risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. Chloroform also was detected in the sub-slab sample at an estimated concentration that did not exceed its risk-based target sub-slab concentration relative to VI. Chloroform was detected at essentially the same low concentration in the sub-slab vapor,

basement IA and first floor IA, which is not indicative of a VI pathway. The estimated concentration of chloroform measured in both the basement IA and the first floor IA both exceeded its risk-based target IA concentration. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform in the air in the indoor spaces where chlorinated water is used are typically the result of off-gassing of chloroform into the air during water use. If the municipally-supplied water also is used for watering plants or lawns outdoors, the chloroform can penetrate the soil and get into the shallow groundwater. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

- **Ethylbenzene** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Ethylbenzene was a COPC for the Former FWEC Facility. Ethylbenzene was detected in the sub-slab sample at a concentration that did not exceed its risk-based target sub-slab concentration. The concentration of ethylbenzene in the sub-slab sample was lower than the concentration that was measured in the basement IA, which is evidence against a VI pathway. The concentration of ethylbenzene in the basement IA did exceed its risk-based target indoor air concentration relative to VI, but the concentration measured in the first floor IA did not. The structure at this location had a garage attached to the first floor and a storage area in the basement. The elevated concentrations of this constituent in the basement IA and first floor IA suggest its presence there may be due to automobile exhaust or volatilization from gasoline being stored in these locations, which was documented in the Questionnaire. In addition, ethylbenzene is associated with certain paints and glues. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, ethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 10.**

Location 11 – 175 Church Road

- **1,2,4-Trimethylbenzene** – This constituent was not analyzed for in the shallow monitoring well or VI investigation groundwater samples. It also was not a COPC for the Former FWEC Facility. The concentration of 1,2,4-trimethylbenzene in the sub-slab was lower than in the basement IA, which is evidence against a VI pathway. The risk-based target sub-slab concentration was not exceeded. The concentrations of 1,2,4-trimethylbenzene in the sub-slab sample, basement IA, first floor IA, and OA were too similar to confidently differentiate. The measured concentrations in both the basement IA and the first floor IA exceeded the risk-based target IA concentration relative to VI for this constituent. The structure at this location was reported to have stored paints, oils and lubricants in the basement, which may account for the presence of 1,2,4-trimethylbenzene in the IA at low

concentrations. Based on the collected data and the use or storage of products likely to contain this compound, 1,2,4-trimethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.

- **1,2-Dichloroethane** – This constituent was not detected in either the shallow monitoring well or the VI investigation groundwater samples. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. 1,2-Dichloroethane was a COPC for the Former FWEC Facility. The measured concentration of 1,2-dichloroethane in the sub-slab sample was a low estimated value that did not exceed the risk-based target sub-slab concentration. The concentration of 1,2-dichloroethane in the sub-slab vapor also was lower than it was in the basement IA, which is evidence against a VI pathway. The measured concentrations in both the basement IA and the first floor IA exceeded the risk-based target IA concentration relative to VI for this constituent. Based on the collected data and the use or storage of products likely to contain this compound, 1,2-dichloroethane is not considered to be a COPC relative to possible VI from the groundwater.
- **1,4-Dioxane** – This constituent was not analyzed in the VI investigation groundwater sample but was detected at a low estimated concentration in the shallow groundwater monitoring well sample that did not exceed its risk-based target groundwater concentration relative to VI. 1,4-Dioxane was identified as a COPC for the Former FWEC Facility. 1,4-Dioxane was detected at a low concentration in the sub-slab vapor that did not exceed its risk-based target sub-slab concentration relative to VI, and was not detected in the basement IA. The detected vapor/air concentrations and air detection limits were all similar. Based on the collected data and these considerations, 1,4-dioxane is not considered to be a COPC relative to possible VI from the groundwater.
- **Benzene** – This constituent was not detected in the shallow groundwater monitoring well sample but was detected at a low estimated concentration in the VI investigation groundwater sample. The detected groundwater concentration of benzene did not exceed its risk-based target groundwater concentration. Benzene was a COPC for the Former FWEC Facility. The concentration of benzene in the sub-slab vapor did not exceed its risk-based target sub-slab concentration relative to VI, and it was approximately the same order of magnitude as the concentration that was measured in the basement IA and first floor IA, which is not indicative of a VI pathway. The concentrations of benzene in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had some storage of paints, oils and lubricants in the basement that may account for the presence of benzene in the IA at low concentrations. The structure at this location did not have an attached garage. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, benzene is not considered to be a COPC relative to possible VI from the groundwater.
- **Carbon Tetrachloride** – This constituent was detected at low estimated concentrations in both the shallow groundwater monitoring well sample and the VI investigation

groundwater sample. The concentrations of carbon tetrachloride detected in the shallow groundwater did exceed its risk-based target groundwater concentration relative to VI. However, carbon tetrachloride was not a COPC for the Former FWEC Facility. The estimated concentration of carbon tetrachloride in the sub-slab was slightly lower than in the basement IA, which is evidence against a VI pathway. The risk-based target sub-slab concentration relative to VI was not exceeded. The concentrations of carbon tetrachloride in the sub-slab vapor, the basement IA, the first floor IA, and the OA were approximately the same. The estimated concentrations of carbon tetrachloride in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had storage of aerosol products and paints, oils and lubricants in the basement that may account for the presence of carbon tetrachloride in the IA at low concentrations. However, the low IA concentrations also are approximately the same magnitude as was measured in the OA. Based on the collected data and the use or storage of products likely to contain this compound, carbon tetrachloride is not considered to be a COPC relative to possible VI from the groundwater.

- **Chloroform** – This constituent was detected at low estimated concentrations in both the shallow groundwater monitoring well sample and the VI investigation groundwater sample. The concentrations of chloroform detected in the shallow groundwater did not exceed its risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. This constituent was detected at a concentration in the sub-slab vapor that did exceed its risk-based target sub-slab concentration relative to VI. Chloroform was detected at approximately the same low concentration in the basement IA and first floor IA, which is typically not indicative of a VI pathway. The estimated concentrations of chloroform in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform in the air in the indoor spaces where chlorinated water is used are typically the result of off-gassing of chloroform into the air during water use. If the municipally-supplied water also is used for watering plants or lawns outdoors, the chloroform can penetrate the soil and get into the shallow groundwater. The measured sub-slab vapor concentration appears to be inconsistent with the low shallow groundwater and indoor air concentrations. However, the structure at this location had a pool that was probably filled with publically-supplied water that initially contained chlorine at concentrations between 800 and 1,200 ug/L. It is also likely that chlorine was added to the pool water for hygiene purposes. Spills and leaks from the pool into the ground are likely to explain the uncharacteristically high sub-slab vapor concentration. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.
- **Naphthalene** – This constituent was not analyzed for in either the shallow groundwater monitoring well sample or the VI investigation groundwater sample. Naphthalene was a

COPC for the Former FWEC Facility. Naphthalene was detected at an estimated concentration in the sub-slab vapor that exceeded its risk-based target sub-slab concentration relative to VI. Naphthalene was detected at essentially the same estimated low concentration in the sub-slab vapor, the basement IA and the first floor IA, which is not indicative of a VI pathway. The estimated concentrations of naphthalene in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had storage of resins, oils and cleaners in the basement, which may account for the presence of naphthalene in the IA at low concentrations. However, the low IA concentrations are approximately the same as one-half of the non-detect level of the OA. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products and other products likely to contain this compound, naphthalene is not considered to be a COPC relative to possible VI from the groundwater**.**

- **Trichloroethene** – This constituent was detected in the shallow groundwater monitoring well sample and was detected at a low estimated concentration in the VI investigation groundwater sample. The concentrations of TCE detected in the shallow groundwater exceeded its risk-based target groundwater concentrations relative to VI, but the concentration in the VI investigation groundwater sample did not exceed the target concentration relative to VI. TCE was a COPC for the Former FWEC Facility. The concentration of TCE in the sub-slab was two orders of magnitude higher than it was in the first floor IA, which is evidence for a VI pathway. The concentration of TCE detected in the sub-slab sample exceeded the risk-based target sub-slab concentration relative to VI. The concentrations of TCE in the basement IA exceeded its risk-based target indoor air concentration relative to VI, but the first floor IA did not. The structure at this location had a garage attached to the first floor where a variety of fuels, cleaners and solvents were kept, as well as a storage area in the basement. Based on the collected data and the combined weight of evidence, TCE is considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, only TCE was identified as a COPC relative to possible VI from the groundwater for Location 11.**

Location 12 – 178 Church Road

- **Bromomethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Bromomethane was not a COPC for the Former FWEC Facility. This constituent was detected in the sub-slab sample at a low concentration that did not exceed the risk-based target sub-slab concentration relative to VI. Bromomethane was detected at approximately the same low concentration in the sub-slab vapor, first floor IA, and the OA, with the OA concentration greater than the IA, which is not indicative of a VI pathway. Bromomethane was not analyzed for in the basement IA. The detected concentration of

bromomethane in the first floor IA exceeded its risk-based target IA concentration relative to VI. This may be one of the few cases where the source of the constituent was the OA. The building at this location is connected to the municipal water system which chlorinates its supply water to disinfect it. Low concentrations of bromomethane in IA are typically the result of off-gassing during water use. Based on these factors and considerations, bromomethane is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 12.**

Location 13 – 179 Church Road

- **1,2,4-Trimethylbenzene** – This constituent was not analyzed in either the shallow monitoring well sample or the VI investigation groundwater sample, and it was not a COPC for the Former FWEC Facility. The low estimated concentration of 1,2,4-trimethylbenzene detected in the sub-slab sample did not exceed its risk-based target sub-slab concentration relative to VI. This estimated sub-slab concentration was essentially the same as was measured in the basement IA, which is evidence against a VI pathway. The concentrations of 1,2,4-trimethylbenzene in the sub-slab sample, the basement IA, the first floor IA, and the OA were very similar. The estimated concentration of 1,2,4-trimethylbenzene in the basement IA did not exceed its risk-based target indoor air concentration relative to VI, but the estimated concentration in the first floor IA sample did. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of fuels, cleaners and solvents were kept. The low concentrations of this constituent in the IA may be due in part to volatilization from materials being stored in the basement which were documented in the Questionnaire. Based on the collected data and the use or storage of products likely to contain this compound, 1,2,4-trimethylbenzene is not considered to be a COPC relative to possible VI from the groundwater.

- **1,2-Dichloroethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. This constituent was a COPC for the Former FWEC Facility. The concentration of 1,2-dichloroethane in the sub-slab was a low estimated value that did not exceed the risk-based target sub-slab concentration relative to VI. The concentration of 1,2-dichloroethane in the sub-slab vapor also was lower than the concentration that was detected in the basement IA, which is evidence against a VI pathway. The concentrations of 1,2-dichloroethane in the basement IA and the first floor IA both exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of degreasers, cleaners and adhesives were kept. The low concentrations of this constituent in the IA may be due in part to volatilization from materials being stored in these areas. Based on the collected data and the use or storage of products likely to contain this compound, 1,2-

dichloroethane is not considered to be a COPC relative to possible VI from the groundwater.

- **1,3-Butadiene** – This constituent was not analyzed for in either the shallow monitoring well sample or the VI investigation groundwater sample, and it was not a COPC for the Former FWEC Facility. 1,3-Butadiene was not detected in the sub-slab vapor but was detected in the basement IA at a low estimated concentration. This estimated concentration and the detection limits for 1,3-butadiene in the sub-slab vapor and in the basement IA are very similar, which is evidence against a VI pathway. The risk-based target indoor air concentration relative to VI was exceeded for both the basement IA and the first floor IA. It was reported that a heavy smoker resides at this location, which could account for some portion of the 1,3-butadiene detected in the IA. Based on the collected data and these factors, 1,3-butadiene is not considered to be a COPC relative to possible VI from the groundwater.
- **Acetonitrile** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Acetonitrile was a COPC for the Former FWEC Facility. Acetonitrile was also not detected in either the sub-slab sample or the basement IA, but it was detected in the first floor IA at a concentration that exceeded its risk-based target indoor air concentration. The concentration of acetonitrile in the first floor IA was higher than in the OA, suggesting a possible indoor source. Acetonitrile is associated with artificial finger nail removers and liquid glue removers. Based on the collected data and these considerations, acetonitrile is not considered to be a COPC relative to possible VI from the groundwater.
- **Benzene** – This constituent was not detected in the shallow groundwater monitoring well sample, but was detected at a low estimated concentration in the VI investigation groundwater sample. The detected concentration of benzene detected in the VI investigation groundwater sample did not exceed its risk-based target concentration relative to VI. Benzene was a COPC for the Former FWEC Facility. The concentration of benzene in the sub-slab vapor was approximately the same magnitude as was in the basement IA, which is evidence against a VI pathway. The concentration of benzene detected in the sub-slab sample did not exceed its risk-based target sub-slab concentration relative to VI. The concentration of benzene in the first floor IA exceeded its risk-based target indoor air concentration relative to VI. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of fuels, cleaners and solvents were kept. The low concentrations of this constituent detected in the IA may be due in part to automotive exhaust and volatilization from fuels being stored in these locations. Benzene also is associated with air fresheners and scented candles, which were reported to be used at this location. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products and other products likely to contain this

compound, benzene is not considered to be a COPC relative to possible VI from the groundwater.

- **Bromomethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Bromomethane was detected at essentially the same low concentration in the sub-slab sample, the first floor IA and the OA, which is not indicative of a VI pathway. The estimated concentrations of bromomethane measured in both the basement IA and the first floor IA did exceed its risk-based target indoor air concentration relative to VI. The building at this location is connected to the municipal water system which chlorinates its supply water to disinfect it. Low concentrations of bromomethane in IA are typically the result of off-gassing during water use. Bromomethane also can be associated with automotive exhaust. Based on these factors and considerations, bromomethane is not considered to be a COPC relative to possible VI from the groundwater.
- **Chloroform** – This constituent was detected at low estimated concentrations in both the shallow monitoring well groundwater and VI investigation groundwater samples. The estimated concentrations for both groundwater samples were below the risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. Chloroform was detected at essentially the same low concentration in the sub-slab sample, the basement IA and the first floor IA, which is not indicative of a VI pathway. The estimated concentrations of chloroform in both the basement IA and first floor IA exceeded its risk-based target IA concentration relative to VI. The building at this location is connected to the municipal water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform such as these are typical of off-gassing during water use. If the municipally-supplied water also is used for watering plants or lawns outdoors, the chloroform can penetrate the soil and get into the shallow groundwater. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.
- **Vinyl Chloride** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. Vinyl chloride was a COPC for the Former FWEC Facility. The low estimated concentration of vinyl chloride in the sub-slab sample was an order of magnitude lower than the concentration measured in the basement IA, which is evidence against a VI pathway. The risk-based target sub-slab concentration relative to VI was not exceeded. The concentration of vinyl chloride in the basement IA did exceed its risk-based target indoor air concentration relative to VI, but the concentration measured in the first floor IA did not. A heavy smoker was reported to reside at this location, which could account for a portion of the detected vinyl chloride. The structure at this location had a garage attached to the first floor and a storage area in the basement where a variety of materials were kept.

The low concentrations of this constituent detected in the IA may be due in part to volatilization from these materials. Based on the collected data and these factors and considerations, vinyl chloride is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 13.**

Location 14 – 181 Church Road

- **1,2-Dichloroethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. 1,2-Dichloroethane was a COPC for the Former FWEC Facility. The concentration of 1,2-dichloroethane in the sub-slab vapor was a low estimated value that did not exceed the risk-based target sub-slab concentration relative to VI. The estimated concentration of 1,2-dichloroethane in the sub-slab vapor was seen to be only slightly higher than it was in the basement IA, which is not indicative of a VI pathway. The concentration of 1,2-dichloroethane in the basement IA did exceed its risk-based target indoor air concentration relative to VI, but the concentration measured in the first floor IA did not. Based on the collected data, 1,2-dichloroethane is not considered to be a COPC relative to possible VI from the groundwater.

- **1,4-Dioxane** – This constituent was not analyzed in the VI investigation groundwater sample but was detected at a low estimated concentration in the shallow groundwater monitoring well sample at a concentration that did not exceed its risk-based target groundwater concentration relative to VI. 1,4-Dioxane was a COPC for the Former FWEC Facility. 1,4-Dioxane was detected at a low concentration in the basement IA but was not detected in the sub-slab vapor. The detected vapor/air concentrations and air detection limits were approximately the same. The detected concentration of 1,4-dioxane in the basement IA exceeded its risk-based target IA concentration relative to VI, but the concentration in the first floor IA sampled did not. Based on the collected data and these considerations, 1,4-dioxane is not considered to be a COPC relative to possible VI from the groundwater.

- **Bromomethane** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. This constituent was detected in the sub-slab vapor at a low estimated concentration that did not exceed its risk-based target sub-slab concentration relative to VI. Bromomethane was detected at essentially the same low concentration in the sub-slab sample, the first floor IA and the OA, which is not indicative of a VI pathway. The OA concentration was greater than the IA concentration, and once again, this may be a case where the source of the constituent was the OA. The estimated concentration of

bromomethane in the basement IA did not exceed its risk-based target concentration relative to VI, but the sample from the first floor IA did. The building at this location is connected to the municipal water system, which chlorinates its supply water to disinfect it. Low concentrations of bromomethane in IA are typically the result of off-gassing during water use. The concentration of bromomethane in the basement IA did not exceed its risk-based target indoor air concentration relative to VI, but the concentration measured in the first floor IA did. Based on these factors and considerations, bromomethane is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 14.**

Location 16 – 194 Church Road

- **1,4-Dioxane** – This constituent was not analyzed for in the VI investigation groundwater sample but was detected at a low estimated concentration in the shallow groundwater monitoring well sample that did not exceed its risk-based target groundwater concentration relative to VI. 1,4-Dioxane was a COPC for the Former FWEC Facility. 1,4-Dioxane was detected at a low estimated concentration in the sub-slab vapor that did not exceed its risk-based target sub-slab concentration relative to VI. 1,4-Dioxane was not analyzed for in the basement IA sample. The detected vapor/air concentrations and air detection limits were all approximately the same. The measured concentration of 1,4-dioxane in the first floor IA did exceed its risk-based target IA concentration relative to VI. Based on the collected data and these considerations, 1,4-dioxane is not considered to be a COPC relative to possible VI from the groundwater.

- **Benzene** – This constituent was not detected in the shallow groundwater monitoring well sample but was detected at a low estimated concentration in the VI investigation groundwater sample. The detected concentration of benzene in the VI Investigation groundwater sample did not exceed its risk-based target groundwater concentration relative to VI. Benzene was a COPC for the Former FWEC Facility. The detected concentration of benzene in the sub-slab sample did not exceed its risk-based target sub-slab concentration relative to VI and was only slightly higher than the concentration detected in the first floor IA. Both of these findings are evidence against a VI pathway. The concentration of benzene in the first floor IA did exceed its risk-based target IA concentration relative to VI. The structure at this location had a garage attached to the first floor. The low concentrations of this constituent detected in the IA may be due in part to automotive exhaust or volatilization from fuel being stored in the garage or basement. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, benzene is not considered to be a COPC relative to possible VI from the groundwater.

- **Carbon Tetrachloride** – This constituent was not detected in the shallow groundwater monitoring well sample but was detected at a low estimated concentration in the VI

investigation groundwater sample. This detected concentration did not exceed the risk-based target groundwater concentration relative to VI. Carbon tetrachloride was not a COPC for the Former FWEC Facility. The estimated concentration of carbon tetrachloride detected in the sub-slab sample did not exceed its risk-based target sub-slab concentration relative to VI. This estimated sub-slab concentration was only minimally higher than the estimated concentration that was measured on the first floor IA, which is evidence against a VI pathway. The concentrations of carbon tetrachloride in the sub-slab sample, the first floor IA and the OA were approximately the same magnitude. The concentration of carbon tetrachloride in the first floor IA did exceed its risk-based target IA concentration. The structure at this location had a garage attached to the first floor and storage in the basement where a variety of cleaners and solvents were kept. The low concentrations of this constituent detected in the IA may be due in part to volatilization from materials being stored in these locations. In addition, the low IA concentrations are approximately equivalent to what was measured in the OA. Based on the collected data and the use or storage of products likely to contain this compound, carbon tetrachloride is not considered to be a COPC relative to possible VI from the groundwater.

- **Trichloroethene** – This constituent was not detected in the shallow groundwater monitoring well sample but was detected at a low estimated concentration in the VI investigation groundwater sample. This estimated concentration did exceed the risk-based target groundwater concentration relative to VI. TCE was a COPC for the Former FWEC Facility. The concentration of TCE detected in the sub-slab sample was two orders of magnitude higher than the concentration that was in the first floor IA, which is evidence for a VI pathway. The concentrations of TCE detected in the sub-slab vapor did exceed its risk-based target sub-slab concentrations relative to VI. The concentration of TCE in the first floor IA also exceeded its risk-based target IA concentration. The structure at this location had a garage attached to the first floor where a variety of fuels, cleaners and solvents were kept and a storage area in the basement. Based on the combined weight of evidence, TCE is considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, only TCE was identified as a COPC relative to possible VI from the groundwater for Location 16.**

Location 19 – 205 Church Road

- **1,2-Dichloroethane** – This constituent was not detected in either the shallow groundwater monitoring well sample or the VI investigation groundwater sample. The reporting limits for both groundwater non-detects were below the risk-based target groundwater concentration relative to VI. This constituent was a COPC for the Former FWEC Facility. The concentration of 1,2-dichloroethane in the external soil gas did not exceed its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. The structure at this location had storage of hobby chemicals, paints, and solvents in the basement that may account for the presence of 1,2-dichloroethane in air at low concentrations. Based on the collected data and the use or

storage of products likely to contain this compound, 1,2-dichloroethane is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 19.**

Location 20 – 207 Church Road

- **Naphthalene** – This constituent was not analyzed for in either the shallow groundwater monitoring well sample or the VI investigation groundwater sample. Naphthalene was a COPC for the Former FWEC Facility. Naphthalene was detected in the external soil gas at an estimated concentration that did not exceed its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. The structure at this location had a fireplace that burns wood or coal that could contribute to naphthalene being present in the soil gas. Automotive exhaust also could be a contributor to the naphthalene detected. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, naphthalene is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 20.**

Location 21 – 208 Church Road

- **Chloroform** – This constituent was detected in both the shallow groundwater monitoring well sample (at an estimated concentration) and the VI investigation groundwater sample. The detected concentration in the VI investigation groundwater sample exceeded its risk-based target groundwater concentration relative to VI. The detected concentration in the VI investigation groundwater sample was higher than the estimated concentrations that were reported for the shallow groundwater monitoring well sample or the spring (groundwater breakout at the surface) sample for this location. Chloroform was a COPC for the Former FWEC Facility. Chloroform was detected in the soil gas at a concentration greater than its risk-based target sub-slab concentration relative to VI. Chloroform was not analyzed for in the indoor air at this location. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform in the shallow soil gas can be typical of off-gassing of chloroform (a disinfectant by-product) during water use. If the municipal water is used for watering plants and gardens outdoors, the chloroform also can penetrate the soil and get into the shallow soil gas. There appears to be chlorinated water getting into the shallow soil and groundwater at this location via watering or outdoor washing, as the concentration of chloroform in the shallower VI investigation groundwater sample is higher than in the monitoring well groundwater or the spring. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 21.**

Location 24 – 224 Church Road

- **Chloroform** – This constituent was detected in the shallow groundwater monitoring well sample at a low estimated concentration but not in the VI investigation groundwater sample. The detected concentration in the shallow groundwater monitoring well sample did not exceed its risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. This constituent was detected in the sub-slab sample at a concentration that did not exceed its risk-based target sub-slab concentration relative to VI. Chloroform was not analyzed in the indoor air at this location. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform can be typical of off-gassing of chloroform as a disinfectant by-product during water use. If the municipal water is used for watering plants and gardens outdoors, the chloroform can also penetrate the soil and get into the shallow soil gas. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

- **Naphthalene** – This constituent was not analyzed in either the shallow monitoring well sample or the VI investigation groundwater sample. Naphthalene was a COPC for the Former FWEC Facility. The measured concentration of naphthalene in the sub-slab sample was a low estimated value that did not exceed its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. The structure at this location had a detached garage where a variety of fuels, cleaners and solvents were kept and a craft area and a storage area in the basement. This storage and hobby activity could contribute small amounts of naphthalene to the indoor air. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products and other products likely to contain this compound, naphthalene is not considered to be a COPC relative to possible VI from the groundwater.

- **Trichloroethene** – This constituent was detected at an elevated concentration in the shallow groundwater monitoring well sample, but was not detected in the VI investigation groundwater sample. The measured concentration of TCE in the shallow groundwater monitoring well sample exceeded its risk-based target groundwater concentration relative to VI. However, this sample was collected at a depth of 65 feet below the ground surface and over 500 feet laterally from the residence. In contrast, the VI investigation groundwater sample was collected at a depth of only 14.05 feet below the ground surface and in close proximity to the residence. Given this, the VI investigation groundwater sample is a much better indicator of the potential for VI from a groundwater source than the deeper "shallow" groundwater monitoring well sample. If TCE is present in groundwater in the vicinity of Location 24 at depths comparable to those sampled in the shallow groundwater monitoring well sample, there is no indication that it is reaching the uppermost portion of the water bearing unit beneath the structure at Location 24 as evidenced by the absence of TCE in the VI investigation groundwater sample. The

concentration of TCE in the sub-slab vapor sample also did not exceed its risk-based target sub-slab concentration relative to VI. As such, the TCE is unlikely to pose a VI risk. TCE was a COPC for the Former FWEC Facility. This residence has a pond in the back that may be may be having some effect on the shallow soil vapor contaminant levels. No indoor or outdoor air samples were collected at this location. The structure at this location had a detached garage, and there is a craft area (involving stained glass and bead making) and a storage area for a variety of cleaners and solvents in the basement. Based on the collected shallow groundwater and sub-slab soil gas measurements and the use and storage of products likely to contain this compound, TCE is not considered to be a COPC relative to possible VI from the TCE-impacted groundwater that is at a relatively deeper depth at this location. The deeper TCE plume at this location is consistent with the overall trend seen in this lower portion of the AA.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 24.**

Location 26 – 242 Church Road

- **Trichloroethene** – This constituent was detected in the shallow groundwater monitoring well sample but was not detected in the VI investigation groundwater sample. This most "shallow" shallow groundwater monitoring well sample from this location was collected at a depth of approximately 35 feet below the ground surface and over 500 feet laterally from the residence. The VI investigation groundwater sample was collected at a depth of about 23 feet below the ground surface and in close proximity to the residence. Given this, the VI investigation groundwater sample is a much better indicator of the potential for VI from a groundwater source than the deeper "shallow" groundwater monitoring well sample. The "shallow" groundwater monitoring well concentration did exceed the risk-based target groundwater concentration relative to VI, but the non-detect level for the VI investigation groundwater sample did not. This deeper detection coupled with the non-detect in the VI investigation sample would suggest that TCE may be present in the groundwater at this location, but at greater depth such that is not likely to pose a VI risk. TCE was a COPC for the Former FWEC Facility. In addition, the concentration of TCE in the sub-slab vapor did not exceed its risk-based target sub-slab concentration relative to VI. This residence was reported to have two septic systems, which are also connected to multiple floor drains. It is possible that TCE from consumer products has been discharged into the septic system and subsequently released into the soil vapor. No indoor or outdoor air samples were collected at this location. The structure at this location had a garage attached to the first floor where coal and a variety of oils, cleaners and solvents are kept and a storage area in the basement. Based on the collected shallow groundwater and sub-slab soil gas measurements and the use and storage of products likely to contain this compound, TCE is not considered to be a COPC relative to possible VI from the TCE-impacted groundwater that is at a relatively deeper depth at this location. The deeper TCE

plume at this location is consistent with the overall trend seen in this lower portion of the AA.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 26.**

Location 33 – 40 Stonewall Circle

- **Benzene** – This constituent was not detected in the shallow groundwater monitoring well sample or the spring (groundwater breakout at the surface) sample from this location but was detected at a low estimated concentration in the VI investigation groundwater sample. The VI investigation groundwater concentration did not exceed its risk-based target groundwater concentration relative to VI. Benzene was a COPC for the Former FWEC Facility. The concentration of benzene detected in the sub-slab vapor did not exceed its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. The structure at this location had a garage attached to the basement where gasoline and fuel were stored. Automotive exhaust may be releasing benzene into the air and shallow soil gas at this location. Based on the available data and the use or storage of petroleum hydrocarbon-containing products**,** benzene is not considered to be a COPC relative to possible VI from the groundwater.

- **Chloroform** – This constituent was detected in the shallow groundwater monitoring well sample at a low estimated concentration, and in the VI investigation groundwater sample at a higher concentration. Only the higher concentration detected in the VI investigation groundwater sample exceeded its risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. Chloroform also was detected in the external soil gas at a concentration that exceeded its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations can be typical of off-gassing of chloroform (a disinfectant by-product) during domestic or external water use. If the public water is used for watering plants or washing cars outdoors, the chloroform can also penetrate the soil and get into the shallow soil gas. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 33.**

Location 34 – 20 North Sunset Drive

- **Acrolein** - This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. Acrolein also was not detected in groundwater samples from the Former FWEC Facility. Acrolein was detected in the sub-slab sample at an estimated concentration that exceeded its risk-based target sub-slab concentration relative to VI. However, this estimated result was qualified by the Data

Validator as a TIC based on a mass spectral identification. No indoor or outdoor air samples were collected at this location. Based on this collective evidence, acrolein is not considered to be a COPC relative to possible VI from the groundwater.

- **Chloroform** – This constituent was detected in the shallow groundwater monitoring well sample at an estimated concentration, but not in the VI investigation groundwater samples. The detected concentration did not exceed its risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. Chloroform also was detected in the sub-slab sample at a concentration that did not exceed its risk-based target sub-slab concentration relative to VI. Chloroform was not analyzed in the indoor air at this location. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform in the shallow soil gas can be typical of off-gassing of chloroform as a disinfectant by-product during water use. If the public water is used for watering plants and or washing cars outdoors, the chloroform can penetrate the soil and get into the shallow soil gas. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 34.**

Location 35 – 14 Sunset Drive

- **Naphthalene** – This constituent was not analyzed for in either the shallow groundwater monitoring well sample or the VI investigation groundwater sample. Naphthalene was a COPC for the Former FWEC Facility. Naphthalene was detected in the external soil gas at an estimated concentration that did not exceed its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. The structure at this location had a garage attached to the first floor where a variety of fuels and oils were kept and a storage area in the basement. The low concentrations of this constituent detected in the external soil gas may be due in part to automotive exhaust or volatilization and migration from materials being stored in these locations. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products**,** naphthalene is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 35.**

Location 40 – 390 South Mountain Boulevard

- **Acrolein** – This constituent was not detected in either the shallow monitoring well groundwater sample or the VI investigation groundwater sample. Acrolein was not detected in groundwater samples from the Former FWEC Facility and was not a COPC. Acrolein was detected in the sub-slab sample at an estimated concentration that exceeded its risk-based target sub-slab concentration relative to VI. However, this estimated result

was qualified by the Data Validator as a TIC based on a mass spectral identification. This qualified result exceeded its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. Based on this collective evidence, acrolein is not considered to be a COPC relative to possible VI from the groundwater.

- **Chloroform** – This constituent was detected in the shallow groundwater monitoring well sample at an estimated concentration, but not in the VI investigation groundwater samples. The detected concentration did not exceed its risk-based target groundwater concentration relative to VI. Chloroform also was detected in the sub-slab sample at a concentration that did not exceed its risk-based target sub-slab concentration relative to VI. Chloroform was not analyzed in the indoor air at this location. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform (a disinfectant by-product) can be typical of off-gassing during water use. If the public water is used for watering plants and gardens outdoors, the chloroform can also penetrate the soil and get into the shallow soil gas. Based on these factors and considerations, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 40.**

Location 41 – 393 South Mountain Boulevard

- **Acrolein** – This constituent was not detected in either the shallow groundwater monitoring well groundwater sample or the VI investigation groundwater sample. Acrolein was not detected in groundwater samples from the Former FWEC Facility and was not a COPC for the Former FWEC Facility. Acrolein was detected in the sub-slab sample at an estimated concentration that exceeded its risk-based target sub-slab concentration relative to VI. However, this estimated result was qualified by the Data Validator as a TIC based on a mass spectral identification. No indoor or outdoor air samples were collected at this location. Based on this collective evidence, acrolein is not considered to be a COPC relative to possible VI from the groundwater.

- **Bromodichloromethane** – This constituent was not detected in either the shallow groundwater monitoring well groundwater sample or the VI investigation groundwater sample. The detection limits associated with the non-detect groundwater results were both lower than the risk-based target groundwater concentration relative to VI. The concentration of bromodichloromethane that was detected in the sub-slab sample did not exceed its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. The building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of bromodichloromethane such as these are typical of off-gassing of bromodichloromethane as a disinfectant by-product into the air during water use. Based

on the available evidence, bromodichloromethane is not considered to be a COPC relative to possible VI from the groundwater.

- **Chloroform** – This constituent was detected in the shallow groundwater monitoring well sample at an estimated concentration, but not in the VI investigation groundwater samples. The detected concentration did not exceed its risk-based target groundwater concentration relative to VI. Chloroform was a COPC for the Former FWEC Facility. Chloroform also was detected in the external soil gas sample at a concentration that exceeded its risk-based target sub-slab concentration relative to VI. Chloroform was not analyzed in the indoor air at this location. As noted above, the building at this location is connected to the public water system, which chlorinates its supply water to disinfect it. Low concentrations of chloroform (a disinfectant by-product) can be typical of off-gassing during water use. If the public supply water is used for watering plants and washing cars outdoors, the chloroform can also penetrate the soil and get into the shallow soil gas. Based on the available evidence, chloroform is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 41.**

Location 46 – 420 South Mountain Boulevard (St. Jude's Parish Center)

- **Naphthalene** – This constituent was not analyzed for in either the shallow groundwater monitoring well sample or the VI investigation groundwater sample. Naphthalene was a COPC for the Former FWEC Facility. Naphthalene was detected in the external soil gas at a concentration that slightly exceeded its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. Automotive exhaust is likely to be releasing naphthalene into the air at this location. Gasoline and paints were stored within this structure, and it also has an operational fireplace that can release naphthalene into the air. Based on the combined weight of evidence, naphthalene is not considered to be a COPC relative to possible VI from the groundwater**.**

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 46.**

Location 47 – 420 South Mountain Boulevard (St. Jude's School)

- **Benzene** – This constituent was not detected in the shallow groundwater monitoring well sample but was detected at a low estimated concentration in the VI investigation groundwater sample. The detected groundwater concentration of benzene did not exceed its risk-based target groundwater concentration. Benzene was a COPC for the Former FWEC Facility. The concentration of benzene in the external soil gas did not exceed its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. Automotive exhaust is likely to be releasing benzene into the air at this location. Gasoline and paints were stored within this structure, which can

release benzene into the air. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products, benzene is not considered to be a COPC relative to possible VI from the groundwater.

- **Naphthalene** – This constituent was not analyzed for in either the shallow groundwater monitoring well sample or the VI investigation groundwater sample. Naphthalene was a COPC for the Former FWEC Facility. Naphthalene was detected in the external soil gas at an estimated concentration that exceeded its risk-based target sub-slab concentration relative to VI. No indoor or outdoor air samples were collected at this location. Automotive exhaust is likely to be releasing naphthalene into the air at this location. Gasoline and paints were stored within this structure which can release naphthalene into the air. Based on the collected data and the use or storage of petroleum hydrocarbon-containing products**,** naphthalene is not considered to be a COPC relative to possible VI from the groundwater.

➔ **As such, no constituents were identified as COPCs relative to possible VI from the groundwater for Location 47.**

Summary of the VI COPC Screening

Based on the application of the three-step VI evaluation process presented above, only TCE at Location 11 (175 Church Road) and Location 16 (194 Church Road) was identified as a COPC relative to potential VI and the IA inhalation exposure pathway.

Following the VI air sampling and analyses performed in 2010, VI mitigation activities were performed at Location 11 and Location 16 in July of 2011. It should be noted that two mitigation systems were installed in 2011 because the assessment of potential indoor air risks performed at that time indicated that the indoor air at both locations was being potentially influenced by VI to a degree greater than the pre-cautionary screening levels would limit. However, the analysis performed here for this RI using more complete and recent data also indicated the need for mitigation systems at both Location 11 and Location 16. The active soil depressurization (ASD) systems at Location 11 and Location 16 were both made operational on Friday, July 8, 2011. Reports describing these ASD systems are included as Supplement 2. These ASD systems feature a single suction point, an external mounted blower at Location 11, and a garage attic mounted blower at Location 16. Given the operation of the systems, the concentrations of TCE measured in the sub-slab vapor would be dramatically reduced and the vapor migration pathway into the IA would be severed.

Based on approximately 10 years of groundwater monitoring data from residential wells and monitoring wells, the extent of the contaminant plume in the Affected Area has been stable and the contaminant concentrations have generally decreased due to the continuing operation of the groundwater extraction and treatment system at the source at the Former FWEC Facility and the natural attenuation processes that are reducing the concentrations of many of the contaminants. In

addition, closure of the private wells in the Affected Area has reduced the induced migration of groundwater toward the residences. This also has led to a reduction in the concentrations of the groundwater contaminants beneath the structures that could influence potential vapor intrusion at these locations. These ongoing activities and natural processes are expected to lead to further declines in the concentrations of the shallow volatile groundwater contaminants in the Affected Area in the future, and a further reduction in the potential for VI at these residences in the future.

Based on the downward trend in contaminant concentrations and the installation and operation of the VI mitigation systems at the two residences associated with unique hydrogeologic conditions that indicated a potential risk associated with VI, there are no continuing health risks for the Affected Area via the indoor air exposure pathway, and no further quantification of inhalation risk is warranted.

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TABLES

Table D-1. Summary of the VI Sampling Performed for the Groups 1, 2 and 3 Locations in the Affected Area

		RI GROUNDWATER MONITORING		ADDITIONAL VI SAMPLING PERFORMED				
LOCATION CODE	TCE GROUND-WATER CONCEN-TRATION GROUP [1]	SHALLOW GROUND- WATER MONITORING WELL ZONE	SHALLOW GROUND-WATER (GW-MW)	GROUND-WATER (GW-VI)	SUB-SLAB (SS) / EXTERNAL SOIL GAS (SSG)	BASEMENT (BASE)	INDOOR AIR (IA)	OUTDOOR AIR (OA)
GROUP 1 GROUNDWATER SAMPLING LOCATIONS BASED ON TCE CONCENTRATIONS								
8	1	E	X	X	SS	X	X	X
9	1	E	X	X	SS	X	X	X
-	1	E	X	ACCESS DENIED - NO SAMPLING				
10	1	E	X	X	SS	X	X	X
11	1	E	X	X	SS	X	X	X
12	1	E	X	X	SSG	NA	X	X
13	1	E	X	X	SS	X	X	X
14	1	E	X	X	SS	X	X	X
15	1	E	X	X	ACCESS DENIED - NO FURTHER SAMPLING			
TOTAL								
GROUP 2 GROUNDWATER SAMPLING LOCATIONS BASED ON TCE CONCENTRATIONS								
3	2	D	X	X	SS	⊡	-	-
5	2	E	X	X	-	⊡	-	-
6	2	E	X	X	-	⊡	-	-
7	2	E	X	X	-	⊡	-	-
16	2	C	X	X	SS	⊡	X	X
17	2	C	X	X	-	⊡	-	-
18	2	C	X	X	-	NA	-	-
19	2	C	X	X	SS	⊡	-	-
20	2	C	X	X	SS	⊡	-	-
21	2	C	X	X	SS	⊡	-	-
22	2	F	X	X	SS	⊡	-	-
23	2	F	X	X	SS / SSG	⊡	-	-
24	2	F	X	X	SS	⊡	-	-
25	2	F	X	X	-	⊡	-	-
28	2	C	X	X	SS	⊡	-	-
29	2	C	X	X	SS	⊡	-	-
30	2	C	X	X	SS	⊡	-	-
31	2	C	X	X	-	⊡	-	-
32	2	C	X	X	SS	⊡	-	-
33	2	C	X	X	SS	⊡	-	-
TOTAL								
GROUP 3 GROUNDWATER SAMPLING LOCATIONS BASED ON TCE CONCENTRATIONS								
2	3	B	X	X	SS	⊡	-	-
26	3	G	X	X	SS	⊡	-	-
34	3	H	X	X	SS	⊡	-	-
35	3	H	-	X	SS	⊡	-	-
36	3	H	X	X	-	⊡	-	-
37	3	H	X	X	-	⊡	-	-
40	3	H	X	X	SS	⊡	-	-
41	3	H	X	X	SS	⊡	-	-
44	3	A	X	X	SS	⊡	-	-
45	3	A	X	X	SS	⊡	-	-
46	3	A	X	X	SS / SSG	⊡	-	-
47	3	A	X	X	SS	NA	-	-
TOTAL								

NOTES:

NA = Not Applicable (i.e., structure has no basement)

- = Not Sampled

The Property # referenced here is synonymous with the Location # referenced in the RI Report (e.g. Property #2 is the same as Location #2)

Table D-2. Breakdown of the Affected Area into Groundwater Zones and the Building Locations and Shallow Groundwater Wells That Were Sampled for VI Concerns			
Affected Area Groundwater Zone	**Locations within the Zone that were Sampled for Soil Gas, Indoor Air and/or Outdoor Air**	**Shallow Groundwater Monitoring Wells within the Zone Where Monitoring Well Samples Were Collected**	**Locations Where VI Investigation Groundwater Samples Were Collected**
A	Location 44	RMW-10S RMW-12S	None
B	Location 2	RMW-4S RMW-5S RMW-6S	Location 2
C	Location 16 Location 19 Location 20 Location 21 Location 28 Location 29 Location 30 Location 32 Location 33	Location 15 Spring Location 15Vault RMW-11S	Location 15 Location 16 Location 16 Sump Location 18 Location 19 Location 21 Location 28 Location 29 Location 30 Location 31 Location 32 Location 33
D	Location 3	RMW-8S	Location 3
E	Location 8 Location 9 Location 10 Location 11 Location 12 Location 13 Location 14	Location 14 Spring FWEC-6S RMW-8S RMW-9S1 RMW-9S2	Location 5 Location 6 Location 7 Location 8 Location 8 Sump Location 9 Location 10 Location 11 Location 12 Location 13 Location 14
F	Location 22 Location 23 Location 24	RMW-10S RMW-11S	Location 22 Location 23 Location 24
G	Location 26	RMW-12S	Location 26
H	Location 34 Location 35 Location 40 Location 41	RMW-10S RMW-13S1 RMW-13S2	Location 34 Location 35 Location 36 Location 40 Location 41

The Property # referenced here is synonymous with the Location # referenced in the RI Report (e.g. Property #2 is the same as Location #2)

Table D-3RES. Results of the VISL Calculator Screening Runs Performed for the Sampled Residences in the Affected Area Using the External Soil Gas, Sub-Slab Soil Gas and Indoor Air Measurements

RESIDENTIAL ADDRESSES									
Address	**Sample Type - Identifier**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**
		Screening Based on External or Subslab Soil Gas Measurements				**Screening Based on Indoor Air Measurements**			
14 Sunset Drive									
	Subslab-1	9.8E-07		2.5E-02		--		--	
20 Sunset Drive									
	Subslab-1	6.7E-07		1.4E-02		--		--	
	Subslab-2	4.3E-07		3.0E-02		--		--	
10 Stonewall Circle									
	Subslab-1	4.3E-07		2.0E-02		--		--	
	Subslab-2	3.7E-07		2.3E-02		--		--	
	Subslab-3	4.2E-07		1.6E-02		--		--	
15 Stonewall Circle									
	Subslab-1	2.3E-07		6.6E-03		--		--	
	Subslab-2	0.0E+00		5.5E-03		--		--	
20 Stonewall Circle									
	Subslab-1	2.6E-07		1.8E-02		--		--	
	Subslab-2	2.9E-07		1.8E-02		--		--	
30 Stonewall Circle									
	Subslab-1	2.5E-07		9.0E-03		--		--	
40 Stonewall Circle									
	Subslab-1	**7.9E-06**	Chloroform	1.9E-02		--		--	
	Subslab-2	**1.1E-06**	None over 1.0E-06; Chloroform and Benzene over 1.0E-07	7.6E-03		--		--	
130 Church Road									
	Subslab-1	1.9E-07		2.3E-03		--		--	
	Subslab-2	1.3E-07		7.4E-03		--		--	
146 Church Road									
	Subslab-1	3.3E-07		6.7E-03		--		--	
	Subslab-2	7.7E-07		2.3E-02		--		--	
170 Church Road									
	Subslab-1	5.1E-07		1.6E-02		--		--	
	Indoor Air-1	--		--		**1.7E-04**	Benzene 1,3-Butadiene 1,4-Dichlorobenzene 1,4-Dioxane Ethylbenzene Naphthalene	**8.9E+00**	Naphthalene 1,2,3-Trimethylbenzene 1,2,4-Trimethylbenzene
	Indoor Air-2	--		--		**3.3E-05**	Benzene Chloroform 1,2-Dichloroethane 1,4-Dioxane	8.2E-01	

RESIDENTIAL ADDRESSES									
Address	**Sample Type - Identifier**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**
		Screening Based on External or Subslab Soil Gas Measurements				**Screening Based on Indoor Air Measurements**			
171 Church Road									
	Subslab-1	4.0E-07		1.9E-02		--		--	
	Subslab-2	**2.8E-06**	Naphthalene	9.7E-02		--		--	
	Indoor Air-1	--		--		**6.7E-05**	Benzene Bromodichloromethane Chloroform Ethylbenzene Naphthalene	**2.7E+00**	Naphthalene 1,2,4-Trimethylbenzene
	Indoor Air-2	--		--		**6.9E-05**	Benzene Bromodichloromethane Chloroform Ethylbenzene Naphthalene	**3.1E+00**	Naphthalene 1,2,4-Trimethylbenzene
174 Church Road									
	Subslab-1	2.9E-07		1.2E-02		--		--	
	Subslab-2	1.5E-07		9.8E-03		--		--	
	Indoor Air-1	--		--		**5.0E-05**	Benzene 1,3-Butadiene Chloroform 1,4-Dichlorobenzene 1,2-Dichloroethane Ethylbenzene Naphthalene	**1.7E+00**	None over 1.0; 1,3-Butadiene 1,2-Dichloroethane, Naphthalene and 1,2,4-Trimethylbenzene over 0.1
	Indoor Air-2	--		--		**4.1E-05**	Benzene 1,3-Butadiene Chloroform 1,2-Dichloroethane 1,4-Dioxane	**1.2E+00**	None over 1.0; 1,3-Butadiene, 1,2-Dichloroethane and Isopropanol over 0.1

RESIDENTIAL ADDRESSES									
Address	**Sample Type - Identifier**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**
		Screening Based on External or Subslab Soil Gas Measurements				**Screening Based on Indoor Air Measurements**			
175 Church Road									
	Subslab-1	**7.6E-06**	Chloroform Trichloroethylene	**1.4E+00**	Trichloroethylene	--		--	
	Subslab-2	**1.2E-04**	Chloroform Trichloroethylene	**2.5E+01**	Trichloroethylene	--		--	
	Subslab-R1	**4.5E-05**	Chloroform Trichloroethylene	**9.3E+00**	Trichloroethylene	--		--	
	Subslab-R2	**6.6E-06**	Chloroform Naphthalene Trichloroethylene	9.7E-01		--		--	
	Indoor Air-1	--		--		**9.2E-05**	Benzene Bromodichloromethane 1,3-Butadiene Carbon Tetrachloride Chloroform 1,2-Dichloroethane Naphthalene	**2.0E+00**	None over 1.0; 1,2-Dichloroethane, Naphthalene, Trichloroethylene and 1,2,4-Trimethylbenzene over 0.1
	Indoor Air-2	--		--		**7.1E-05**	Benzene 1,3-Butadiene Carbon Tetrachloride Chloroform, 1,2-Dichloroethane Naphthalene	**2.1E+00**	Naphthalene
178 Church Road									
	Soil Gas-1	2.6E-07		3.2E-02		--		--	
	Soil Gas-2	7.8E-10		5.5E-03		--		--	
	Indoor Air-1	--		--		**4.4E-06**	None over 1.0E-06; Benzene, Carbon Tetrachloride, 1,2-Dichloroethane, 1,4- Dioxane, Ethylbenzene and Trichloroethylene over 1.0E-07	3.7E-01	
	Indoor Air-2	--		--		**1.3E-05**	Benzene Vinyl Chloride	1.1E-01	
179 Church Road									
	Subslab-1	2.3E-07		9.2E-03		--		--	
	Indoor Air-1	--		--		**9.0E-06**	Benzene 1,3-Butadiene Chloroform 1,2-Dichloroethane	4.0E-01	
	Indoor Air-2	--		--		**8.7E-05**	Benzene 1,3-Butadiene Chloroform 1,2-Dichloroethane,	**2.7E+00**	1,3-Butadiene

RESIDENTIAL ADDRESSES									
Address	**Sample Type - Identifier**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**	**VI Carcinogenic Risk***	**Greatest Contributors** to VI Carcinogenic Risk**	**VI Non-Cancer Hazard***	**Greatest Contributors** to VI Non-Cancer Hazard**
		Screening Based on External or Subslab Soil Gas Measurements				**Screening Based on Indoor Air Measurements**			
181 Church Road									
	Subslab-1	5.7E-08		1.5E-02		--		--	
	Indoor Air-1	--		--		**7.1E-06**	Chloroform 1,2-Dichloroethane 1,4-Dioxane	2.3E-01	
	Indoor Air-2	--		--		**2.8E-06**	None over 1.0E-06; Benzene, Carbon Tetrachloride, 1,2-Dichloroethane, 1,4-Dioxane and Ethylbenzene, over 1.0E-07	2.1E-01	
194 Church Road									
	Subslab-1	**3.7E-05**	Trichloroethylene	**8.5E+00**	Trichloroethylene	--		--	
	Subslab-2	**1.3E-06**	Trichloroethylene	2.5E-01		--		--	
	R-1	**4.4E-06**	Trichloroethylene	**1.0E+00**	Trichloroethylene	--		--	
	R-2	2.1E-07		3.6E-02		--		--	
	Indoor Air-1	--		--		**8.6E-06**	Benzene 1,4-Dioxane Trichloroethylene	**1.3E+00**	Trichloroethylene
	Indoor Air-2	--		--		**6.8E-06**	Benzene Carbon Tetrachloride Trichloroethylene	**1.1E+00**	None over 1.0; Trichloroethylene over 0.1
205 Church Street									
	Subslab-1	2.7E-07		8.2E-03		--		--	
	Subslab-2	3.7E-07		1.2E-02		--		--	
207 Church Street									
	Subslab-1	6.9E-07		3.2E-02		**--**		**--**	
208 Church Street									
	Subslab-1	**4.7E-06**	Chloroform	9.4E-03		**--**		**--**	
212 Church Street									
	Subslab-1	6.1E-08		1.7E-02		**--**		**--**	
222 Church Street									
	Subslab-1	3.2E-07		3.2E-02		--		--	
	Soil Gas-1	5.2E-07		2.0E-02		--		--	
224 Church Street									
	Subslab-1	**1.5E-06**	None over 1.0E-06; Chloroform, 1,4-Dichlorobenzene, Naphthalene and Trichloroethylene over 1.0E-07	1.2E-01		--		--	
	Subslab-2	9.2E-07		4.5E-02		--		--	
242 Church Street									
	Subslab-1	9.3E-07		9.2E-02		--		--	
	Subslab-2	2.0E-07		1.1E-02		--		--	
390 South Mountain Boulevard									
	Subslab-1	6.0E-07		6.5E-03		--		--	
	Subslab-2	4.4E-07		8.0E-03		--		--	

RESIDENTIAL ADDRESSES									
Address	Sample Type - Identifier	VI Carcinogenic Risk*	Greatest Contributors** to VI Carcinogenic Risk	VI Non-Cancer Hazard*	Greatest Contributors** to VI Non-Cancer Hazard	VI Carcinogenic Risk*	Greatest Contributors** to VI Carcinogenic Risk	VI Non-Cancer Hazard*	Greatest Contributors** to VI Non-Cancer Hazard
		Screening Based on External or Subslab Soil Gas Measurements				Screening Based on Indoor Air Measurements			
393 South Mountain Boulevard									
	Subslab-1	**2.5E-05**	Chloroform	3.9E-02		--		--	
	Subslab-2	4.9E-07		5.9E-03		--		--	
420 South Mountain Blvd - Rectory									
	Subslab-1	1.50E-07		9.10E-03		--		--	
	Subslab-2	1.50E-07		3.80E-03		--		--	

NOTES:

* Projected VI Carcinogenic Risks less than 1E-6 are not highlighted. Projected VI Carcinogenic Risks greater than 1E-6 but less than 1E-4 are indicated in bold font. Projected VI Carcinogenic Risks greater than 1E-4 are indicated in bold font and highlighted in yellow. Projected VI Non-Cancer Hazards less than 1 are not highlighted. Projected VI Non-Cancer Hazards greater than 1 but less than 10 are indicated in bold font. Projected VI Non-Cancer Hazards greater than 10 are indicated in bold font and highlighted in yellow.

** Table lists individual constitutents contributing more than 1E-6 to the VI Carcinogenic Risk estimate or more that 1.0 to the VI Non-Cancer Hazard estimate. When the cumulative risk or hazard estimate only slightly exceeds 1E-6 or 1, respectively, constituents with individual risk or hazard contributions at 1/10th of these levels are identified.

Chemicals not included because not on VISL dataset: Ethanol, n-Heptane, 2,2,4-Trimethylpentane, p-Ethyltoluene, tert-butyl alcohol, alpha pinene, Limonene, n-undecane, 1,3-dichlorobenzene, n-decane and Freon 114.

Chemicals not included because no inhalation toxicity data in VISL: 1,3,5-Trimethylbenzene, trans-1,2-Dichloroethene and cis-1,2-Dichloroethene.

Other: Cumene = Isopropylbenzene
o-Xylene = 1,2-Dimethylbenzene
Xylenes = m/p-Xylene
If >1 dilution factor, selected higher concentration as value
n-propylbenzene = propylbenzene

Table D-3-COM. Results of the VISL Calculator Screening Runs Performed for the Sampled Public Structures in the Affected Area Using the External Soil Gas, Sub-

COMMERCIAL ADDRESSES									
Address	Sample Type - Identifier	VI Carcinogenic Risk*	Greatest Contributors** to VI Carcinogenic Risk	VI Non-Cancer Hazard*	Greatest Contributors** to VI Non-Cancer Hazard	VI Carcinogenic Risk*	Greatest Contributors** to VI Carcinogenic Risk	VI Non-Cancer Hazard*	Greatest Contributors** to VI Non-Cancer Hazard
		Screening Based on External or Subslab Soil Gas Measurements				Screening Based on Indoor Air Measurements			
420 South Mountain Blvd - School									
	Subslab-1	6.5E-08		2.5E-03		--		--	
	Subslab-2	3.2E-08		1.0E-03		--		--	
	Subslab-3	3.0E-08		6.9E-04		--		--	
	Subslab-4	1.2E-07		2.0E-03		--		--	
	Subslab-5	3.8E-08		8.5E-04		--		--	
	Subslab-6	5.7E-07		1.9E-02		--		--	
	Subslab-7	3.9E-08		1.0E-03		--		--	
420 South Mountain Blvd - Church									
	Subslab-1	1.7E-08		8.5E-04		--		--	
420 South Mountain Blvd - Parish Center									
	Soil Gas-1	2.00E-08		5.20E-04		--		--	
	Subslab-1	9.30E-08		3.50E-03		--		--	
	Subslab-2	4.30E-07		1.10E-02		--		--	

NOTES:

* Projected VI Carcinogenic Risks less than 1E-6 are not highlighted. Projected VI Carcinogenic Risks greater than 1E-6 but less than 1E-4 are indicated in bold font. Projected VI Carcinogenic Risks greater

** Table lists individual constitutents contributing more than 1E-6 to the VI Carcinogenic Risk estimate or more that 1.0 to the VI Non-Cancer Hazard estimate. When the cumulative risk or hazard estimate only

Chemicals not included because not on VISL dataset: Ethanol, n-Heptane, 2,2,4-Trimethylpentane, p-Ethyltoluene, tert-butyl alcohol, alpha pinene, Limonene, n-undecane, 1,3-dichlorobenzene, n-decane and Freon 114.

Chemicals not included because no inhalation toxicity data in VISL: 1,3,5-Trimethylbenzene, trans-1,2-Dichloroethene and cis-1,2-Dichloroethene.

Other: Cumene = Isopropylbenzene
o-Xylene = 1,2-Dimethylbenzene
Xylenes = m/p-Xylene
If >1 dilution factor, selected higher concentration as value
n-propylbenzene = propylbenzene

Table D-4. Location-by-Location Application of Steps I and II of the VI Chemical of Potential Concern Selection Process for Locations in the Affected Area								
		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 3 146 Church Road [Affected Area D]	Acrolein	Yes	OA (ug/m^3)	Not Analyzed	Yes	Not Detected (0.42)	Yes (Estimated) (0.07)	Not Analyzed (0.0021)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	3.9 NJ				
			GW-VI (ug/L)	<1.9				
			GW-MW (ug/L)	<1.3				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 8 170 Church Road [Affected Area Zone E]	1,2,4-Trimethylbenzene	Yes	OA (ug/m^3)	<0.93	Yes	Not Analyzed (2.9)	No (24)	First Floor - No Basement - Yes (0.73)
			IA (ug/m^3)	0.54 J				
			Base (ug/m^3)	26				
			SSG/SS (ug/m^3)	1				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	1,2-Dichloroethane	Yes	OA (ug/m^3)	0.053 J	Yes	No (Not Detected) (2.2)	No (3.6)	First Floor - Yes Basement - No (Estimated) (0.11)
			IA (ug/m^3)	0.53				
			Base (ug/m^3)	<0.13				
			SSG/SS (ug/m^3)	0.061 J				
			GW-VI (ug/L)	<0.24				
			GW-MW (ug/L)	<0.19				
	1,2-Dimethylbenzene (o-xylene)	Yes	OA (ug/m^3)	0.083 J	Yes	No (Not Detected) (49)	No (350)	First Floor - No Basement - Yes (10)
			IA (ug/m^3)	0.4				
			Base (ug/m^3)	23				
			SSG/SS (ug/m^3)	1				
			GW-VI (ug/L)	Not Analyzed*				
			GW-MW (ug/L)	<0.43				
	1,3-Butadiene	Yes	OA (ug/m^3)	<0.42	No	Not Analyzed (0.031)	No (Not Detected) (3.1)	First Floor - No (Estimated) Basement - Yes (Estimated) (0.094)
			IA (ug/m^3)	0.084 J				
			Base (ug/m^3)	0.24 J				
			SSG/SS (ug/m^3)	<0.38				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	1,4-Dioxane	Yes	OA (ug/m^3)	<0.68	Yes	No (2900)	No (19)	First Floor - Yes Basement - Yes (0.56)
			IA (ug/m^3)	2				
			Base (ug/m^3)	15				
			SSG/SS (ug/m^3)	1.2				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	0.61 J				
	Benzene	Yes	OA (ug/m^3)	0.3 J	Yes	No (1.6)	No (12)	First Floor - Yes Basement - Yes (0.36)
			IA (ug/m^3)	1				
			Base (ug/m^3)	23				
			SSG/SS (ug/m^3)	4.2				
			GW-VI (ug/L)	0.61 J				
			GW-MW (ug/L)	<0.08				
	Chloroform	Yes	OA (ug/m^3)	<0.93	Yes	No (0.81)	No (4.1)	First Floor - Yes (Estimated) Basement - Uncertain (0.12)
			IA (ug/m^3)	0.42 J				
			Base (ug/m^3)	<0.78				
			SSG/SS (ug/m^3)	0.19 J				
			GW-VI (ug/L)	0.35 J				
			GW-MW (ug/L)	0.22 J				
	Ethylbenzene	Yes	OA (ug/m^3)	0.083 J	Yes	No (Not Detected) (3.5)	No (37)	First Floor - No Basement - Yes (1.1)
			IA (ug/m^3)	0.4				
			Base (ug/m^3)	18				
			SSG/SS (ug/m^3)	0.96				
			GW-VI (ug/L)	<0.25				
			GW-MW (ug/L)	<0.1				
	m/p-Xylene	Yes	OA (ug/m^3)	0.16 J	Yes	No (36)	No (350)	First Floor - No Basement - Yes (10)
			IA (ug/m^3)	1.2				
			Base (ug/m^3)	65				
			SSG/SS (ug/m^3)	3				
			GW-VI (ug/L)	<0.43				
			GW-MW (ug/L)	0.27 J				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 9 171 Church Road [Affected Area Zone E]	1,2,4-Trimethylbenzene	Yes	OA (ug/m^3)	<0.79	Yes	Not Analyzed (2.9)	No (24)	First Floor - Yes Basement - Yes (0.73)
			IA (ug/m^3)	7.4				
			Base (ug/m^3)	9.3				
			SSG/SS (ug/m^3)	4.1				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	Benzene	Yes	OA (ug/m^3)	0.31	Yes	No (1.6)	No (12)	First Floor - Yes Basement - Yes (0.36)
			IA (ug/m^3)	2				
			Base (ug/m^3)	2.3				
			SSG/SS (ug/m^3)	3				
			GW-VI (ug/L)	0.61 J				
			GW-MW (ug/L)	<0.08				
	Bromodichloromethane	Yes	OA (ug/m^3)	<1.1	No	No (Not Detected) (0.88)	Not Detected (2.5)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.076)
			IA (ug/m^3)	0.12 J				
			Base (ug/m^3)	0.19 J				
			SSG/SS (ug/m^3)	<1.1				
			GW-VI (ug/L)	<0.093				
			GW-MW (ug/L)	<0.12				
	Bromomethane	Yes	OA (ug/m^3)	0.62 J	Yes	No (Not Detected) (1.7)	No (17)	First Floor - Yes Basement - No (0.52)
			IA (ug/m^3)	0.74				
			Base (ug/m^3)	0.47 J				
			SSG/SS (ug/m^3)	0.93				
			GW-VI (ug/L)	<0.31				
			GW-MW (ug/L)	<0.18				
	Chloroform	Yes	OA (ug/m^3)	<0.78	Yes	No (0.81)	Yes (4.1)	First Floor - Yes Basement - Yes (0.12)
			IA (ug/m^3)	1.4				
			Base (ug/m^3)	1.1				
			SSG/SS (ug/m^3)	2.2				
			GW-VI (ug/L)	0.35 J				
			GW-MW (ug/L)	0.22 J				
	Ethylbenzene	Yes	OA (ug/m^3)	0.09 J	Yes	No (Not Detected) (3.5)	No (37)	First Floor - Yes Basement - Yes (1.1)
			IA (ug/m^3)	3.3				
			Base (ug/m^3)	4.1				
			SSG/SS (ug/m^3)	2.1				
			GW-VI (ug/L)	<0.25				
			GW-MW (ug/L)	<0.1				
	m/p-Xylene	Yes	OA (ug/m^3)	0.2 J	Yes	No (36)	No (350)	First Floor - Yes Basement - Yes (10)
			IA (ug/m^3)	14				
			Base (ug/m^3)	20				
			SSG/SS (ug/m^3)	6.9				
			GW-VI (ug/L)	<0.43				
			GW-MW (ug/L)	0.27 J				
	Naphthalene	Yes	OA (ug/m^3)	<4.1	Yes	Not Analyzed (4.6)	Yes (2.8)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.083)
			IA (ug/m^3)	3.6 J				
			Base (ug/m^3)	3.8 J				
			SSG/SS (ug/m^3)	5				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 10 174 Church Road [Affected Area Zone E]	1,2-Dichloroethane	Yes	OA (ug/m^3)	<0.065	Yes	No (Not Detected) (2.2)	No (3.6)	First Floor - Yes Basement - Yes (0.11)
			IA (ug/m^3)	2.1				
			Base (ug/m^3)	1				
			SSG/SS (ug/m^3)	0.08 J				
			GW-VI (ug/L)	<0.24				
			GW-MW (ug/L)	<0.19				
	1,3-Butadiene	Yes	OA (ug/m^3)	<0.31	Yes	Not Analyzed (0.031)	No (3.1)	First Floor - Yes Basement - Yes (Estimated) (0.094)
			IA (ug/m^3)	0.8				
			Base (ug/m^3)	0.31 J				
			SSG/SS (ug/m^3)	0.08 J				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	1,4-Dioxane	Yes	OA (ug/m^3)	<0.5	Yes	No (2900)	No (Not Detected) (19)	First Floor - Yes Basement - No (Not Detected) (0.56)
			IA (ug/m^3)	1				
			Base (ug/m^3)	<0.65				
			SSG/SS (ug/m^3)	<0.58				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	0.61 J				
	2-Hexanone	Yes	OA (ug/m^3)	<2.9	Yes	No (Not Detected) (820)	No (100)	First Floor - No Basement - No (Not Detected) (3.1)
			IA (ug/m^3)	1.4 J				
			Base (ug/m^3)	<3.6				
			SSG/SS (ug/m^3)	0.7 J				
			GW-VI (ug/L)	<0.55				
			GW-MW (ug/L)	<0.5				
	Benzene	Yes	OA (ug/m^3)	0.24	Yes	No (1.6)	No (12)	First Floor - Yes Basement - Yes (0.36)
			IA (ug/m^3)	2.6				
			Base (ug/m^3)	1.4				
			SSG/SS (ug/m^3)	1.2				
			GW-VI (ug/L)	0.61 J				
			GW-MW (ug/L)	<0.08				
	Chloroform	Yes	OA (ug/m^3)	<0.68	Yes	No (0.81)	No (4.1)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.12)
			IA (ug/m^3)	0.37 J				
			Base (ug/m^3)	0.28 J				
			SSG/SS (ug/m^3)	0.28 J				
			GW-VI (ug/L)	0.35 J				
			GW-MW (ug/L)	0.22 J				
	Ethylbenzene	Yes	OA (ug/m^3)	<0.078	Yes	No (Not Detected) (3.5)	No (37)	First Floor - No Basement -Yes (1.1)
			IA (ug/m^3)	0.56				
			Base (ug/m^3)	1.6				
			SSG/SS (ug/m^3)	0.19				
			GW-VI (ug/L)	<0.25				
			GW-MW (ug/L)	<0.1				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 11 175 Church Road [Affected Area Zone E]	1,2,4-Trimethylbenzene	Yes	OA (ug/m^3)	0.26 J	Yes	Not Analyzed (2.9)	No (24)	First Floor - Yes Basement - Yes (0.73)
			IA (ug/m^3)	1.5				
			Base (ug/m^3)	1.8				
			SSG/SS (ug/m^3)	1.2				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	1,2-Dichloroethane	Yes	OA (ug/m^3)	0.077 J	Yes	No (Not Detected) (2.2)	No (3.6)	First Floor - Yes Basement - Yes (0.11)
			IA (ug/m^3)	1.3				
			Base (ug/m^3)	4				
			SSG/SS (ug/m^3)	0.15 J				
			GW-VI (ug/L)	<0.24				
			GW-MW (ug/L)	<0.19				
	1,4-Dioxane	Yes	OA (ug/m^3)	<0.65	Yes	No (2900)	No (19)	First Floor - No Basement - No (Not Detected) (0.56)
			IA (ug/m^3)	0.4 J				
			Base (ug/m^3)	<0.58				
			SSG/SS (ug/m^3)	1.3				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	0.61 J				
	Benzene	Yes	OA (ug/m^3)	0.51	Yes	No (1.6)	No (12)	First Floor - Yes Basement - Yes (0.36)
			IA (ug/m^3)	0.89				
			Base (ug/m^3)	1.1				
			SSG/SS (ug/m^3)	1.5				
			GW-VI (ug/L)	0.61 J				
			GW-MW (ug/L)	<0.08				
	Carbon Tetrachloride	Yes	OA (ug/m^3)	0.33 J	Yes	Yes (Estimated) (0.41)	No (16)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.47)
			IA (ug/m^3)	0.52 J				
			Base (ug/m^3)	0.82 J				
			SSG/SS (ug/m^3)	0.5 J				
			GW-VI (ug/L)	0.35 J				
			GW-MW (ug/L)	0.71 J				
	Chloroform	Yes	OA (ug/m^3)	<0.88	Yes	No (0.81)	Yes (4.1)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.12)
			IA (ug/m^3)	1.5 J				
			Base (ug/m^3)	1.7 J				
			SSG/SS (ug/m^3)	47				
			GW-VI (ug/L)	0.35 J				
			GW-MW (ug/L)	0.22 J				
	Naphthalene	Yes	OA (ug/m^3)	<5	Yes	Not Analyzed (0.46)	Yes (Estimated) (2.8)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.083)
			IA (ug/m^3)	3.3 J				
			Base (ug/m^3)	2.5 J				
			SSG/SS (ug/m^3)	3.6 J				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	Trichloroethene	Yes	OA (ug/m^3)	< 0.19	Yes	Yes (0.52)	Yes (7)	First Floor - No (Not Detected) Basement - Yes (0.21)
			IA (ug/m^3)	< 0.17				
			Base (ug/m^3)	0.24				
			SSG/SS (ug/m^3)	97				
			GW-VI (ug/L)	0.18 J				
			GW-MW (ug/L)	62				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

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		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 12 178 Church Road [Affected Area E]	Bromomethane	Yes	OA (ug/m^3)	1.2	Yes	No (Not Detected) (1.7)	No (17)	First Floor - Yes Basement - Uncertain (0.52)
			IA (ug/m^3)	0.8				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.1				
			GW-VI (ug/L)	<0.31				
			GW-MW (ug/L)	<0.18				

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		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 13 179 Church Road [Affected Area Zone E]	1,2,4-Trimethylbenzene	Yes	OA (ug/m^3)	<0.79	Yes	Not Analyzed (2.9)	No (24)	First Floor - Yes (Estimated) Basement - No (0.73)
			IA (ug/m^3)	0.79 J				
			Base (ug/m^3)	0.38 J				
			SSG/SS (ug/m^3)	0.37 J				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	1,2-Dichloroethane	Yes	OA (ug/m^3)	0.65 J	Yes	No (Not Detected) (2.2)	No (3.6)	First Floor - Yes Basement - Yes (0.11)
			IA (ug/m^3)	4				
			Base (ug/m^3)	0.2				
			SSG/SS (ug/m^3)	0.057 J				
			GW-VI (ug/L)	<0.24				
			GW-MW (ug/L)	<0.13				
	1,3-Butadiene	Yes	OA (ug/m^3)	<0.35	No	Not Analyzed (0.031)	No (Not Detected) (3.1)	First Floor - Yes Basement - Yes (Estimated) (0.094)
			IA (ug/m^3)	2.9				
			Base (ug/m^3)	0.17 J				
			SSG/SS (ug/m^3)	<0.4				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	Acetonitrile	Yes	OA (ug/m^3)	<1	No	No (Not Detected) (4,400)	No (Not Detected) (210)	First Floor - Yes Basement - No (Not Detected) (6.3)
			IA (ug/m^3)	7.6				
			Base (ug/m^3)	<1				
			SSG/SS (ug/m^3)	<2				
			GW-VI (ug/L)	<0.3				
			GW-MW (ug/L)	<0.68				
	Benzene	Yes	OA (ug/m^3)	0.22 J	Yes	No (1.6)	No (12)	First Floor - Yes Basement - Yes (0.36)
			IA (ug/m^3)	3				
			Base (ug/m^3)	0.38				
			SSG/SS (ug/m^3)	0.45				
			GW-VI (ug/L)	0.61 J				
			GW-MW (ug/L)	<0.08				
	Bromomethane	Yes	OA (ug/m^3)	0.58 J	Yes	No (Not Detected) (1.7)	No (17)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.52)
			IA (ug/m^3)	0.54 J				
			Base (ug/m^3)	0.62 J				
			SSG/SS (ug/m^3)	0.7 J				
			GW-VI (ug/L)	<0.31				
			GW-MW (ug/L)	<0.18				
	Chloroform	Yes	OA (ug/m^3)	<0.78	Yes	No (0.81)	No (4.1)	First Floor - Yes (Estimated) Basement - Yes (Estimated) (0.12)
			IA (ug/m^3)	0.88 J				
			Base (ug/m^3)	0.25 J				
			SSG/SS (ug/m^3)	0.5 J				
			GW-VI (ug/L)	0.35 J				
			GW-MW (ug/L)	0.22 J				
	Vinyl Chloride	Yes	OA (ug/m^3)	<0.041	Yes	No (Not Detected) (0.15)	No (5.6)	First Floor -No Basement - Yes (0.17)
			IA (ug/m^3)	0.12				
			Base (ug/m^3)	0.2				
			SSG/SS (ug/m^3)	0.019 J				
			GW-VI (ug/L)	<0.13				
			GW-MW (ug/L)	<0.14				

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		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 14 181 Church Road [Affected Area Zone E]	1,2-Dichloroethane	Yes	OA (ug/m^3)	0.069 J	Yes	No (Not Detected) (2.2)	No (3.6)	First Floor - No (Estimated) Basement - Yes (0.11)
			IA (ug/m^3)	0.08 J				
			Base (ug/m^3)	0.21				
			SSG/SS (ug/m^3)	0.93 J				
			GW-VI (ug/L)	<0.24				
			GW-MW (ug/L)	<0.19				
	1,4-Dioxane	Yes	OA (ug/m^3)	<0.58	Yes	No (2900)	No (Not Detected) (19)	First Floor - No (Estimated) Basement - Yes (0.56)
			IA (ug/m^3)	0.32 J				
			Base (ug/m^3)	1.2				
			SSG/SS (ug/m^3)	<1.4				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	0.61 J				
	Bromomethane	Yes	OA (ug/m^3)	0.8	Yes	No (Not Detected) (1.7)	No (17)	First Floor - Yes (Estimated) Basement - No (Estimated) (0.52)
			IA (ug/m^3)	0.62 J				
			Base (ug/m^3)	0.37 J				
			SSG/SS (ug/m^3)	0.97 J				
			GW-VI (ug/L)	<0.31				
			GW-MW (ug/L)	<0.18				

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		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 16 194 Church Road [Affected Area Zone C]	1,4-Dioxane	Yes	OA (ug/m^3)	<0.47	Yes	No (Not Detected) (2900)	No (19)	First Floor - Yes Basement - Uncertain (0.56)
			IA (ug/m^3)	0.68				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.4 J				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	<0.31				
	Benzene	Yes	OA (ug/m^3)	0.48	Yes	No (1.6)	No (12)	First Floor - Yes Basement - Not Analyzed (0.36)
			IA (ug/m^3)	0.51				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.2				
			GW-VI (ug/L)	0.14 J				
			GW-MW (ug/L)	<0.08				
	Carbon Tetrachloride	Yes	OA ug/m3	0.36 J	Yes	No (0.41)	No (16)	First Floor - Yes (Estimated) Basement - Not Analyzed (0.47)
			IA (ug/m^3)	0.5 J				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	0.75 J				
			GW-VI (ug/L)	0.29 J				
			GW-MW (ug/L)	<0.06				
	Trichloroethene	Yes	OA ug/m3	<0.15	Yes	Yes (Estimated) (0.52)	Yes (7)	First Floor - Yes Basement - Not Analyzed (0.21)
			IA (ug/m^3)	2.5				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	591				
			GW-VI (ug/L)	0.88 J				
			GW-MW (ug/L)	<0.06				

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		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 19 205 Church Road [Affected Area Zone C]	1,2-Dichloroethane	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (Not Detected) (2.2)	No (3.6)	Not Analyzed (0.11)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.1				
			GW-VI (ug/L)	<0.24				
			GW-MW (ug/L)	<0.19				

		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 20 207 Church Road [Affected Area Zone C]	Naphthalene	Yes	OA (ug/m^3)	Not Analyzed	Yes	Not Analyzed (4.6)	No (Estimated) (2.8)	Not Analyzed (0.083)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1 J				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				

		Step I: Potential Completeness of the Vapor Intrusion Exposure Pathway				Step II: Potential Significance of the Measured Gas Concentrations		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 21 208 Church Road [Affected Area Zone C]	Chloroform	Yes	OA (ug/m^3)	Not Analyzed	Yes	Yes (0.81)	Yes (4.1)	Not Analyzed (0.12)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			Spring (ug/L)	0.085 J				
			SSG/SS (ug/m^3)	19				
			GW-VI (ug/L)	11				
			GW-MW (ug/L)	0.39 J				

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		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas (and/or possibly Indoor Air) at the Building?			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 24 224 Church Road [Affected Area Zone F]	Chloroform	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (0.81)	No (4.1)	Not Analyzed (0.12)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.6				
			GW-VI (ug/L)	<0.15				
			GW-MW (ug/L)	0.39 J				
	Naphthalene	Yes	OA (ug/m^3)	Not Analyzed	Yes	Not Analyzed (4.6)	No (Estimated) (2.8)	Not Analyzed (0.083)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.1 J				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				
	Trichloroethene	Yes	OA (ug/m^3)	Not Analyzed	Yes	Yes (0.52)	No (7)	Not Analyzed (0.21)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	6.4				
			GW-VI (ug/L)	<0.18				
			GW-MW (ug/L)	21				

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 26 242 Church Road [Affected Area Zone G]	Trichloroethene	Yes	OA (ug/m^3)	Not Analyzed	Yes	Yes (0.52)	No (7)	Not Analyzed (0.21)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	4.5				
			GW-VI (ug/L)	<0.18				
			GW-MW (ug/L)	8.1				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 33 40 Stonewall Circle [Affected Area Zone C]	Benzene	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (1.6)	No (12)	Not Analyzed (0.36)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	3.8				
			Spring (ug/L)	<0.08				
			GW-VI (ug/L)	0.14 J				
			GW-MW (ug/L)	<0.08				
	Chloroform	Yes	OA (ug/m^3)	Not Analyzed	Yes	Yes (0.81)	Yes (4.1)	Not Analyzed (0.12)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	30				
			Spring (ug/L)	0.085 J				
			GW-VI (ug/L)	11				
			GW-MW (ug/L)	0.39 J				

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 34 20 North Sunset Drive [Affected Area Zone H]	Acrolein	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (Not Detected) (0.42)	Yes (Estimated) (0.07)	Not Analyzed (0.0021)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	11 NJ				
			GW-VI (ug/L)	<1.9				
			GW-MW (ug/L)	<1.3				
	Chloroform	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (0.81)	No (4.1)	Not Analyzed (0.12)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.7				
			GW-VI (ug/L)	<0.15				
			GW-MW (ug/L)	0.17 J				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 35 14 Sunset Drive [Affected Area Zone H]	Naphthalene	Yes	OA (ug/m^3)	Not Analyzed	Yes	Not Analyzed (4.6)	No (Estimated) (2.8)	Not Analyzed (0.083)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	1.8 J				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 40 390 South Mountain Blvd. [Affected Area Zone H]	Acrolein	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (Not Detected) (0.42)	Yes (Estimated) (0.07)	Not Analyzed (0.0021)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	6.4 NJ				
			GW-VI (ug/L)	<1.9				
			GW-MW (ug/L)	<1.3				
	Chloroform	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (0.81)	No (4.1)	Not Analyzed (0.12)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	2.2				
			GW-VI (ug/L)	<0.15				
			GW-MW (ug/L)	0.17 J				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 41 393 South Mountain Blvd. [Affected Area Zone A]	Acrolein	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (Not Detected) (0.42)	Yes (Estimated) (0.07)	Not Analyzed (0.0021)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	15 NJ				
			GW-VI (ug/L)	<1.9				
			GW-MW (ug/L)	<1.3				
	Bromodichloromethane	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (Not Detected) (0.88)	No (2.5)	Not Analyzed (0.076)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	2.5				
			GW-VI (ug/L)	<0.093				
			GW-MW (ug/L)	<0.12				
	Chloroform	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (0.81)	Yes (4.1)	Not Analyzed (0.12)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	98				
			GW-VI (ug/L)	<0.15				
			GW-MW (ug/L)	0.17 J				

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 46 420 South Mountain Blvd. St. Jude's Parish Center [Affected Area Zone A]	Naphthalene	Yes	OA (ug/m^3)	Not Analyzed	Yes	Not Analyzed (4.6)	Yes (2.8)	Not Analyzed (0.083)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	3.6				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

		Step I: Potential Completeness of the				Step II: Potential Significance of the Measured Gas		
		Considered Sufficiently Volatile and Toxic by USEPA to Pose an Inhalation Risk Via Vapor Intrusion from a Groundwater Source?	Analyte Detected in the Affected Area Shallow Groundwater, Sub-Slab Vapor or Soil Gas			Groundwater Exceeds USEPA Target Groundwater Concentration for VI Screening [A]?	Sub-Slab or Soil Gas Exceeds USEPA Target Sub-Slab and Exterior Soil Gas Concentration for VI Screening [B]?	Basement or First Floor Indoor Air Exceeds USEPA Target Indoor Air Concentration Screening Value [C]?
LOCATION	**ANALYTE**	**YES / NO**	**MEASUREMENTS**			**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**	**[TCR=1E-6 or THQ=0.1]**
Location 47 420 South Mountain Blvd. St. Jude's School [Affected Area Zone A]	Benzene	Yes	OA (ug/m^3)	Not Analyzed	Yes	No (1.6)	No (12)	Not Analyzed (0.36)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	5.1				
			GW-VI (ug/L)	0.19 J				
			GW-MW (ug/L)	<0.08				
	Naphthalene	Yes	OA (ug/m^3)	Not Analyzed	Yes	Not Analyzed (4.6)	Yes (2.6)	Not Analyzed (0.083)
			IA (ug/m^3)	Not Analyzed				
			Base (ug/m^3)	Not Analyzed				
			SSG/SS (ug/m^3)	6.3				
			GW-VI (ug/L)	Not Analyzed				
			GW-MW (ug/L)	Not Analyzed				

ABBREVIATIONS:
Base = Basement Indoor Air
GW-MW = Monitoring Well groundwater (Shallow)
GW-VI = Residential Groundwater (Shallow)
IA = First Floor Indoor Air
OA = Outdoor Air
Spring = Groundwater Breakout Spring
SS = External Soil Gas
SSG = Sub-Slab Vapor
USEPA = U.S. Environmental Protection Agency
TCR = Total Cancer Risk
THQ = Total Hazard Quotient
VI = Vapor Intrusion
VISL = Vapor Intrusion Screening Level

DATA QUALIFIERS:
J = Data Validation Qualifier (Estimated Concentration Below the Reporting Limit)
NJ = Data Validation Qualifier (Tentatively Identified Compound)
Not Analyzed* = o-xylene not reported separated, but as part of Total Xylenes

TARGET CONCENTRATION NOTES:
[A] VISL Calculator June 2015 Target Groundwater Concentration
[B] VISL Calculator June 2015 Target Sub-Slab and Exterior Soil Gas Concentration
[C] EPA Residential Indoor Air RSL and VISL Calculator June 2015 Target Indoor Air Concentration

The Property # referenced here is synonymous with the Location # referenced in the RI Report (e.g. Property #2 is the same as Location #2)

NOTES AND ABBREVIATIONS PRESENTED ON THE LAST PAGE OF THE TABLE

Table D-5. Constituents That Were Not Eliminated by Steps I and II of the VI Evaluation			
Constituent	**Locations Where this Constituent is Still a COPC for Potential VI**	**Wass this Constituent Considered a Common Contaminant of Potential Indoor Air Concern for Groundwater by PADEP [1]**	**Wass this Constituent Considered a Common Contaminant of Potential Indoor Air Concern for Residential or Non-Residential Soil by PADEP [1]**
Acetonitrile	Location 13	No	No - Neither
Acrolein	Location 3 Location 34 Location 40 Location 41	No	No - Neither
Benzene	Location 8 Location 9 Location 10 Location 11 Location 13 Location 16 Location 33 Location 47	No	Yes – Residential only
Bromodichloromethane	Location 9 Location 41	No	No - Neither
Bromomethane	Location 9 Location 12 Location 13 Location 14	No	No - Neither
1,3-Butadiene	Location 8 Location 10 Location 13	No	No - Neither
Carbon Tetrachloride	Location 11 Location 16	No	Yes - Both
Chloroform	Location 8 Location 9 Location 10 Location 11 Location 13 Location 21 Location 24 Location 33 Location 34 Location 40 Location 41	Yes	Yes - Both

Table D-5. Constituents That Were Not Eliminated by Steps I and II of the VI Evaluation			
Constituent	**Locations Where this Constituent is Still a COPC for Potential VI**	**Wass this Constituent Considered a Common Contaminant of Potential Indoor Air Concern for Groundwater by PADEP [1]**	**Wass this Constituent Considered a Common Contaminant of Potential Indoor Air Concern for Residential or Non-Residential Soil by PADEP [1]**
1,2-Dichloroethane	Location 8 Location 10 Location 11 Location 13 Location 14 Location 19	No	Yes - Both
1,2-Dimethyl benzene	Location 8	No	No - Neither
1,4-Dioxane	Location 8 Location 10 Location 11 Location 14 Location 16	No	No - Neither
Ethylbenzene	Location 8 Location 9 Location 10	No	No - Neither
2-Hexanone	Location 10	No	No - Neither
Naphthalene	Location 9 Location 11 Location 20 Location 24 Location 35 Location 46 Location 47	No	No - Neither
Trichloroethene	Location 11 Location 16 Location 24 Location 26	No	No - Neither
1,2,4-Trimethylbenzene	Location 8 Location 9 Location 11 Location 13	No	No - Neither
Vinyl Chloride	Location 13	No	Yes - Both
m/p-Xylenes	Location 8 Location 9	Yes	Yes - Both
Source (1): Department of Environmental Protection, Bureau of Land Recycling and Waste Management, Document Number 253-0300-100, Land Recycling Program Technical Guidance Manual – Section IV.A.4. Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard, January 24, 2004, SHS Definitions, COPIACs for Groundwater and Soil, Pages 22 and 23.			

The Property # referenced here is synonymous with the Location # referenced in the RI Report (e.g. Property #2 is the same as Location #2)

Table D-6. Summary of the Measured Indoor and Outdoor Air Concentrations of the Constituents Retained After Steps I and II of the VI Evaluation and Comparison to Typical Background Indoor Air Concentrations

	BASEMENT AIR							FIRST FLOOR AIR							RANGE OF 90TH %-ILE BACKGROUND			OUTDOOR AIR						
			(ug/m3)							(ug/m3)					(ug/m3)					(ug/m3)				
ANALYTE	**# DET**	**# NA**	**MIN**	**QUAL**		**MAX**	**QUAL**	**# DET**	**# NA**	**MIN**	**QUAL**		**MAX**	**QUAL**	**MIN**		**MAX**	**# DET**	**# NA**	**MIN**	**QUAL**		**MAX**	**QUAL**
Acetonitrile	0	0	<1		-	<1		1	0	7.6		-	7.6		x	-	x	0	0	<1		-	<1	
Acrolein	0	4	x		-	x		0	4	x		-	x		x	-	x	0	4	x		-	x	
Benzene	5	3	0.38		-	23		6	2	0.51		-	3		5.2	-	15	6	3	0.22	J	-	0.51	
Bromodichloromethane	1	1	0.19	J	-	0.19	J	1	1	0.12	J	-	0.12	J	x	-	x	0	1	<1.1		-	<1.1	
Bromomethane	3	1	0.37	J	-	0.62	J	4	0	0.54	J	-	0.8		0.6	-	0.6 (1)	4	0	0.58	J	-	1.2	
1,3-Butadiene	3	0	0.024	J	-	0.31	J	3	0	0.084	J	-	2.9		1.6	-	1.6 (1)	0	0	<0.31		-	<0.31	
Carbon Tetrachloride	1	1	0.82	J	-	0.82	J	2	0	0.5	J	-	0.52	J	<RL	-	0.94	2	0	0.33	J	-	0.36	J
Chloroform	4	6	0.25	J	-	1.7	J	5	6	0.37	J	-	1.5	J	<RL	-	6.2	0	6	<0.68		-	<0.68	
1,2-Dichloroethane	4	1	0.02		-	4		5	1	0.8	J	-	4		< RL	-	0.4	4	1	0.053	J	-	0.65	J
1,2-Dimethylbenzene	1	0	23		-	23		1	0	0.4		-	0.4		x	-	x	1	0	0.083	J	-	0.083	J
1,4-Dioxane	2	0	1.2		-	15		5	0	0.32	J	-	2		x	-	x	0	0	<0.47		-	<0.47	
Ethylbenzene	3	0	1.6		-	18		3	0	0.4		-	3.3		4.8	-	13	2	0	0.083	J	-	0.09	J
2-Hexanone	0	0	<3.6		-	<3.6		1	0	1.4	J	-	1.4	J	<1.6	-	<2.05 (2)	0	0	<2.9		-	<2.9	
Naphthalene	2	6	2.5	J	-	3.8	J	2	6	3.3	J	-	3.6	J	2.15	-	4.8 (3)	0	6	<4.1		-	<4.1	
Trichloroethene	0	4	x		-	x		1	0	2.5		-	2.5		<RL	-	2.1	0	4	<0.15		-	<0.15	
1,2,4-Trimethylbenzene	4	0	0.38	J	-	26		4	0	0.79	J	-	7.4		6.7	-	9.3 (5)	1	0	0.26	J	-	0.26	J
Vinyl Chloride	1	0	0.2		-	0.2		1	0	0.12		-	0.12		<RL	-	0.04	0	0	<0.041		-	<0.041	
m/p-Xylene	2	0	20		-	60		2	0	1.2		-	14		12	-	56	2	0	0.16	J	-	0.2	J

NOTES:

(#) = Number of studies reflected in the ranges; DET = Detected measurements; MAX = Maximum reported; MIN = Minimum reported; NA = Case where the analyte was not analyzed for; RL = Reporting Limit; QUAL = Qualifier / J = signifies estimated concentration

Table D-7. Identification of Common Consumer Products and Residential Sources Associated with the Constituents Remaining as Potential COPCs for VI Following the Step I and II Screening	
Constituent	**Sources (Reference)**
Acetonitrile	Nail polish remover, liquid glue removers
Acrolein	livestock feed, pesticides, aquatic plant growth control, burning tobacco, fried foods, roasted coffee, and burning of gasoline and oil (C)
Benzene	tobacco smoke, gasoline, automobile exhaust, glues, paints, furniture wax, and detergents (E); scented candles and carpet glue (P)
Bromodichloromethane	chlorinated water and swimming pool water (F)
Bromomethane	automobile exhaust, fumigator, and pest control (G)
1,3-Butadiene	automobile exhaust, cigarette smoke, wood fire smoke, burning of rubber and plastics (D)
Carbon Tetrachloride	aerosol can propellant, refrigerant, cleaning fluid, dry cleaning, spot remover, fire extinguishers, and insecticides (H)
Chloroform	chlorinated water, showers and swimming pool water (I)
1,2-Dichloroethane	additive to unleaded gasoline, degreasers, cleaning solutions, pesticides, adhesives, paints, varnished, finish removers, carpet and wall paper glue (J); polyresin molded decorations (P)
1,2-Dimethylbenzene	[also known as o-xylene] paint products
1,4-Dioxane	solvents and tap water (A)
Ethylbenzene	gasoline, paints, inks, pesticides, carpet glues, paints, varnishes, tobacco products, automobile products, and burning oil, gas or coal (K)
2-Hexanone	paint and paint thinner (L)
Naphthalene	burning tobacco, burning wood, moth balls, toilet cleaner blocks, dyes, resins, leather tanning, insecticides, and automobile exhaust (O)
Trichloroethene	degreasers, solvents, paints, glues, typewriter correction fluids, paint removers, rug cleaners, adhesives, automotive cleaning and degreasers, and spot removers (M)
1,2,4-Trimethylbenzene	Building materials, paints and stains; octane boosters (Q)
Vinyl Chloride	TCE breakdown product, tobacco smoke, and release from PVC pipes and packaging (N)
m/p-Xylene	automobile exhaust, solvents, petroleum products, gasoline, paint, varnish, shellac, rust preventatives, wood preservatives, furniture refinishers, and cigarette smoke (B) floor polish (P)

NOTES:

A ATSDR - Public Health Statement: 1,4-Dioxane, http://www.atsdr.cdc.gov/phs/phs.asp?id&tid=199

B ATSDR - Public Health Statement: Xylenes, http://www.atsdr.cdc.gov/phs/phs.asp?id&tid=53

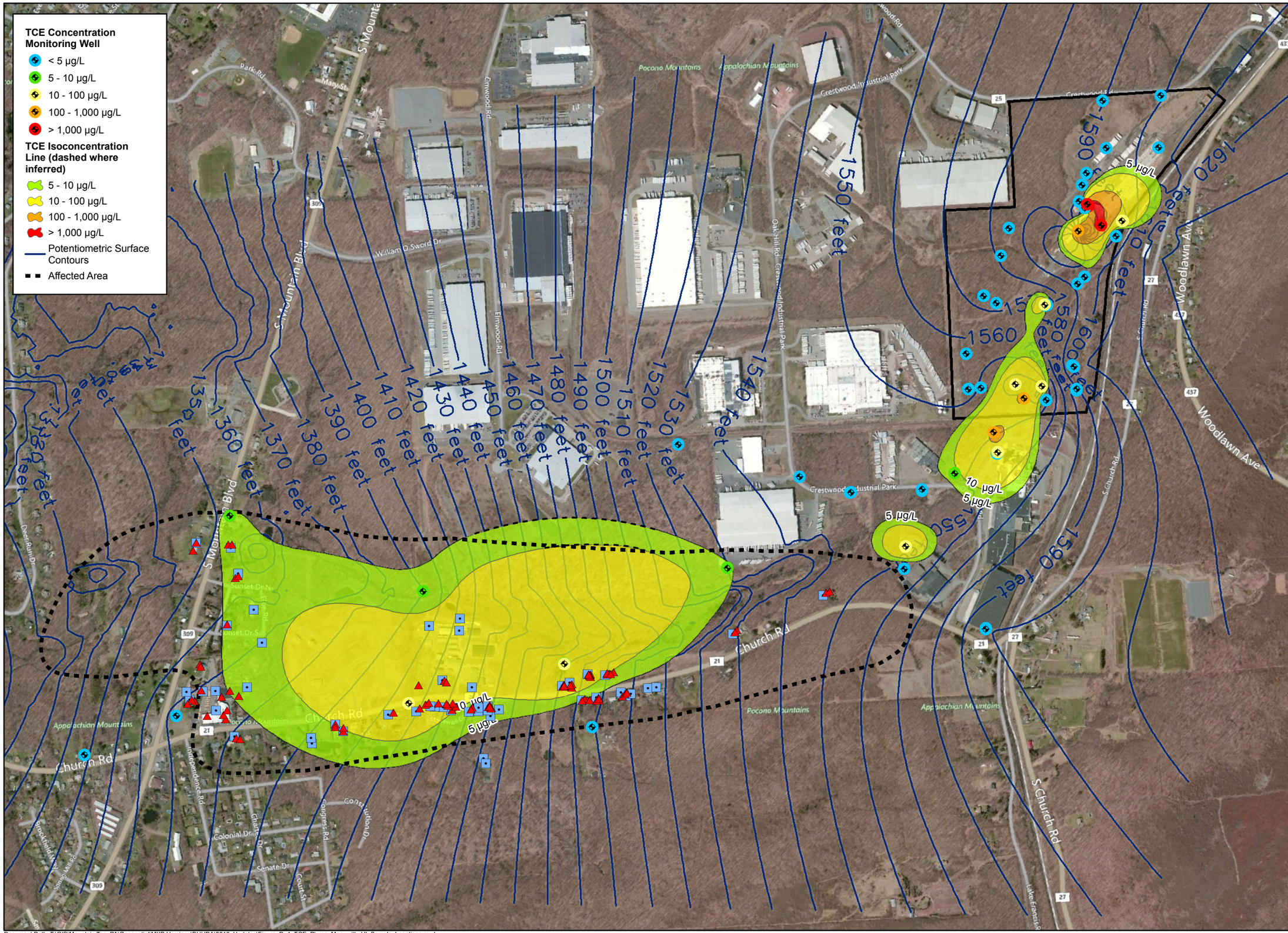
C ATSDR - Public Health Statement: Acrolein, http://www.atsdr.cdc.gov/phs/phs.asp?id=554&tid=102

D ATSDR - Public Health Statement: 1,3-Butadiene, http://www.atsdr.cdc.gov/phs/phs.asp?id=457&tid=81

E ATSDR - Public Health Statement: Benzene, http://www.atsdr.cdc.gov/phs/phs.asp?id=37&tid=14

Table D-7. Identification of Common Consumer Products and Residential Sources Associated with the Constituents Remaining as Potential COPCs for VI Following the Step I and II Screening	
Constituent	**Sources (Reference)**
F ATSDR - Public Health Statement: Bromodichloromethane, http://www.atsdr.cdc.gov/phs/phs.asp?id=706&tid=127	
G ATSDR - Public Health Statement: Bromomethane, http://www.atsdr.cdc.gov/phs/phs.asp?id=820&tid=160	
H ATSDR - Public Health Statement: Carbon Tetrachloride, http://www.atsdr.cdc.gov/phs/phs.asp?id=194&tid=35	
I ATSDR - Public Health Statement: Chloroform, http://www.atsdr.cdc.gov/phs/phs.asp?id=51&tid=16	
J ATSDR - Public Health Statement: 1,2-Dichloroethane, http://www.atsdr.cdc.gov/phs/phs.asp?id=590&tid=110	
K ATSDR - Public Health Statement: Ethylbenzene, http://www.atsdr.cdc.gov/phs/phs.asp?id=381&tid=66	
L ATSDR - Public Health Statement: 2-Hexanone, http://www.atsdr.cdc.gov/phs/phs.asp?id=736&tid=134	
M ATSDR - Public Health Statement: Trichloroethene, http://www.atsdr.cdc.gov/phs/phs.asp?id=171&tid=30	
N ATSDR - Public Health Statement: Vinyl Chloride, http://www.atsdr.cdc.gov/phs/phs.asp?id=280&tid=51	
O ATSDR - Public Health Statement: Naphthalene, http://www.atsdr.cdc.gov/phs/phs.asp?id=238&tid=43	
P NJDEP, Site Remediation Program, Vapor Intrusion Technical Guidance, Version 3.1, March 2013, http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_main.pdf	
Q HIH, http://www.householdproducts.nlm.nih.gov/cgi-bin/household/brands?tbl=chem&id=150	

FIGURES



SOURCES:

TCE CONCENTRATION MONITORING WELLS, ISOCONCENTRATION LINES, POTENTIOMETRIC SURFACE CONTOURS AND AFFECTED AREA: RAMBOLL ENVIRONMENTAL FIGURE 6-9 (KTS). 07/30/2015

FIGURE D-1

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA

MOUNTAIN TOP, PENNSYLVANIA

TETRA TECH

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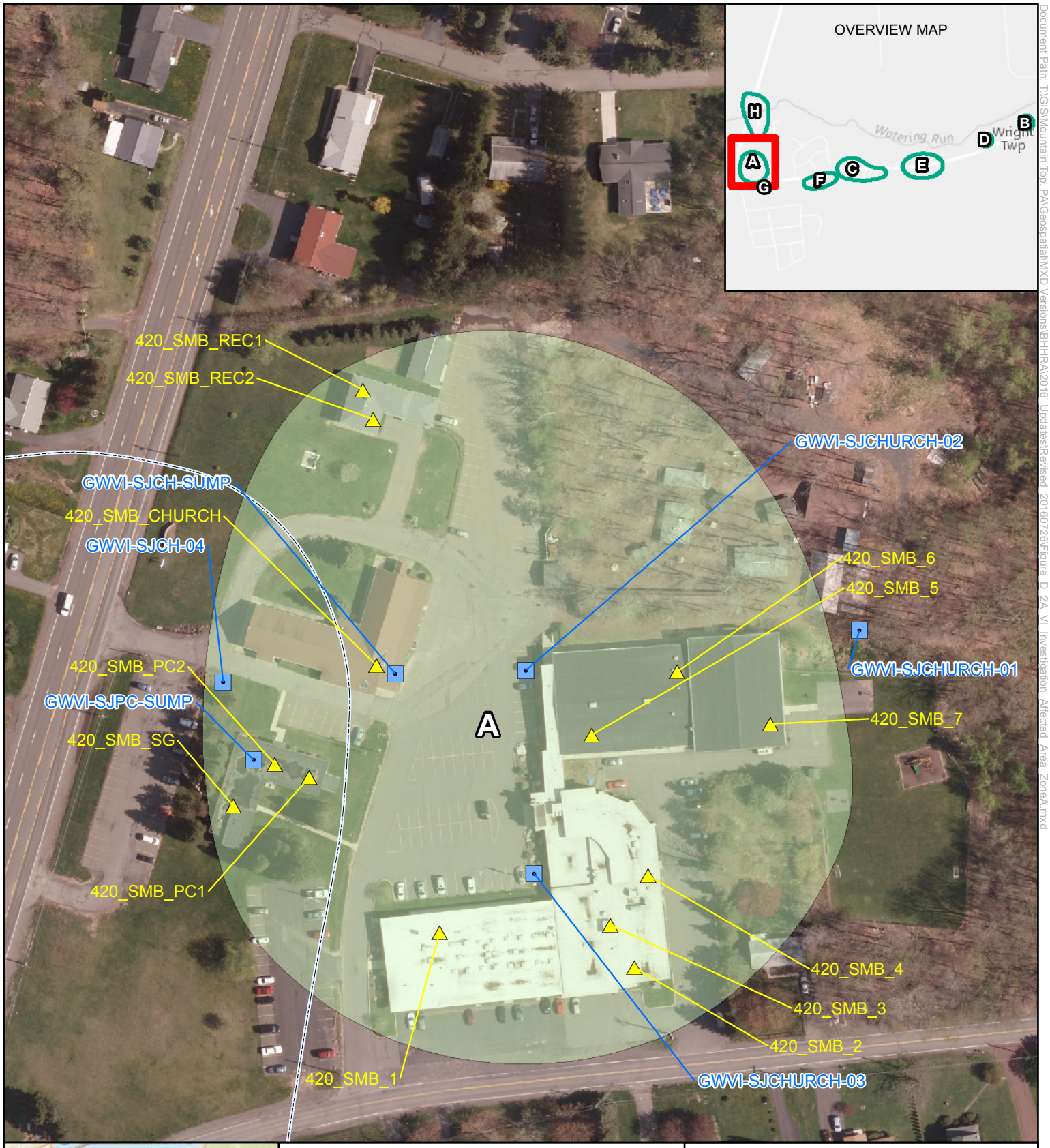

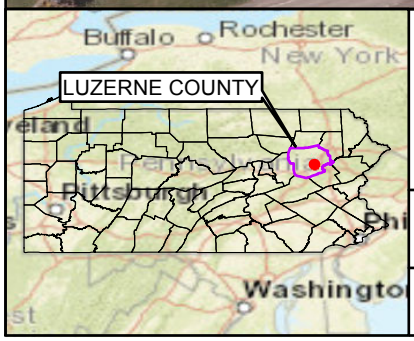

Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 50 100 200
Feet

N

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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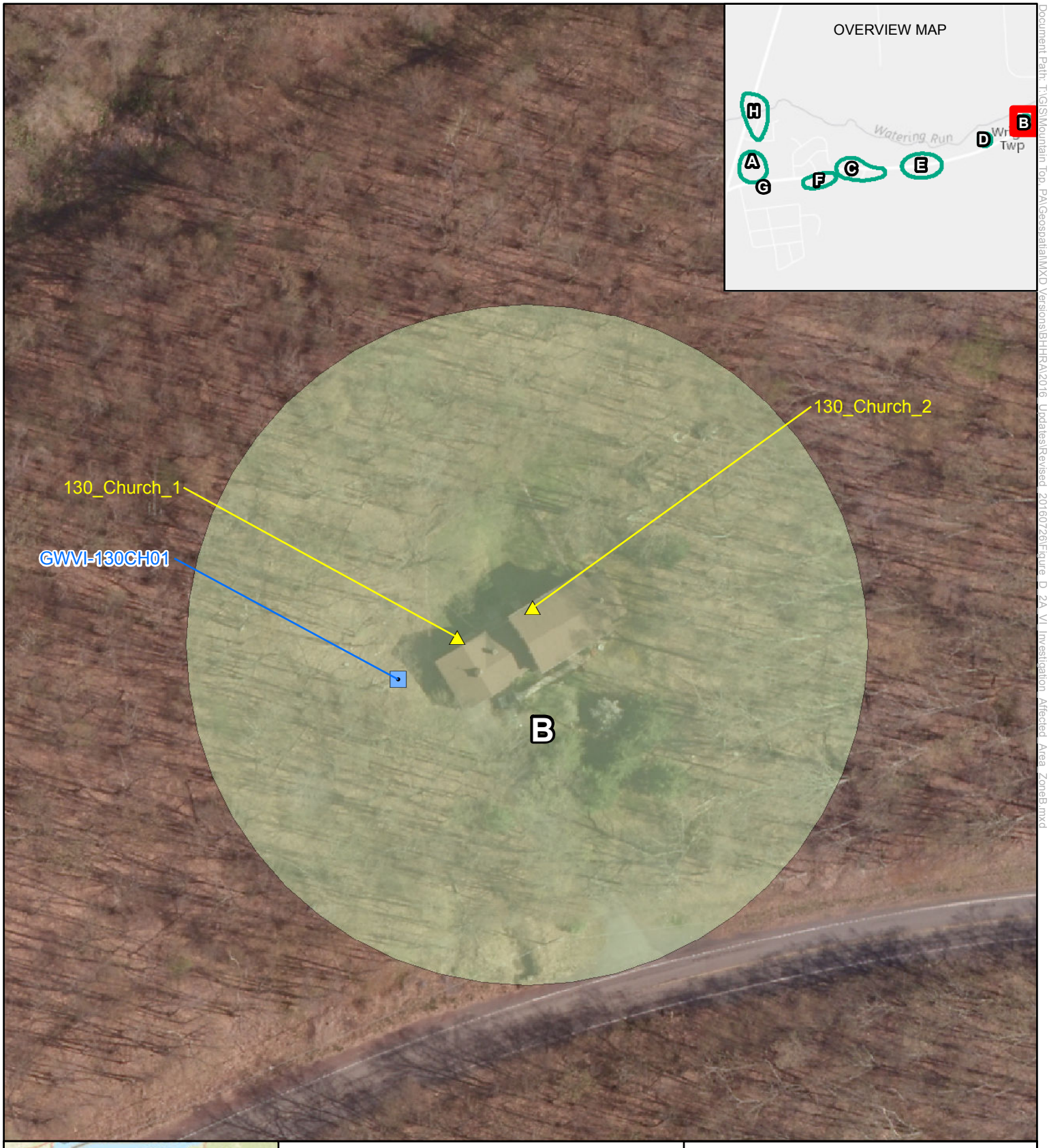
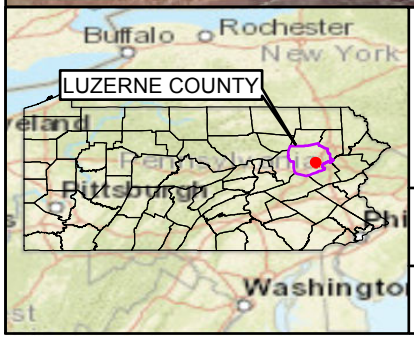
FIGURE D-2A

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING A

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneA.mxd





Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 25 50 100
Feet

N

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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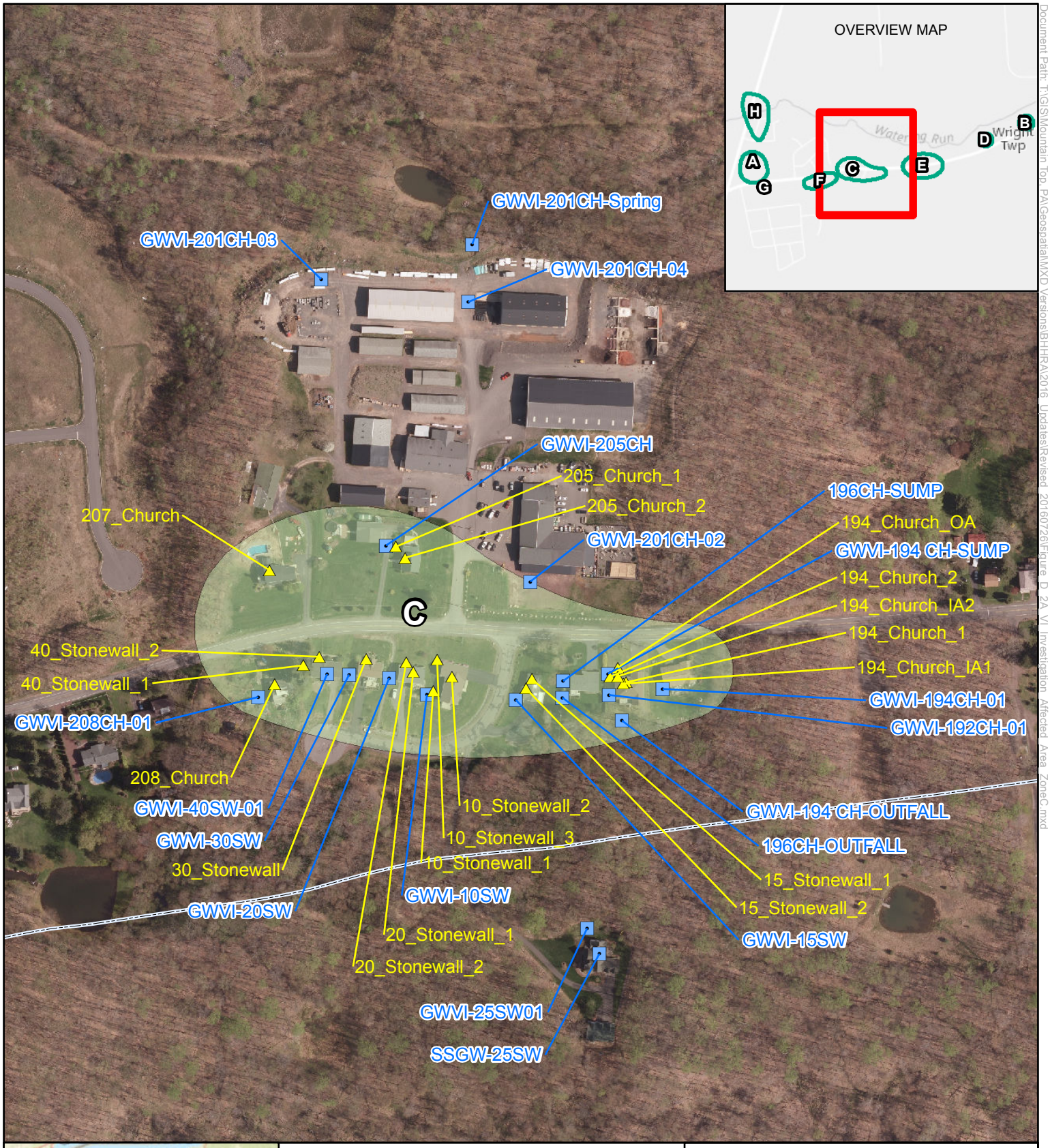
TETRA TECH

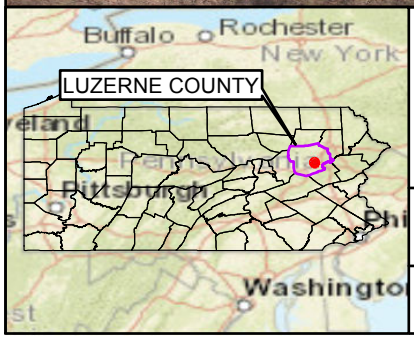
FIGURE D-2B

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING B

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD_Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneB.mxd





Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 50 100 200
Feet

N

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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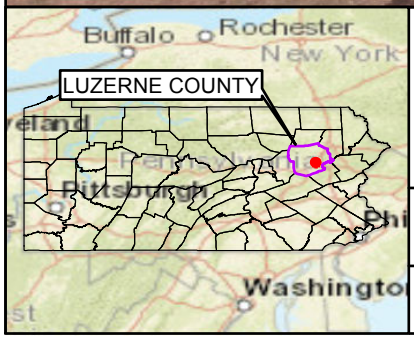
TETRA TECH

FIGURE D-2C

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING C

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneC.mxd



Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 25 50 100
Feet

N

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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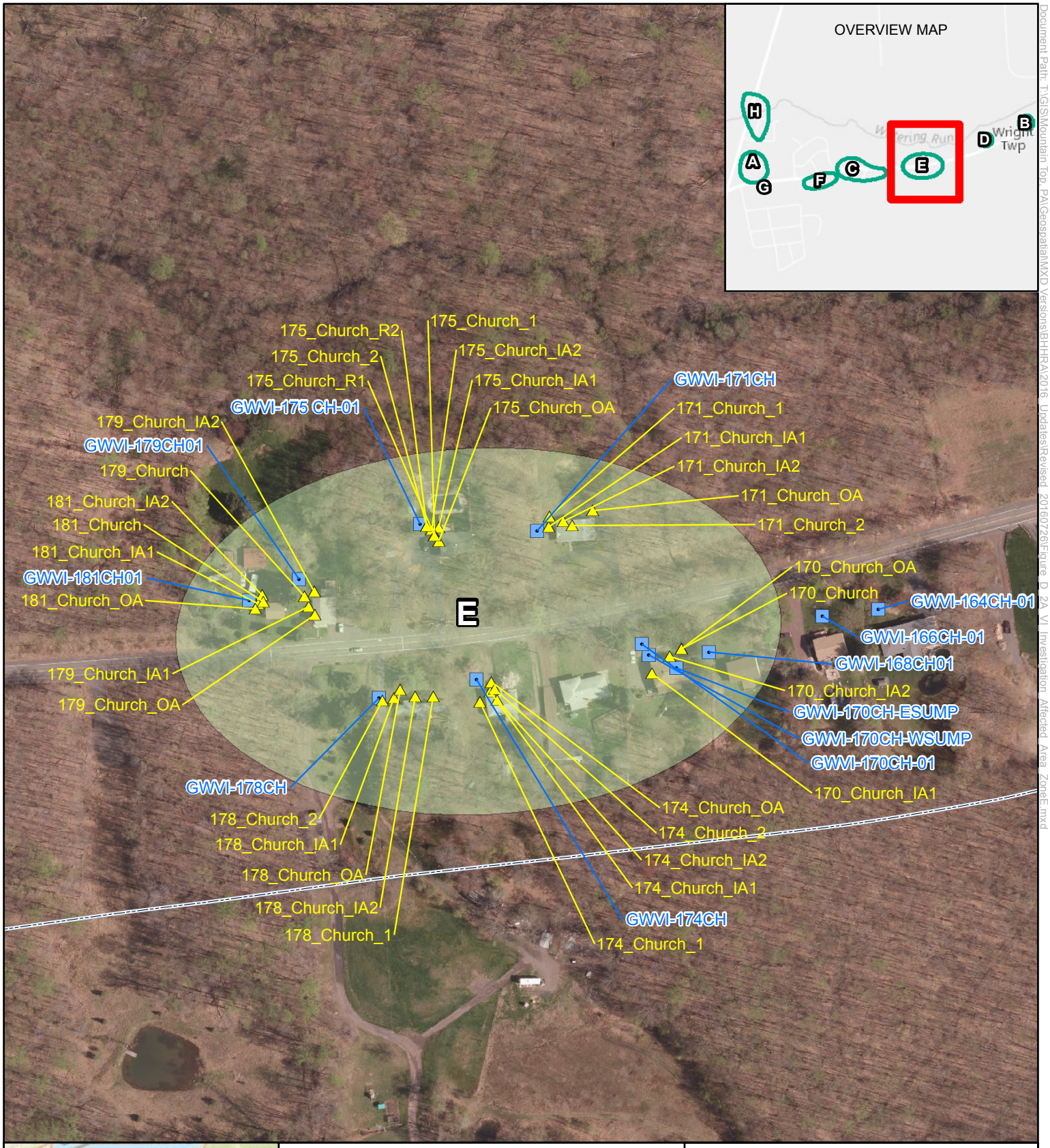
TETRA TECH

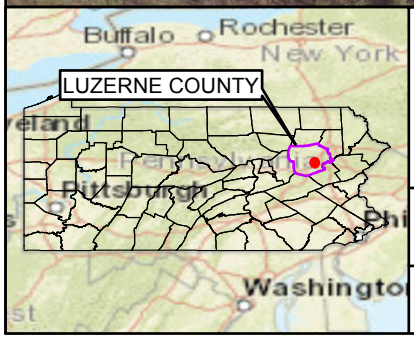
FIGURE D-2D

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING D

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneD.mxd





Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 50 100 200
Feet

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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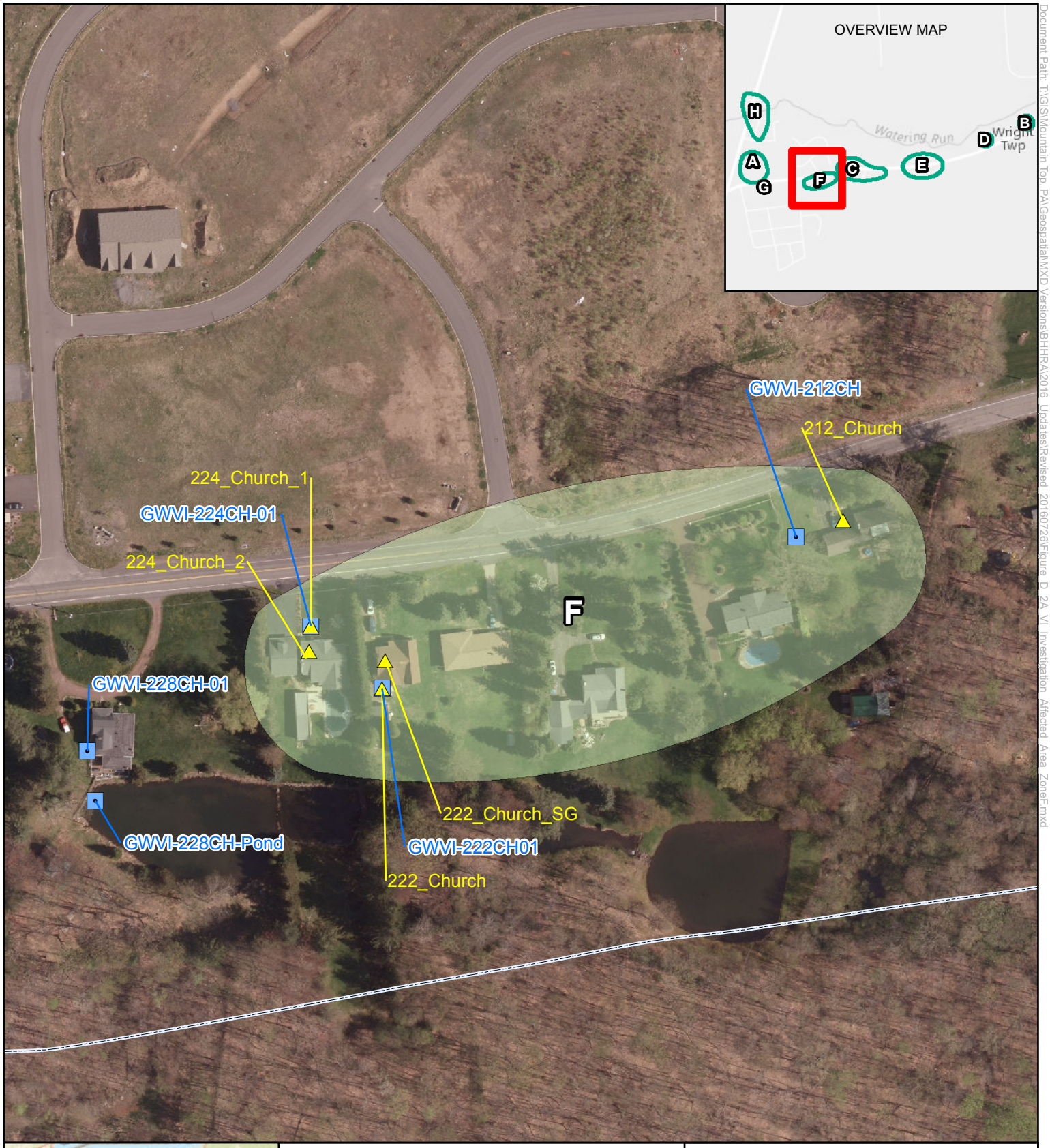
TETRA TECH

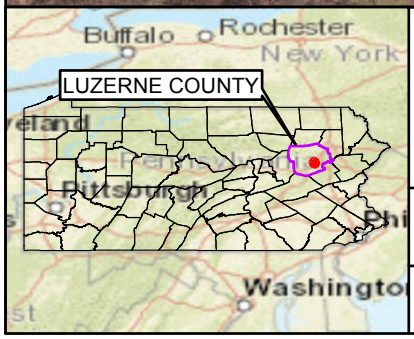
FIGURE D-2E

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING E

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD_Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneE.mxd





Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 50 100 200
Feet

N

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

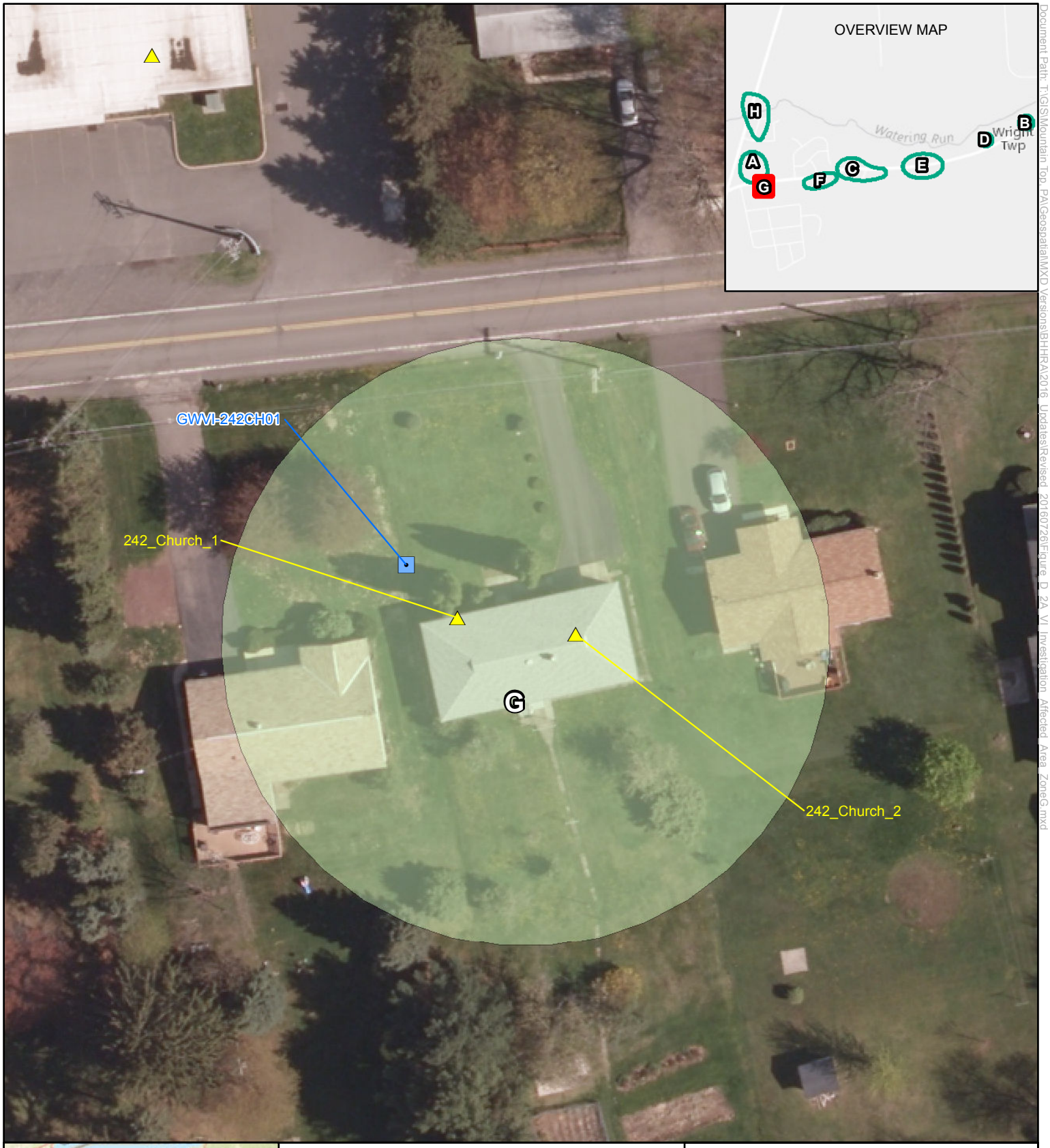
TETRA TECH

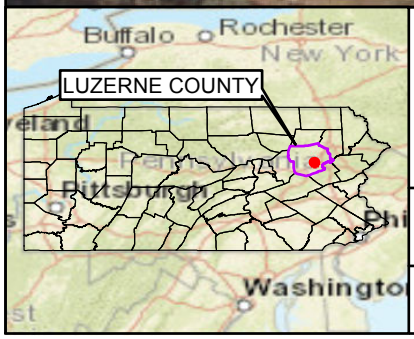
FIGURE D-2F

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING F

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneF.mxd





Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 25 50
Feet

N

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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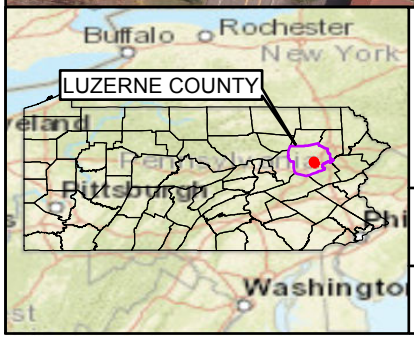
TETRA TECH

FIGURE D-2G

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING G

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneG.mxd



Legend

- Air Vapor Intrusion Sample Locations (Indoor Air, Outdoor Air, Sub-Slab Vapor, Exterior Soil Gas)
- Shallow Groundwater Vapor Intrusion Sample Locations
- Affected Area
- Affected Area Groundwater Zone for the VI Evaluation

0 50 100 200
Feet

N

Sources:
Aerial Photography: Axis Geospatial, 2011
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
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TETRA TECH

FIGURE D-2H

LOCATIONS OF THE SAMPLING PERFORMED FOR THE VAPOR INTRUSION EVALUATION FOR THE AFFECTED AREA HIGHLIGHTING SHALLOW MONITORING WELL GROUPING H

MOUNTAIN TOP, PENNSYLVANIA

Document Path: T:\GIS\Mountain Top_PA\Geospatial\MXD Versions\BHHRA\2016_Updates\Revised_20160726\Figure_D_2A_VI_Investigation_Affected_Area_ZoneH.mxd

SUPPLEMENTS

Supplement 1

USEPA VISL Calculator Outputs for the 78 Residential and Commercial Runs for the Affected Area

OSWER VAPOR INTRUSION ASSESSMENT - 10 STONEWALL CIRCLE (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
			Csg	Cia	CR	HQ	IUR		RfC		
			(ug/m^3)	(ug/m^3)			(ug/m^3)$^{-1}$		(mg/m^3)		i
x	67-64-1	Acetone	2.4E+01	7.20E-01	No IUR	2.2E-05			3.10E+01	A	
x	71-43-2	Benzene	3.0E+00	9.00E-02	2.5E-07	2.9E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.2E-01	2.46E-02	No IUR	4.7E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide	9.0E-01	2.70E-02	No IUR	3.7E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.6E-01	1.08E-02	2.3E-08	1.0E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.8E-01	5.40E-03	4.4E-08	5.3E-05	2.30E-05	I	9.80E-02	A	
x	98-82-8	Cumene	4.2E-01	1.26E-02	No IUR	3.0E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	1.6E+00	4.80E-02	No IUR	7.7E-06			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	2.5E-01	7.50E-03	2.9E-08	9.0E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	107-06-2	Dichloroethane, 1,2-	1.3E-01	3.90E-03	3.6E-08	5.3E-04	2.60E-05	I	7.00E-03	P	
x	100-41-4	Ethylbenzene	1.2E+00	3.60E-02	3.2E-08	3.5E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.8E+00	5.40E-02	No IUR	7.4E-05			7.00E-01	I	
x	67-63-0	Isopropanol	6.9E+00	2.07E-01	No IUR	9.9E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.5E+00	1.05E-01	No IUR	2.0E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	7.4E-01	2.22E-02	No IUR	7.1E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride	4.5E+00	1.35E-01	1.3E-09	2.2E-04	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene	3.2E-01	9.60E-03	No IUR	9.2E-06			1.00E+00	X	
x	100-42-5	Styrene	1.4E+00	4.20E-02	No IUR	4.0E-05			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	6.4E-01	1.92E-02	1.8E-09	4.6E-04	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	1.3E+01	3.90E-01	No IUR	7.5E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.5E+00	4.50E-02	No IUR	1.4E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.7E-01	8.10E-03	No IUR	1.6E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.5E-01	4.50E-03	9.4E-09	2.2E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.1E+00	3.30E-02	No IUR	4.5E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate	5.6E+00	1.68E-01	No IUR	8.1E-04			2.00E-01	I	
x	95-47-6	Xylene, o-	1.0E+00	3.00E-02	No IUR	2.9E-04			1.00E-01	S	
x	1330-20-7	Xylenes	3.4E+00	1.02E-01	No IUR	9.8E-04			1.00E-01	I	
					4.3E-07	**2.0E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 10 STONEWALL CIRCLE (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.5E+01	4.50E-01	No IUR	1.4E-05			3.10E+01	A	
x	71-43-2	Benzene	4.5E-01	1.35E-02	3.8E-08	4.3E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	2.2E+00	6.60E-02	No IUR	1.3E-02			5.00E-03	I	
x	75-15-0	Carbon Disulfide	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	4.8E-01	1.44E-02	3.1E-08	1.4E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	7.3E-01	2.19E-02	1.8E-07	2.1E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	8.0E+00	2.40E-01	No IUR	2.6E-03			9.00E-02	I	
x	98-82-8	Cumene	1.7E-01	5.10E-03	No IUR	1.2E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	1.0E-01	3.00E-03	No IUR	4.8E-07			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.2E+00	6.60E-02	No IUR	6.3E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	1.0E-01	3.00E-03	1.7E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	3.1E-01	9.30E-03	8.6E-08	1.3E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	2.2E-02	6.60E-04	No IUR	3.2E-06			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	2.1E-01	6.30E-03	1.1E-08	2.0E-04	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	4.0E-01	1.20E-02	1.1E-08	1.2E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.5E+00	4.50E-02	No IUR	8.6E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.3E-01	6.90E-03	No IUR	2.2E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene	1.3E-01	3.90E-03	No IUR	3.7E-06			1.00E+00	X	
x	100-42-5	Styrene	2.4E-01	7.20E-03	No IUR	6.9E-06			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.7E-01	5.10E-03	4.7E-10	1.2E-04	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	2.6E+00	7.80E-02	No IUR	1.5E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.0E+00	1.20E-01	No IUR	3.8E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	5.1E-01	1.53E-02	No IUR	2.9E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.5E-01	4.50E-03	9.4E-09	2.2E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.0E+00	6.00E-02	No IUR	8.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.3E-01	9.90E-03	No IUR	1.4E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	95-47-6	Xylene, o-	4.8E-01	1.44E-02	No IUR	1.4E-04			1.00E-01	S	
x	1330-20-7	Xylenes	1.4E+00	4.20E-02	No IUR	4.0E-04			1.00E-01	I	
					3.7E-07	**2.3E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 10 STONEWALL CIRCLE (SSG3)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
			Csg	Cia	CR	HQ	IUR		RfC		
			(ug/m^3)	(ug/m^3)			(ug/m^3)$^{-1}$		(mg/m^3)		i
x	67-64-1	Acetone	1.30E+01	3.90E-01	No IUR	1.2E-05			3.10E+01	A	
x	71-43-2	Benzene	3.80E+00	1.14E-01	3.2E-07	3.6E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	1.1E+00	3.30E-02	No IUR	6.3E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide	5.9E-01	1.77E-02	No IUR	2.4E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.6E-01	1.08E-02	2.3E-08	1.0E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene	4.1E-01	1.23E-02	No IUR	2.9E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	1.6E-01	4.80E-03	No IUR	7.7E-07			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.2E+00	6.60E-02	No IUR	6.3E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.0E-02	1.20E-03	1.1E-08	1.6E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	9.7E-01	2.91E-02	5.2E-08	9.3E-04	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	4.2E-01	1.26E-02	1.1E-08	1.2E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.7E+00	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.4E-01	4.20E-03	No IUR	1.3E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene	2.7E-01	8.10E-03	No IUR	7.8E-06			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	3.0E-01	9.00E-03	8.3E-10	2.2E-04	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	2.4E+00	7.20E-02	No IUR	1.4E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.8E+00	5.40E-02	No IUR	1.7E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.4E-01	1.02E-02	No IUR	2.0E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	8.6E-02	2.58E-03	5.4E-09	1.2E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.5E+00	4.50E-02	No IUR	6.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	4.8E-01	1.44E-02	No IUR	2.0E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	95-47-6	Xylene, o-	4.8E-01	1.44E-02	No IUR	1.4E-04			1.00E-01	S	
x	1330-20-7	Xylenes	1.3E+00	3.90E-02	No IUR	3.7E-04			1.00E-01	I	
					4.2E-07	**1.6E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 14 SUNSET DRIVE (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.30E+01	3.90E-01	No IUR	1.2E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.10E-01	3.30E-03	9.2E-09	1.1E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	9.3E-01	2.79E-02	No IUR	5.4E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.4E-01	1.02E-02	2.2E-08	9.8E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.0E+00	3.00E-02	2.5E-07	2.9E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	3.1E-01	9.30E-03	3.6E-08	1.1E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.2E+00	6.60E-02	No IUR	6.3E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.5E-02	7.50E-04	6.9E-09	1.0E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.1E-02	2.73E-03	2.4E-09	2.6E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.0E-01	6.00E-03	No IUR	8.2E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	7.0E-01	2.10E-02	No IUR	6.7E-04			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.0E+00	9.00E-02	No IUR	1.7E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.0E-01	6.00E-03	No IUR	1.9E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	1.8E+00	5.40E-02	6.5E-07	1.7E-02	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	4.0E-01	1.20E-02	No IUR	2.3E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.1E+00	3.30E-02	No IUR	1.1E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.7E+00	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.4E-02	1.02E-03	2.1E-09	4.9E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.4E+00	7.20E-02	No IUR	9.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	7.8E-02	2.34E-03	No IUR	2.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	2.7E-01	8.10E-03	No IUR	7.8E-05			1.00E-01	I	
				TOTAL:	**9.8E-07**	**2.5E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 15 STONEWALL CIRCLE (SSG1)
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	4.30E+01	1.29E+00	No IUR	4.0E-05			3.10E+01	A	
x	71-43-2	Benzene	3.00E-01	9.00E-03	2.5E-08	2.9E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.2E-01	2.46E-02	No IUR	4.7E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	8.3E-01	2.49E-02	2.0E-07	2.4E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.9E+00	5.70E-02	No IUR	5.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	1.9E-01	5.70E-03	5.1E-09	5.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	67-63-0	Isopropanol	3.2E+00	9.60E-02	No IUR	4.6E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.5E+00	7.50E-02	No IUR	1.4E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	7.8E-01	2.34E-02	No IUR	7.5E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	9.4E-01	2.82E-02	No IUR	5.4E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-		--	--	--			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	95-47-6	Xylene, o-	2.0E-01	6.00E-03	No IUR	5.8E-05			1.00E-01	S	
x	1330-20-7	Xylenes	5.6E-01	1.68E-02	No IUR	1.6E-04			1.00E-01	I	
					2.3E-07	**6.6E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 15 STONEWALL CIRCLE (SSG2)
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.30E+01	9.90E-01	No IUR	3.1E-05			3.10E+01	A	
x	71-43-2	Benzene		--	--	--	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.2E-01	2.46E-02	No IUR	4.7E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.9E+00	5.70E-02	No IUR	5.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene		--	--	--	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.8E+00	1.14E-01	No IUR	2.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	6.0E-01	1.80E-02	No IUR	3.5E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-		--	--	--			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.4E+00	4.20E-02	No IUR	5.8E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	95-47-6	Xylene, o-		--	--	--			1.00E-01	S	
x	1330-20-7	Xylenes	3.8E-01	1.14E-02	No IUR	1.1E-04			1.00E-01	I	
					0.0E+00	**5.5E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 20 SUNSET DRIVE (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.00E+01	6.00E-01	No IUR	1.9E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.40E+00	4.20E-02	1.2E-07	1.3E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.0E-01	2.40E-02	No IUR	4.6E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.4E+01	4.20E-01	No IUR	5.8E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	1.8E-01	5.40E-03	1.2E-08	5.2E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.7E+00	5.10E-02	4.2E-07	5.0E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene	2.2E-01	6.60E-03	No IUR	1.6E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	1.7E+00	5.10E-02	No IUR	8.2E-06			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	4.0E-01	1.20E-02	6.8E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	6.1E-02	1.83E-03	1.7E-08	2.5E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.6E+00	1.08E-01	9.6E-08	1.0E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	6.0E-01	1.80E-02	No IUR	2.5E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	8.4E-01	2.52E-02	No IUR	1.2E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	5.0E+00	1.50E-01	No IUR	2.9E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	3.7E-01	1.11E-02	No IUR	1.1E-05			1.00E+00	X	
x	115-07-1	Propylene	2.6E+00	7.80E-02	No IUR	2.5E-05			3.00E+00	CA	
x	100-42-5	Styrene	1.7E-01	5.10E-03	No IUR	4.9E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	4.5E-01	1.35E-02	1.3E-09	3.2E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.5E+00	4.50E-02	No IUR	8.6E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.2E-01	1.86E-02	No IUR	5.9E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.5E+01	4.50E-01	No IUR	8.6E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.8E-02	8.40E-04	1.8E-09	4.0E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.5E+00	4.50E-02	No IUR	6.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	7.9E-01	2.37E-02	No IUR	3.2E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.8E-01	1.14E-02	No IUR	1.1E-04			1.00E-01	S	
x	1330-20-7	Xylenes	6.9E+00	2.07E-01	No IUR	2.0E-03			1.00E-01	I	
				TOTAL:	**6.7E-07**	**1.4E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 20 SUNSET DRIVE (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.60E+01	7.80E-01	No IUR	2.4E-05			3.10E+01	A	
x	75-05-8	Acetonitrile	1.00E+00	3.00E-02	No IUR	4.8E-04			6.00E-02	I	
x	71-43-2	Benzene	3.00E-01	9.00E-03	2.5E-08	2.9E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.5E-01	2.55E-02	No IUR	4.9E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	3.1E+00	9.30E-02	No IUR	1.3E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	1.8E-01	5.40E-03	1.2E-08	5.2E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	5.4E-01	1.62E-02	1.3E-07	1.6E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.0E-01	1.50E-02	No IUR	1.6E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	8.9E-02	2.67E-03	1.5E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.5E-01	1.35E-02	1.3E-07	1.8E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	4.4E-01	1.32E-02	No IUR	6.3E-05			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	5.4E-01	1.62E-02	2.9E-08	5.2E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.4E-01	4.20E-03	3.7E-09	4.0E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.9E-01	5.70E-03	No IUR	7.8E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.5E+00	4.50E-02	No IUR	2.2E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.6E+00	4.80E-02	No IUR	9.2E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	7.7E-01	2.31E-02	No IUR	2.2E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.2E+00	6.60E-02	6.1E-09	1.6E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.0E+00	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	8.4E-01	2.52E-02	No IUR	8.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.3E+00	6.90E-02	No IUR	1.3E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.3E+00	3.90E-02	8.2E-08	1.9E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.0E+00	6.00E-02	No IUR	8.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	7.2E-02	2.16E-03	9.4E-09	2.1E-05	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.5E-01	4.50E-03	No IUR	4.3E-05			1.00E-01	S	
x	1330-20-7	Xylenes	3.2E-01	9.60E-03	No IUR	9.2E-05			1.00E-01	I	
				TOTAL:	**4.3E-07**	**3.0E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 20 STONEWALL CIRCLE (SSG1)
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.60E+01	1.08E+00	No IUR	3.3E-05			3.10E+01	A	
x	71-43-2	Benzene	2.10E+00	6.30E-02	1.8E-07	2.0E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	1.1E+00	3.30E-02	No IUR	6.3E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.0E+00	3.00E-02	No IUR	3.2E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.7E+00	5.10E-02	No IUR	4.9E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.4E-01	4.20E-03	3.9E-08	5.8E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	2.8E-01	8.40E-03	7.5E-09	8.1E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	6.7E-01	2.01E-02	No IUR	2.8E-05			7.00E-01	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.8E+00	1.14E-01	No IUR	2.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	1.6E+00	4.80E-02	No IUR	9.2E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-		--	--	--			5.00E+00	I	
x	79-01-6	Trichloroethylene	5.1E-01	1.53E-02	3.2E-08	7.3E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.4E+00	7.20E-02	No IUR	9.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	4.6E-02	1.38E-03	6.0E-09	1.3E-05	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.2E-01	9.60E-03	No IUR	9.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	9.0E-01	2.70E-02	No IUR	2.6E-04			1.00E-01	I	
					2.6E-07	**1.8E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 20 STONEWALL CIRCLE (SSG2)
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration	Calculated Indoor Air Concentration	VI Carcinogenic Risk	VI Hazard	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator
			Csg	Cia	CR	HQ	IUR		RfC		
			(ug/m^3)	(ug/m^3)			(ug/m^3)$^{-1}$		(mg/m^3)		i
x	67-64-1	Acetone	2.30E+01	6.90E-01	No IUR	2.1E-05			3.10E+01	A	
x	71-43-2	Benzene		--	--	--	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.2E-01	2.46E-02	No IUR	4.7E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	9.3E-01	2.79E-02	2.3E-07	2.7E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	2.0E-01	6.00E-03	5.3E-09	5.8E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.2E+00	6.60E-02	No IUR	1.3E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	2.5E-01	7.50E-03	6.9E-10	1.8E-04	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	1.0E+00	3.00E-02	No IUR	5.8E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-		--	--	--			5.00E+00	I	
x	79-01-6	Trichloroethylene	8.6E-01	2.58E-02	5.4E-08	1.2E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.5E+00	4.50E-02	No IUR	6.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.8E-01	5.40E-03	No IUR	5.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	5.2E-01	1.56E-02	No IUR	1.5E-04			1.00E-01	I	
					2.9E-07	**1.8E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 30 STONEWALL CIRCLE (SSG1)
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.30E+01	6.90E-01	No IUR	2.1E-05			3.10E+01	A	
x	71-43-2	Benzene	2.00E+00	6.00E-02	1.7E-07	1.9E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	7.0E-01	2.10E-02	No IUR	4.0E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide	8.1E-01	2.43E-02	No IUR	3.3E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	1.9E-08	8.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.6E-01	4.80E-03	3.9E-08	4.7E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.0E-01	6.00E-03	No IUR	6.4E-05			9.00E-02	I	
x	98-82-8	Cumene	1.6E-01	4.80E-03	No IUR	1.2E-05			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.0E-02	1.20E-03	1.1E-08	1.6E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	1.8E-01	5.40E-03	4.8E-09	5.2E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.1E-01	9.30E-03	No IUR	1.3E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.9E-01	1.47E-02	No IUR	4.7E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.7E+00	5.10E-02	No IUR	2.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.5E+00	1.05E-01	No IUR	2.0E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.2E-01	6.60E-03	No IUR	2.1E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene	1.0E-01	3.00E-03	No IUR	2.9E-06			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.6E-01	4.80E-03	4.4E-10	1.2E-04	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	1.3E+00	3.90E-02	No IUR	7.5E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.1E-01	1.23E-02	No IUR	3.9E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.8E-02	1.14E-03	No IUR	2.2E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	7.0E-02	2.10E-03	4.4E-09	1.0E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.7E-01	5.10E-03	No IUR	4.9E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.0E-01	1.20E-02	No IUR	1.2E-04			1.00E-01	I	
					2.5E-07	**9.0E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 40 STONEWALL CIRCLE (SSG1)
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.60E+01	1.08E+00	No IUR	3.3E-05			3.10E+01	A	
x	71-43-2	Benzene	2.40E+00	7.20E-02	2.0E-07	2.3E-03	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane	3.00E-01	9.00E-03	1.2E-07	No RfC	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide	3.0E+00	9.00E-02	No IUR	1.2E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	1.9E-08	8.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	3.0E+01	9.00E-01	**7.4E-06**	8.8E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.0E-01	1.50E-02	No IUR	1.6E-04			9.00E-02	I	
x	98-82-8	Cumene	1.1E+01	3.30E-01	No IUR	7.9E-04			4.00E-01	I	
x	110-82-7	Cyclohexane	3.0E-01	9.00E-03	No IUR	1.4E-06			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.5E+00	7.50E-02	No IUR	7.2E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	7.3E-02	2.19E-03	2.0E-08	3.0E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.5E+00	4.50E-02	8.0E-08	1.4E-03	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	3.3E-01	9.90E-03	8.8E-09	9.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	9.2E-01	2.76E-02	No IUR	3.8E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.5E-01	1.35E-02	No IUR	4.3E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.6E+00	4.80E-02	No IUR	2.3E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.2E+00	9.60E-02	No IUR	1.8E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	3.4E-01	1.02E-02	No IUR	3.3E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene	1.8E-01	5.40E-03	No IUR	5.2E-06			1.00E+00	X	
x	100-42-5	Styrene	7.2E-01	2.16E-02	No IUR	2.1E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-	1.1E-01	3.30E-03	6.8E-08	No RfC	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.9E-01	5.70E-03	5.3E-10	1.4E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	9.4E-01	2.82E-02	No IUR	1.4E-05			2.00E+00	I	
x	108-88-3	Toluene	1.7E+00	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	7.0E-01	2.10E-02	No IUR	6.7E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	4.0E-02	1.20E-03	No IUR	2.3E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	6.7E-01	2.01E-02	No IUR	2.8E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	5.9E-01	1.77E-02	No IUR	2.4E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.5E-02	4.50E-04	2.0E-09	4.3E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.8E-01	1.44E-02	No IUR	1.4E-04			1.00E-01	S	
x	1330-20-7	Xylenes	1.1E+00	3.30E-02	No IUR	3.2E-04			1.00E-01	I	
					7.9E-06	**1.9E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 40 STONEWALL CIRCLE (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.90E+01	1.77E+00	No IUR	5.5E-05			3.10E+01	A	
x	71-43-2	Benzene	3.80E+00	1.14E-01	3.2E-07	3.6E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide	3.4E-01	1.02E-02	No IUR	1.4E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	5.2E-01	1.56E-02	3.3E-08	1.5E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.8E+00	8.40E-02	6.9E-07	8.2E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	3.7E-01	1.11E-02	No IUR	1.2E-04			9.00E-02	I	
x	98-82-8	Cumene	1.4E-01	4.20E-03	No IUR	1.0E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	1.5E-01	4.50E-03	No IUR	7.2E-07			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.4E+00	7.20E-02	No IUR	6.9E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	5.3E-02	1.59E-03	1.5E-08	2.2E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	9.1E-02	2.73E-03	2.4E-09	2.6E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	4.6E-01	1.38E-02	No IUR	1.9E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.9E-01	1.47E-02	No IUR	4.7E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.2E+00	3.60E-02	No IUR	1.7E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.8E+00	1.14E-01	No IUR	2.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.1E-01	3.30E-03	3.1E-10	7.9E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	4.1E-01	1.23E-02	No IUR	5.9E-06			2.00E+00	I	
x	108-88-3	Toluene	4.5E-01	1.35E-02	No IUR	2.6E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.5E-01	1.95E-02	No IUR	6.2E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	4.3E-02	1.29E-03	No IUR	2.5E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.5E+00	4.50E-02	No IUR	6.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	2.2E-01	6.60E-03	No IUR	9.0E-04			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.3E-01	3.90E-03	No IUR	3.7E-05			1.00E-01	S	
x	1330-20-7	Xylenes	3.0E-01	9.00E-03	No IUR	8.6E-05			1.00E-01	I	
					1.1E-06	**7.6E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 130 CHURCH ROAD (SSG1)
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.30E+00	9.90E-02	No IUR	3.1E-06			3.10E+01	A	
x	71-43-2	Benzene	8.60E-02	2.58E-03	7.2E-09	8.2E-05	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide	7.8E-01	2.34E-02	No IUR	3.2E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.1E-01	6.30E-03	1.3E-08	6.0E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	6.3E-01	1.89E-02	1.5E-07	1.8E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.9E-01	5.70E-03	No IUR	6.1E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	4.8E+00	1.44E-01	No IUR	1.4E-03			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.0E-02	1.20E-03	1.1E-08	1.6E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	8.0E-02	2.40E-03	No IUR	1.2E-05			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	2.0E-01	6.00E-03	5.3E-09	5.8E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.5E-01	1.05E-02	No IUR	2.0E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	7.9E-01	2.37E-02	No IUR	4.5E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.3E+01	1.59E+00	No IUR	5.1E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.4E-01	7.20E-03	No IUR	1.4E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.5E+00	4.50E-02	No IUR	6.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.8E-01	5.40E-03	No IUR	5.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	3.3E-01	9.90E-03	No IUR	9.5E-05			1.00E-01	I	
				TOTAL:	**1.9E-07**	**2.3E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 130 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.70E+00	1.71E-01	No IUR	5.3E-06			3.10E+01	A	
x	71-43-2	Benzene	3.00E-01	9.00E-03	2.5E-08	2.9E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	6.2E-01	1.86E-02	No IUR	3.6E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide	6.0E+00	1.80E-01	No IUR	2.5E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	1.9E-08	8.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.7E-01	8.10E-03	6.6E-08	7.9E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	4.5E-01	1.35E-02	No IUR	1.4E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	7.9E+00	2.37E-01	No IUR	2.3E-03			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.0E-02	1.20E-03	1.1E-08	1.6E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	1.0E-01	3.00E-03	No IUR	1.4E-05			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	1.0E-01	3.00E-03	2.7E-09	2.9E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	3.9E-01	1.17E-02	No IUR	5.6E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.2E-01	1.86E-02	No IUR	3.6E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene	7.2E-01	2.16E-02	No IUR	4.1E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	7.7E+01	2.31E+00	No IUR	7.4E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.6E-01	1.08E-02	No IUR	2.1E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.8E-02	5.40E-04	1.1E-09	2.6E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.6E+00	4.80E-02	No IUR	6.6E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	8.3E-02	2.49E-03	No IUR	2.4E-05			1.00E-01	S	
x	1330-20-7	Xylenes	2.0E-01	6.00E-03	No IUR	5.8E-05			1.00E-01	I	
				TOTAL:	**1.3E-07**	**7.4E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 146 CHURCH STREET (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone		--	--	--			3.10E+01	A	
x	71-43-2	Benzene	1.40E+00	4.20E-02	1.2E-07	1.3E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide	2.3E+00	6.90E-02	No IUR	9.5E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.6E-01	1.08E-02	2.3E-08	1.0E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.3E-01	6.90E-03	5.7E-08	6.8E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.9E-01	5.70E-03	No IUR	6.1E-05			9.00E-02	I	
x	98-82-8	Cumene	1.1E+00	3.30E-02	No IUR	7.9E-05			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	3.5E-01	1.05E-02	4.1E-08	1.3E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	8.0E-02	2.40E-03	2.2E-08	3.3E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.1E+00	3.30E-02	5.9E-08	1.1E-03	5.00E-06	I	3.00E-02	I	
x	100-41-4	Ethylbenzene	5.2E-02	1.56E-03	1.4E-09	1.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.4E-01	4.20E-03	No IUR	5.8E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	3.9E-01	1.17E-02	No IUR	5.6E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.2E-01	1.86E-02	No IUR	3.6E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride	1.7E+00	5.10E-02	5.0E-10	8.2E-05	1.00E-08	I	6.00E-01	I	Mut
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	100-42-5	Styrene	1.7E-01	5.10E-03	No IUR	4.9E-06			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	108-88-3	Toluene		--	--	--			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.3E-01	1.59E-02	No IUR	5.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.0E-01	6.00E-03	No IUR	1.2E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.9E-01	5.70E-03	1.2E-08	2.7E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.0E-02	1.20E-03	No IUR	1.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	9.0E-02	2.70E-03	No IUR	2.6E-05			1.00E-01	I	
				TOTAL:	**3.3E-07**	**6.7E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 146 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.10E+01	9.30E-01	No IUR	2.9E-05			3.10E+01	A	
x	71-43-2	Benzene	1.10E+00	3.30E-02	9.2E-08	1.1E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	8.4E-02	2.52E-03	2.7E-08	1.2E-03	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	4.0E+01	1.20E+00	No IUR	1.6E-03			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.8E-01	8.40E-03	1.8E-08	8.1E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.0E+00	3.00E-02	2.5E-07	2.9E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	3.3E+00	9.90E-02	No IUR	1.1E-03			9.00E-02	I	
x	98-82-8	Cumene	2.7E-01	8.10E-03	No IUR	1.9E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	1.9E-01	5.70E-03	No IUR	9.1E-07			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	8.4E-01	2.52E-02	9.9E-08	3.0E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.4E+00	7.20E-02	No IUR	6.9E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	2.3E-02	6.90E-04	3.9E-10	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	5.7E-01	1.71E-02	1.6E-07	2.3E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.9E+00	5.70E-02	1.0E-07	1.8E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	5.8E-01	1.74E-02	No IUR	1.7E-06			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.8E-01	1.14E-02	1.0E-08	1.1E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.5E-01	1.35E-02	No IUR	4.3E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.5E+00	4.50E-02	No IUR	2.2E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	4.4E+00	1.32E-01	No IUR	2.5E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	3.0E-01	9.00E-03	No IUR	2.9E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	111-84-2	Nonane, n-	4.4E+00	1.32E-01	No IUR	6.3E-03			2.00E-02	P	
x	103-65-1	Propyl benzene	2.0E-01	6.00E-03	No IUR	5.8E-06			1.00E+00	X	
x	100-42-5	Styrene	8.9E+00	2.67E-01	No IUR	2.6E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	3.1E-01	9.30E-03	8.6E-10	2.2E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	2.5E+00	7.50E-02	No IUR	3.6E-05			2.00E+00	I	
x	108-88-3	Toluene	2.0E+00	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.1E-01	1.53E-02	No IUR	4.9E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.4E-01	4.20E-03	No IUR	8.1E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.8E-01	5.40E-03	1.1E-08	2.6E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.6E+00	4.80E-02	No IUR	6.6E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	5.9E-01	1.77E-02	No IUR	2.4E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	4.1E-02	1.23E-03	5.3E-09	1.2E-05	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.0E-01	1.20E-02	No IUR	1.2E-04			1.00E-01	S	
x	1330-20-7	Xylenes	6.9E-01	2.07E-02	No IUR	2.0E-04			1.00E-01	I	
				TOTAL:	**7.7E-07**	**2.3E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 170 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	4.80E+01	No IUR	1.5E-03			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	2.30E+01	**6.4E-05**	7.4E-01	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	7.40E-01	No IUR	1.4E-01			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	2.40E-01	**2.6E-06**	1.2E-01	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.00E-01	6.4E-07	2.9E-03	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.00E+00	No IUR	1.1E-02			9.00E-02	I	
x	98-82-8	Cumene	1.50E+00	No IUR	3.6E-03			4.00E-01	I	
x	110-82-7	Cyclohexane	1.20E+01	No IUR	1.9E-03			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	4.10E-01	**1.6E-06**	4.9E-04	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.00E+00	No IUR	1.9E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.50E+01	**2.7E-05**	4.8E-01	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.80E+01	**1.6E-05**	1.7E-02	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	5.30E+01	No IUR	7.3E-02			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.00E-01	No IUR	1.3E-02			3.00E-02	I	
x	67-63-0	Isopropanol	5.70E+00	No IUR	2.7E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	7.70E+00	No IUR	1.5E-03			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.70E+00	No IUR	5.4E-04			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	8.70E-01	8.1E-08	2.8E-04	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	4.40E+00	**5.3E-05**	**1.4E+00**	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	4.50E+00	No IUR	4.3E-03			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	3.20E+00	No IUR	3.1E-03			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.80E-01	1.7E-08	4.3E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	9.40E+00	No IUR	4.5E-03			2.00E+00	I	
x	108-88-3	Toluene	9.80E+01	No IUR	1.9E-02			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.00E-01	No IUR	1.3E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.30E+00	No IUR	2.5E-04			5.00E+00	I	
x	79-01-6	Trichloroethylene	9.10E-02	1.9E-07	4.4E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.50E+00	No IUR	3.4E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-	6.90E+00	No IUR	**1.3E+00**			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	2.60E+01	No IUR	**3.6E+00**			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	2.30E+01	No IUR	2.2E-01			1.00E-01	S	
x	1330-20-7	Xylenes	6.50E+01	No IUR	6.2E-01			1.00E-01	I	
			TOTAL:	**1.7E-04**	**8.9E+00**					

Notes:

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 170 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 170 CHURCH STREET (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.30E+01	No IUR	7.1E-04			3.10E+01	A	
x	75-05-8	Acetonitrile	1.60E+00	No IUR	2.6E-02			6.00E-02	I	
x	71-43-2	Benzene	1.00E+00	**2.8E-06**	3.2E-02	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	8.40E-02	9.0E-07	4.0E-02	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.20E+01	No IUR	1.6E-02			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.30E-01	7.1E-07	3.2E-03	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	4.20E-01	**3.4E-06**	4.1E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	9.90E-01	No IUR	1.1E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	2.10E-01	No IUR	3.4E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.10E+00	No IUR	2.0E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	5.30E-01	**4.9E-06**	7.3E-02	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	2.00E+00	**3.6E-06**	6.4E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	4.00E-01	3.6E-07	3.8E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.20E+00	No IUR	1.6E-03			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	2.30E+00	No IUR	1.1E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.00E+00	No IUR	3.8E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.70E-01	No IUR	5.4E-05			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	2.10E-02	1.9E-09	6.7E-06	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	9.70E-01	9.6E-09	1.6E-03	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	3.20E+00	No IUR	6.1E-04			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.80E-01	No IUR	1.2E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	5.00E-02	No IUR	9.6E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.10E-02	6.5E-08	1.5E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.10E+00	No IUR	1.5E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	5.40E-01	No IUR	7.4E-02			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.00E-01	No IUR	3.8E-03			1.00E-01	S	
x	1330-20-7	Xylenes	1.20E+00	No IUR	1.2E-02			1.00E-01	I	
			TOTAL:	**3.3E-05**	**8.2E-01**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

(2)	**Generic Attenuation Factors:**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Source Medium of Vapors	**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**

OSWER VAPOR INTRUSION ASSESSMENT - 170 CHURCH STREET (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ		Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i	
	Groundwater	(-)		AFgw_R_IA	0.001	AFgw_C_IA	0.001			AFgw_IA	0.001
	Sub-Slab and Exterior Soil Gas	(-)		AFss_R_IA	0.03	AFss_C_IA	0.03			AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential		Commercial		Selected (based on scenario)	
Trichloroethylene	Symbol	Value	Symbol	Value	Symbol	Value
	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 170 CHURCH STREET (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.90E+01	5.70E-01	No IUR	1.8E-05			3.10E+01	A	
x	75-05-8	Acetonitrile	3.50E+00	1.05E-01	No IUR	1.7E-03			6.00E-02	I	
x	71-43-2	Benzene	4.20E+00	1.26E-01	3.5E-07	4.0E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide	3.4E+00	1.02E-01	No IUR	1.4E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.9E-01	5.70E-03	4.7E-08	5.6E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.4E-01	1.62E-02	No IUR	1.7E-04			9.00E-02	I	
x	98-82-8	Cumene	1.1E+00	3.30E-02	No IUR	7.9E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	1.1E+00	3.30E-02	No IUR	5.3E-06			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	4.8E+00	1.44E-01	No IUR	1.4E-03			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	6.1E-02	1.83E-03	1.7E-08	2.5E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.2E+00	3.60E-02	6.4E-08	1.2E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	1.5E-01	4.50E-03	No IUR	4.3E-07			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.6E-01	2.88E-02	2.6E-08	2.8E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.9E+00	1.17E-01	No IUR	1.6E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	7.9E-01	2.37E-02	No IUR	1.1E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.0E+00	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.3E-01	6.90E-03	No IUR	2.2E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	4.3E-02	1.29E-03	1.2E-10	4.1E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	2.4E-01	7.20E-03	No IUR	6.9E-06			1.00E+00	X	
x	115-07-1	Propylene	2.1E+00	6.30E-02	No IUR	2.0E-05			3.00E+00	CA	
x	100-42-5	Styrene	2.3E-01	6.90E-03	No IUR	6.6E-06			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	7.0E-01	2.10E-02	1.9E-09	5.0E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	8.3E-01	2.49E-02	No IUR	1.2E-05			2.00E+00	I	
x	108-88-3	Toluene	6.8E+00	2.04E-01	No IUR	3.9E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	7.2E-01	2.16E-02	No IUR	6.9E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.6E+01	4.80E-01	No IUR	9.2E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	5.0E-02	1.50E-03	3.1E-09	7.2E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	7.3E+00	2.19E-01	No IUR	3.0E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.0E+00	3.00E-02	No IUR	4.1E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.0E+00	3.00E-02	No IUR	2.9E-04			1.00E-01	S	
x	1330-20-7	Xylenes	3.0E+00	9.00E-02	No IUR	8.6E-04			1.00E-01	I	
				TOTAL:	**5.1E-07**	**1.6E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 171 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.90E+01	No IUR	9.0E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	2.00E+00	**5.6E-06**	6.4E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane	1.20E-01	**1.6E-06**	No RfC	3.70E-05	CA			
x	74-83-9	Bromomethane	7.40E-01	No IUR	1.4E-01			5.00E-03	I	
x	75-15-0	Carbon Disulfide	1.60E+00	No IUR	2.2E-03			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.60E-01	7.7E-07	3.5E-03	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.40E+00	**1.1E-05**	1.4E-02	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	7.40E-01	No IUR	7.9E-03			9.00E-02	I	
x	98-82-8	Cumene	3.10E-01	No IUR	7.4E-04			4.00E-01	I	
x	110-82-7	Cyclohexane	5.90E-01	No IUR	9.4E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	3.20E+00	No IUR	3.1E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	7.70E-02	7.1E-07	1.1E-02	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.30E+00	**2.9E-06**	3.2E-03	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.30E+00	No IUR	3.2E-03			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	5.40E+00	No IUR	2.6E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.00E+00	No IUR	5.8E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	5.30E-01	No IUR	1.7E-04			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	3.60E+00	**4.4E-05**	**1.2E+00**	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	1.00E+00	No IUR	9.6E-04			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	5.10E-01	No IUR	4.9E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	8.10E-01	7.5E-08	1.9E-02	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	2.00E+01	No IUR	3.8E-03			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.40E-01	No IUR	1.1E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.90E-01	No IUR	7.5E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	5.90E-02	1.2E-07	2.8E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.00E+00	No IUR	2.7E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	7.40E+00	No IUR	**1.0E+00**			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.80E+00	No IUR	4.6E-02			1.00E-01	S	
x	1330-20-7	Xylenes	1.40E+01	No IUR	1.3E-01			1.00E-01	I	
			TOTAL:	**6.7E-05**	**2.7E+00**					

Notes:

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 171 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 171 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
	75-07-0	Acetaldehyde		--	--	2.20E-06	I	9.00E-03	I	
x	67-64-1	Acetone	2.90E+01	No IUR	9.0E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	2.30E+00	**6.4E-06**	7.4E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane	1.90E-01	**2.5E-06**	No RfC	3.70E-05	CA			
x	74-83-9	Bromomethane	4.70E-01	No IUR	9.0E-02			5.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.50E-01	7.5E-07	3.4E-03	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.10E+00	**9.0E-06**	1.1E-02	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	7.20E-01	No IUR	7.7E-03			9.00E-02	I	
x	98-82-8	Cumene	3.80E-01	No IUR	9.1E-04			4.00E-01	I	
x	110-82-7	Cyclohexane	8.60E-01	No IUR	1.4E-04			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.70E+00	No IUR	2.6E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	9.30E-02	8.6E-07	1.3E-02	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	4.10E+00	**3.7E-06**	3.9E-03	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.30E+00	No IUR	4.5E-03			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	6.60E+00	No IUR	3.2E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.00E+00	No IUR	5.8E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	5.70E-01	No IUR	1.8E-04			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	1.30E-02	1.2E-09	4.2E-06	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	3.80E+00	**4.6E-05**	**1.2E+00**	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	1.30E+00	No IUR	1.2E-03			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	5.50E-01	No IUR	5.3E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	9.50E-01	8.8E-08	2.3E-02	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	1.80E+01	No IUR	3.5E-03			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.40E-01	No IUR	1.1E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.80E-01	No IUR	5.4E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	4.10E-02	8.6E-08	2.0E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.80E+00	No IUR	2.5E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	9.30E+00	No IUR	**1.3E+00**			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	6.10E+00	No IUR	5.8E-02			1.00E-01	S	
x	1330-20-7	Xylenes	2.00E+01	No IUR	1.9E-01			1.00E-01	I	
			TOTAL:	**6.9E-05**	**3.1E+00**					

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on Symbol	Selected (based on Value
Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

(2) **Generic Attenuation Factors:**

Source Medium of Vapors	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on Symbol	Selected (based on Value

OSWER VAPOR INTRUSION ASSESSMENT - 171 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ		Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i	
	Groundwater	(-)		AFgw_R_IA	0.001	AFgw_C_IA	0.001			AFgw_IA	0.001
	Sub-Slab and Exterior Soil Gas	(-)		AFss_R_IA	0.03	AFss_C_IA	0.03			AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on Symbol	Selected (based on Value
	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals

The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride

See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 171 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	9.00E+01	2.70E+00	No IUR	8.4E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene		--	--	--	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	9.3E-01	2.79E-02	No IUR	5.4E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	2.1E-01	6.30E-03	6.7E-08	3.0E-03	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	9.0E+00	2.70E-01	No IUR	3.7E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.0E+00	3.00E-02	2.5E-07	2.9E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	2.5E-01	7.50E-03	No IUR	1.2E-06			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	3.0E-01	9.00E-03	3.5E-08	1.1E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.2E+00	6.60E-02	No IUR	6.3E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	9.7E-02	2.91E-03	1.7E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.0E-01	3.00E-03	2.8E-08	4.1E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	5.2E-01	1.56E-02	1.4E-08	1.5E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	6.3E-01	1.89E-02	No IUR	2.6E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	2.1E+00	6.30E-02	No IUR	3.0E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.8E+00	1.14E-01	No IUR	2.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	4.9E-01	1.47E-02	No IUR	4.7E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	5.0E-02	1.50E-03	1.4E-10	4.8E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	1.8E-01	5.40E-03	No IUR	5.2E-06			1.00E+00	X	
x	115-07-1	Propylene	7.9E+00	2.37E-01	No IUR	7.6E-05			3.00E+00	CA	
x	100-42-5	Styrene	1.0E+00	3.00E-02	No IUR	2.9E-05			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.2E+00	3.60E-02	3.3E-09	8.6E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	3.5E+00	1.05E-01	No IUR	2.0E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	8.0E-01	2.40E-02	No IUR	7.7E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	4.2E+00	1.26E-01	No IUR	2.4E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.2E-01	3.60E-03	7.5E-09	1.7E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.2E+00	3.60E-02	No IUR	4.9E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	6.1E-01	1.83E-02	No IUR	1.8E-04			1.00E-01	S	
x	1330-20-7	Xylenes	1.4E+00	4.20E-02	No IUR	4.0E-04			1.00E-01	I	
				TOTAL:	**4.0E-07**	**1.9E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 171 CHURCH STREET (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.00E+01	1.50E+00	No IUR	4.6E-05			3.10E+01	A	
x	75-05-8	Acetonitrile	1.80E+00	5.40E-02	No IUR	8.6E-04			6.00E-02	I	
x	71-43-2	Benzene	3.00E+00	9.00E-02	2.5E-07	2.9E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	5.8E-01	1.74E-02	No IUR	3.3E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide	1.3E+01	3.90E-01	No IUR	5.3E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	1.0E-01	3.00E-03	6.4E-09	2.9E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.2E+00	6.60E-02	5.4E-07	6.5E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.0E-01	1.50E-02	No IUR	1.6E-04			9.00E-02	I	
x	98-82-8	Cumene	3.7E+00	1.11E-01	No IUR	2.7E-04			4.00E-01	I	
x	110-82-7	Cyclohexane	6.2E-01	1.86E-02	No IUR	3.0E-06			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	5.1E-01	1.53E-02	6.0E-08	1.8E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.7E-01	5.10E-03	4.7E-08	7.0E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	7.0E-01	2.10E-02	3.7E-08	6.7E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	2.1E+00	6.30E-02	5.6E-08	6.0E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.9E+00	5.70E-02	No IUR	7.8E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	7.0E+00	2.10E-01	No IUR	6.7E-03			3.00E-02	I	
x	67-63-0	Isopropanol	4.2E+00	1.26E-01	No IUR	6.0E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.0E+01	3.00E-01	No IUR	5.8E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.2E+00	6.60E-02	No IUR	2.1E-05			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	2.6E-01	7.80E-03	7.2E-10	2.5E-06	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	7.0E-01	2.10E-02	2.1E-10	3.4E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	5.0E+00	1.50E-01	**1.8E-06**	4.8E-02	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-	6.8E+00	2.04E-01	No IUR	9.8E-03			2.00E-02	P	
x	103-65-1	Propyl benzene	6.4E-01	1.92E-02	No IUR	1.8E-05			1.00E+00	X	
x	115-07-1	Propylene	2.9E+00	8.70E-02	No IUR	2.8E-05			3.00E+00	CA	
x	100-42-5	Styrene	3.9E+00	1.17E-01	No IUR	1.1E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.1E+00	3.30E-02	3.1E-09	7.9E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	6.5E-01	1.95E-02	No IUR	9.3E-06			2.00E+00	I	
x	108-88-3	Toluene	1.3E+01	3.90E-01	No IUR	7.5E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.7E-01	2.01E-02	No IUR	6.4E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.0E+00	3.00E-02	No IUR	5.8E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	5.1E-02	1.53E-03	3.2E-09	7.3E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	4.1E+00	1.23E-01	No IUR	1.7E-02			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	2.8E+00	8.40E-02	No IUR	8.1E-04			1.00E-01	S	
x	1330-20-7	Xylenes	6.9E+00	2.07E-01	No IUR	2.0E-03			1.00E-01	I	
				TOTAL:	**2.8E-06**	**9.7E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 174 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.60E+01	No IUR	1.1E-03			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	1.40E+00	**3.9E-06**	4.5E-02	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	4.70E-01	No IUR	9.0E-02			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	3.10E-01	**3.3E-06**	1.5E-01	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.90E-01	6.2E-07	2.8E-03	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.80E-01	**2.3E-06**	2.7E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	9.10E-01	No IUR	9.7E-03			9.00E-02	I	
x	98-82-8	Cumene	2.10E-01	No IUR	5.0E-04			4.00E-01	I	
x	110-82-7	Cyclohexane	2.90E-01	No IUR	4.6E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	3.10E-01	**1.2E-06**	3.7E-04	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.10E+00	No IUR	2.0E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.00E+00	**9.3E-06**	1.4E-01	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.60E+00	**1.4E-06**	1.5E-03	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.00E+00	No IUR	1.4E-03			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.40E+01	No IUR	6.7E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	9.00E+00	No IUR	1.7E-03			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.50E-01	No IUR	8.0E-05			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	2.30E+00	**2.8E-05**	7.4E-01	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	3.30E-01	No IUR	3.2E-04			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	7.20E-01	No IUR	6.9E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	5.10E-01	4.7E-08	1.2E-02	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	1.40E+00	No IUR	6.7E-04			2.00E+00	I	
x	108-88-3	Toluene	8.30E+00	No IUR	1.6E-03			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.50E-01	No IUR	1.1E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.60E-01	No IUR	5.0E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	4.70E-02	9.8E-08	2.3E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.30E+00	No IUR	1.8E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	2.20E+00	No IUR	3.0E-01			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.80E-02	7.8E-08	1.7E-04	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.40E+00	No IUR	1.3E-02			1.00E-01	S	
x	1330-20-7	Xylenes	4.00E+00	No IUR	3.8E-02			1.00E-01	I	
			TOTAL:	**5.0E-05**	**1.7E+00**					

Notes:

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 174 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT 174 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.80E+01	No IUR	1.2E-03			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	2.60E+00	**7.2E-06**	8.3E-02	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	5.00E-01	No IUR	9.6E-02			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	8.00E-01	**8.5E-06**	3.8E-01	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.00E-01	6.4E-07	2.9E-03	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	3.70E-01	**3.0E-06**	3.6E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.40E+00	No IUR	1.5E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	2.10E-01	No IUR	3.4E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.90E+00	No IUR	1.8E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.10E+00	**1.9E-05**	2.9E-01	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.00E+00	**1.8E-06**	3.2E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	5.60E-01	5.0E-07	5.4E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.90E-01	No IUR	5.3E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-	1.40E+00	No IUR	4.5E-02			3.00E-02	I	
x	67-63-0	Isopropanol	3.90E+01	No IUR	1.9E-01			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	5.30E+00	No IUR	1.0E-03			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.30E+00	No IUR	4.2E-04			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	5.10E-01	No IUR	4.9E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.50E+00	1.4E-07	3.6E-02	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	7.10E-01	No IUR	3.4E-04			2.00E+00	I	
x	108-88-3	Toluene	6.40E+00	No IUR	1.2E-03			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	4.70E-02	No IUR	9.0E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.40E-02	7.1E-08	1.6E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.00E+00	No IUR	1.4E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.00E-01	No IUR	2.9E-03			1.00E-01	S	
x	1330-20-7	Xylenes	1.00E+00	No IUR	9.6E-03			1.00E-01	I	
			TOTAL:	**4.1E-05**	**1.2E+00**					

Notes:

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT 174 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 174 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	4.50E+01	1.35E+00	No IUR	4.2E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.20E+00	3.60E-02	1.0E-07	1.2E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	5.8E-01	1.74E-02	No IUR	3.3E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	2.0E-01	6.00E-03	6.4E-08	2.9E-03	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.0E-01	6.00E-03	1.3E-08	5.8E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.1E-01	6.30E-03	5.2E-08	6.2E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.8E-01	5.40E-03	No IUR	5.8E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	3.0E-01	9.00E-03	3.5E-08	1.1E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	7.3E-02	2.19E-03	2.0E-08	3.0E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.9E-01	5.70E-03	5.1E-09	5.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.9E-01	8.70E-03	No IUR	1.2E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	7.0E-01	2.10E-02	No IUR	6.7E-04			3.00E-02	I	
x	67-63-0	Isopropanol	3.2E+00	9.60E-02	No IUR	4.6E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	5.0E+00	1.50E-01	No IUR	2.9E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	5.7E-01	1.71E-02	No IUR	5.5E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	4.0E-02	1.20E-03	1.1E-10	3.8E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene	8.3E+00	2.49E-01	No IUR	8.0E-05			3.00E+00	CA	
x	100-42-5	Styrene	4.0E-01	1.20E-02	No IUR	1.2E-05			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.9E-01	5.70E-03	5.3E-10	1.4E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	8.3E-01	2.49E-02	No IUR	4.8E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.8E-01	1.74E-02	No IUR	5.6E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.5E-01	4.50E-03	No IUR	8.6E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	4.4E-01	1.32E-02	No IUR	1.8E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.7E-01	5.10E-03	No IUR	4.9E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.0E-01	1.20E-02	No IUR	1.2E-04			1.00E-01	I	
				TOTAL:	**2.9E-07**	**1.2E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 174 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.40E+01	7.20E-01	No IUR	2.2E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.90E-01	5.70E-03	1.6E-08	1.8E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.0E-01	2.40E-02	No IUR	4.6E-03			5.00E-03	I	
x	75-15-0	Carbon Disulfide	2.4E+01	7.20E-01	No IUR	9.9E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	1.9E-08	8.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.8E-01	8.40E-03	6.9E-08	8.2E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	1.7E-01	5.10E-03	2.0E-08	6.1E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	8.0E-02	2.40E-03	2.2E-08	3.3E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.8E-01	5.40E-03	4.8E-09	5.2E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.5E-01	7.50E-03	No IUR	1.0E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.6E+00	4.80E-02	No IUR	2.3E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.8E+00	2.04E-01	No IUR	3.9E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.8E-01	5.40E-03	No IUR	1.7E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	6.5E-02	1.95E-03	1.8E-10	6.2E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	2.4E-01	7.20E-03	No IUR	6.9E-06			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	5.6E-01	1.68E-02	1.6E-09	4.0E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	7.2E-01	2.16E-02	No IUR	4.1E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.4E-01	1.92E-02	No IUR	6.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	5.1E-02	1.53E-03	No IUR	2.9E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.3E-02	9.90E-04	2.1E-09	4.7E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	9.6E-01	2.88E-02	No IUR	3.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.7E-01	1.11E-02	No IUR	1.5E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.9E-01	5.70E-03	No IUR	5.5E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.2E-01	1.26E-02	No IUR	1.2E-04			1.00E-01	I	
				TOTAL:	**1.5E-07**	**9.8E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	8.30E+01	No IUR	2.6E-03			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	1.10E+00	**3.1E-06**	3.5E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane	1.50E-01	**2.0E-06**	No RfC	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	1.80E-01	**1.9E-06**	8.6E-02	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.30E+00	No IUR	1.8E-03			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	8.20E-01	**1.8E-06**	7.9E-03	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.70E+00	**1.4E-05**	1.7E-02	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.40E+00	No IUR	1.5E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	3.00E-01	No IUR	4.8E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.20E+00	No IUR	2.1E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.00E+00	**3.7E-05**	5.5E-01	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	4.00E-01	No IUR	3.8E-05			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.10E+00	9.8E-07	1.1E-03	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	6.70E-01	No IUR	9.2E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-	1.10E+00	No IUR	3.5E-02			3.00E-02	I	
x	67-63-0	Isopropanol	5.70E+00	No IUR	2.7E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	9.00E+00	No IUR	1.7E-03			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	7.80E-01	No IUR	2.5E-04			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	2.50E+00	**3.0E-05**	8.0E-01	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene	3.30E+00	No IUR	1.1E-03			3.00E+00	CA	
x	100-42-5	Styrene	1.40E+00	No IUR	1.3E-03			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.20E-01	1.1E-08	2.9E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	3.00E-01	No IUR	1.4E-04			2.00E+00	I	
x	108-88-3	Toluene	6.00E+00	No IUR	1.2E-03			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.30E-01	No IUR	1.7E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.40E-01	5.0E-07	1.2E-01	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.50E+00	No IUR	2.1E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.80E+00	No IUR	2.5E-01			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.40E-02	6.1E-08	1.3E-04	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	9.60E-01	No IUR	9.2E-03			1.00E-01	S	
x	1330-20-7	Xylenes	2.30E+00	No IUR	2.2E-02			1.00E-01	I	
			TOTAL:	**9.2E-05**	**2.0E+00**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

(2)	**Generic Attenuation Factors:**	**Residential**	**Commercial**	**Selected (based on scenario)**

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ		Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i	
	Source Medium of Vapors			**Symbol**	**Value**	**Symbol**	**Value**			**Symbol**	**Value**
	Groundwater	(-)		AFgw_R_IA	0.001	AFgw_C_IA	0.001			AFgw_IA	0.001
	Sub-Slab and Exterior Soil Gas	(-)		AFss_R_IA	0.03	AFss_C_IA	0.03			AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential		Commercial		Selected (based on scenario)	
Trichloroethylene	**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.90E+01	No IUR	1.8E-03			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	8.90E-01	**2.5E-06**	2.8E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform	2.70E-01	1.1E-07	No RfC	1.10E-06	I			
x	74-83-9	Bromomethane	1.70E+00	No IUR	3.3E-01			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	2.00E-01	**2.1E-06**	9.6E-02	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	4.00E-01	No IUR	5.5E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	5.20E-01	**1.1E-06**	5.0E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene	2.50E-01	No IUR	4.8E-03			5.00E-02	P	
x	67-66-3	Chloroform	1.50E+00	**1.2E-05**	1.5E-02	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	3.10E+00	No IUR	3.3E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	7.60E-01	No IUR	1.2E-04			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.20E+00	No IUR	2.1E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.30E+00	**1.2E-05**	1.8E-01	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	4.00E-01	7.1E-07	1.3E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	7.40E-01	6.6E-07	7.1E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	6.30E-01	No IUR	8.6E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-	9.40E-01	No IUR	3.0E-02			3.00E-02	I	
x	67-63-0	Isopropanol	3.70E+00	No IUR	1.8E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.00E+00	No IUR	1.2E-03			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	6.10E-01	No IUR	1.9E-04			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	3.30E+00	**4.0E-05**	**1.1E+00**	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	2.40E-01	No IUR	2.3E-04			1.00E+00	X	
x	115-07-1	Propylene	2.80E+00	No IUR	8.9E-04			3.00E+00	CA	
x	100-42-5	Styrene	1.90E+00	No IUR	1.8E-03			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.20E-01	1.1E-08	2.9E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	3.80E-01	No IUR	1.8E-04			2.00E+00	I	
x	108-88-3	Toluene	6.80E+00	No IUR	1.3E-03			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.00E-01	No IUR	1.6E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.50E-02	No IUR	1.2E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.50E+00	No IUR	2.1E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.80E+00	No IUR	2.5E-01			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	6.90E-01	No IUR	6.6E-03			1.00E-01	S	
x	1330-20-7	Xylenes	1.70E+00	No IUR	1.6E-02			1.00E-01	I	
			TOTAL:	**7.1E-05**	**2.1E+00**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone		--	--	--			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	3.50E-01	1.05E-02	2.9E-08	3.4E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide	1.8E+00	5.40E-02	No IUR	7.4E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	4.0E-01	1.20E-02	2.6E-08	1.2E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	5.9E+00	1.77E-01	**1.4E-06**	1.7E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	1.5E+00	4.50E-02	No IUR	7.2E-06			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	3.8E+00	1.14E-01	No IUR	1.1E-03			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	4.9E-02	1.47E-03	8.4E-10	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.9E-02	8.70E-04	8.1E-09	1.2E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	1.8E-02	5.40E-04	No IUR	2.6E-06			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	5.2E-02	1.56E-03	1.4E-09	1.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	4.6E-01	1.38E-02	No IUR	1.9E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	8.0E-01	2.40E-02	No IUR	7.7E-04			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.8E+00	1.14E-01	No IUR	2.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8.0E-01	2.40E-02	No IUR	7.7E-06			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene	1.1E+00	3.30E-02	No IUR	1.1E-05			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-	3.4E-02	1.02E-03	2.1E-08	No RfC	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	9.5E-01	2.85E-02	2.6E-09	6.8E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.0E-01	6.00E-03	No IUR	1.2E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	8.4E-01	2.52E-02	No IUR	8.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.7E+00	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	9.7E+01	2.91E+00	**6.1E-06**	**1.4E+00**	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	5.4E+00	1.62E-01	No IUR	2.2E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.0E-01	9.00E-03	No IUR	1.2E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	3.0E-02	9.00E-04	3.9E-09	8.6E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	5.2E-02	1.56E-03	No IUR	1.5E-05			1.00E-01	S	
x	1330-20-7	Xylenes	1.0E-01	3.00E-03	No IUR	2.9E-05			1.00E-01	I	
				TOTAL:	**7.6E-06**	**1.4E+00**					

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.80E+01	1.14E+00	No IUR	3.5E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.10E+00	3.30E-02	9.2E-08	1.1E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	4.7E+01	1.41E+00	**1.2E-05**	1.4E-02	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.0E+00	6.00E-02	No IUR	6.4E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.8E+00	8.40E-02	No IUR	8.1E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	2.0E-01	6.00E-03	3.4E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.5E-01	4.50E-03	4.2E-08	6.2E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.5E-01	4.50E-03	4.0E-09	4.3E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	9.4E+00	2.82E-01	No IUR	5.4E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.0E+01	3.00E-01	2.8E-08	7.2E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	5.3E-01	1.59E-02	No IUR	3.0E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.9E+00	5.70E-02	No IUR	1.8E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.3E+00	6.90E-02	No IUR	1.3E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.7E+03	5.16E+01	**1.1E-04**	**2.5E+01**	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	3.7E+00	1.11E-01	No IUR	1.5E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.5E-01	4.50E-03	No IUR	4.3E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.0E-01	1.20E-02	No IUR	1.2E-04			1.00E-01	I	
				TOTAL:	**1.2E-04**	**2.5E+01**					

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (SSGR1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.00E+02	3.00E+00	No IUR	9.3E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	4.20E-01	1.26E-02	3.5E-08	4.0E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.0E+01	3.00E-01	**2.5E-06**	2.9E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene		--	--	--	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.0E+00	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	7.0E+00	2.10E-01	1.9E-08	5.0E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene		--	--	--			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.5E-01	1.05E-02	No IUR	2.0E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	6.5E+02	1.94E+01	**4.0E-05**	**9.3E+00**	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-		--	--	--			1.00E-01	S	
x	1330-20-7	Xylenes		--	--	--			1.00E-01	I	
				TOTAL:	**4.3E-05**	**9.3E+00**					

OSWER VAPOR INTRUSION ASSESSMENT - 175 CHURCH ROAD (SSGR2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.00E+01	6.00E-01	No IUR	1.9E-05			3.10E+01	A	
x	75-05-8	Acetonitrile	2.50E+00	7.50E-02	No IUR	1.2E-03			6.00E-02	I	
x	71-43-2	Benzene	1.50E+00	4.50E-02	1.3E-07	1.4E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	75-15-0	Carbon Disulfide	8.4E-01	2.52E-02	No IUR	3.5E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	5.0E-01	1.50E-02	3.2E-08	1.4E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	4.1E+00	1.23E-01	**1.0E-06**	1.2E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	9.7E-01	2.91E-02	No IUR	3.1E-04			9.00E-02	I	
x	98-82-8	Cumene	5.4E-01	1.62E-02	No IUR	3.9E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	3.1E+00	9.30E-02	No IUR	1.5E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.4E+00	7.20E-02	No IUR	6.9E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.3E+00	3.90E-02	6.9E-08	1.2E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	5.8E-01	1.74E-02	No IUR	1.7E-06			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.1E-01	2.73E-02	2.4E-08	2.6E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.1E+00	3.30E-02	No IUR	4.5E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	6.6E-01	1.98E-02	No IUR	6.3E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.3E+00	3.90E-02	No IUR	1.9E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.9E+00	8.70E-02	No IUR	1.7E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	3.6E+00	1.08E-01	**1.3E-06**	3.5E-02	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	9.3E-01	2.79E-02	No IUR	2.7E-05			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	9.5E-01	2.85E-02	2.6E-09	6.8E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	5.0E-01	1.50E-02	No IUR	7.2E-06			2.00E+00	I	
x	108-88-3	Toluene		--	--	--			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.2E-01	1.56E-02	No IUR	5.0E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.6E-01	4.80E-03	No IUR	9.2E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	6.4E+01	1.92E+00	**4.0E-06**	9.2E-01	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	7.9E-01	2.37E-02	No IUR	3.2E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.2E-01	1.26E-02	No IUR	1.2E-04			1.00E-01	S	
x	1330-20-7	Xylenes	1.0E+00	3.00E-02	No IUR	2.9E-04			1.00E-01	I	
				TOTAL:	**6.6E-06**	**9.7E-01**					

OSWER VAPOR INTRUSION ASSESSMENT - 178 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.20E+01	No IUR	3.7E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	3.00E-01	8.3E-07	9.6E-03	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane	8.00E-01	No IUR	1.5E-01			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.40E+00	No IUR	1.9E-03			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.30E-01	7.1E-07	3.2E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform		--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.30E+00	No IUR	2.5E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.90E+00	No IUR	1.8E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	9.30E-02	8.6E-07	1.3E-02	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	5.60E-02	No IUR	2.7E-04			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	4.00E-01	7.1E-07	1.3E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.60E-01	8.5E-07	9.2E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.20E-01	No IUR	1.6E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	2.10E+00	No IUR	1.0E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.30E+00	No IUR	2.5E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.80E-01	No IUR	1.7E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	6.80E-01	No IUR	1.3E-04			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.10E-01	No IUR	9.9E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.20E-01	No IUR	2.3E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.00E-01	4.2E-07	9.6E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	8.40E-01	No IUR	1.2E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	6.90E-01	No IUR	6.6E-03			1.00E-01	S	
x	1330-20-7	Xylenes	2.30E+00	No IUR	2.2E-02			1.00E-01	I	
			TOTAL:	**4.4E-06**	**3.7E-01**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 178 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 178 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.00E+01	No IUR	6.2E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	1.50E+00	**4.2E-06**	4.8E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane		--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform		--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.90E+00	No IUR	2.8E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	1.30E+00	7.4E-07	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	4.80E-01	4.3E-07	4.6E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.00E+00	No IUR	1.9E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	2.20E+00	2.2E-08	3.5E-03	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	4.50E-01	No IUR	8.6E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	2.90E+01	No IUR	9.3E-04			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-		--	--			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane		--	--			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.80E+00	**7.8E-06**	1.7E-02	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.80E-01	No IUR	3.6E-03			1.00E-01	S	
x	1330-20-7	Xylenes	1.20E+00	No IUR	1.2E-02			1.00E-01	I	
			TOTAL:	**1.3E-05**	**1.1E-01**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 178 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 178 CHURCH ROAD (SG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.10E+01	3.30E-01	No IUR	1.0E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.30E+00	3.90E-02	1.1E-07	1.2E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	1.1E+00	3.30E-02	No IUR	6.3E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	4.0E-01	1.20E-02	1.3E-07	5.8E-03	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.9E+00	5.70E-02	No IUR	5.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.3E-01	9.90E-03	8.8E-09	9.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	8.0E-01	2.40E-02	No IUR	4.6E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-	1.2E+01	3.60E-01	No IUR	1.7E-02			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene	1.4E+01	4.20E-01	No IUR	1.3E-04			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.2E+00	3.60E-02	No IUR	6.9E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	2.1E+00	6.30E-02	No IUR	2.0E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-		--	--	--			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.2E-01	3.60E-03	1.6E-08	3.5E-05	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.3E-01	1.29E-02	No IUR	1.2E-04			1.00E-01	S	
x	1330-20-7	Xylenes	7.4E-01	2.22E-02	No IUR	2.1E-04			1.00E-01	I	
				TOTAL:	**2.6E-07**	**3.2E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 178 CHURCH ROAD (SG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.00E+01	3.00E-01	No IUR	9.3E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene		--	--	--	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	7.0E-01	2.10E-02	No IUR	4.0E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.0E+00	6.00E-02	No IUR	6.4E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.9E+00	5.70E-02	No IUR	5.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene		--	--	--	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.4E+00	4.20E-02	No IUR	8.1E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.8E-01	8.40E-03	7.8E-10	2.0E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.6E-01	4.80E-03	No IUR	9.2E-07			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-		--	--	--			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-		--	--	--			1.00E-01	S	
x	1330-20-7	Xylenes		--	--	--			1.00E-01	I	
				TOTAL:	**7.8E-10**	**5.5E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 179 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	8.10E+00	No IUR	2.5E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	3.80E-01	**1.1E-06**	1.2E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane	6.20E-01	No IUR	1.2E-01			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	1.70E-01	**1.8E-06**	8.2E-02	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.90E-01	6.2E-07	2.8E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform	2.50E-01	**2.0E-06**	2.4E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.10E+00	No IUR	1.2E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	3.20E-01	No IUR	5.1E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.60E+00	No IUR	2.5E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.00E-01	**1.9E-06**	2.7E-02	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	2.10E-01	3.7E-07	6.7E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	2.40E-01	2.1E-07	2.3E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.30E+00	No IUR	3.2E-03			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	8.40E-01	No IUR	4.0E-03			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.20E+00	No IUR	4.2E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	6.50E-02	6.0E-09	2.1E-05	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.80E-01	No IUR	1.7E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	1.00E+00	9.3E-08	2.4E-02	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	7.70E+00	No IUR	3.7E-03			2.00E+00	I	
x	108-88-3	Toluene	3.00E+00	No IUR	5.8E-04			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.80E-01	No IUR	1.2E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	9.80E-01	No IUR	1.9E-04			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.40E-02	5.0E-08	1.2E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.60E+00	No IUR	2.2E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.80E-01	No IUR	5.2E-02			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	2.00E-01	8.7E-07	1.9E-03	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.10E-01	No IUR	3.0E-03			1.00E-01	S	
x	1330-20-7	Xylenes	7.80E-01	No IUR	7.5E-03			1.00E-01	I	
			TOTAL:	**9.0E-06**	**4.0E-01**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 179 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 179 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	9.70E+01	No IUR	3.0E-03			3.10E+01	A	
x	75-05-8	Acetonitrile	7.60E+00	No IUR	1.2E-01			6.00E-02	I	
x	71-43-2	Benzene	3.00E+00	**8.3E-06**	9.6E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane	5.40E-01	No IUR	1.0E-01			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	2.90E+00	**3.1E-05**	**1.4E+00**	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.00E+00	No IUR	2.7E-03			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.90E-01	6.2E-07	2.8E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform	8.80E-01	**7.2E-06**	8.6E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	7.80E+00	No IUR	8.3E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	4.10E-01	No IUR	6.6E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.30E+00	No IUR	2.2E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.00E+00	**3.7E-05**	5.5E-01	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	4.00E-01	7.1E-07	1.3E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.10E+00	9.8E-07	1.1E-03	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	7.80E-01	No IUR	1.1E-03			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.90E-01	No IUR	1.6E-02			3.00E-02	I	
x	67-63-0	Isopropanol	1.90E+01	No IUR	9.1E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	8.30E+00	No IUR	1.6E-03			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	3.90E-01	No IUR	1.2E-04			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	3.00E-02	2.8E-09	9.6E-06	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	9.40E-01	9.3E-09	1.5E-03	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	2.40E-01	No IUR	2.3E-04			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.10E+00	No IUR	1.1E-03			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	6.00E-01	5.6E-08	1.4E-02	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	1.40E+01	No IUR	2.7E-03			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.20E-01	No IUR	1.0E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	4.70E-01	No IUR	9.0E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.50E-02	7.3E-08	1.7E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.90E+00	No IUR	2.6E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	7.90E-01	No IUR	1.1E-01			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.20E-01	5.2E-07	1.2E-03	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	9.00E-01	No IUR	8.6E-03			1.00E-01	S	
x	1330-20-7	Xylenes	3.20E+00	No IUR	3.1E-02			1.00E-01	I	
			TOTAL:	**8.7E-05**	**2.7E+00**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 179 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 179 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.90E+01	8.70E-01	No IUR	2.7E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	4.50E-01	1.35E-02	3.8E-08	4.3E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	7.0E-01	2.10E-02	No IUR	4.0E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.4E+00	7.20E-02	No IUR	9.9E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	5.0E-01	1.50E-02	1.2E-07	1.5E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	4.0E-01	1.20E-02	No IUR	1.3E-04			9.00E-02	I	
x	98-82-8	Cumene	8.4E-01	2.52E-02	No IUR	6.0E-05			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-	4.0E-01	1.20E-02	4.7E-08	1.4E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	4.0E+00	1.20E-01	No IUR	1.2E-03			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	5.7E-02	1.71E-03	1.6E-08	2.3E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	8.3E-02	2.49E-03	2.2E-09	2.4E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-	3.0E-01	9.00E-03	No IUR	2.9E-04			3.00E-02	I	
x	67-63-0	Isopropanol	6.6E-01	1.98E-02	No IUR	9.5E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.1E+00	6.30E-02	No IUR	1.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.4E-01	4.20E-03	No IUR	1.3E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	2.0E-01	6.00E-03	5.6E-10	1.9E-06	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.1E+00	3.30E-02	3.1E-09	7.9E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	4.0E-01	1.20E-02	No IUR	2.3E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.7E-01	1.71E-02	No IUR	5.5E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	5.1E-01	1.53E-02	No IUR	2.9E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.6E+00	4.80E-02	No IUR	6.6E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.7E-01	1.11E-02	No IUR	1.5E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.9E-02	5.70E-04	2.5E-09	5.5E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	9.6E-02	2.88E-03	No IUR	2.8E-05			1.00E-01	S	
x	1330-20-7	Xylenes	2.0E-01	6.00E-03	No IUR	5.8E-05			1.00E-01	I	
				TOTAL:	**2.3E-07**	**9.2E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 181 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	7.60E+00	No IUR	2.4E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	2.60E-01	7.2E-07	8.3E-03	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane	3.70E-01	No IUR	7.1E-02			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	4.00E+00	No IUR	5.5E-03			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.20E-01	6.8E-07	3.1E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform	1.60E-01	**1.3E-06**	1.6E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.20E+00	No IUR	1.3E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.90E+00	No IUR	1.8E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.10E-01	**1.9E-06**	2.9E-02	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.20E+00	**2.1E-06**	3.8E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	2.00E-01	1.8E-07	1.9E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	5.20E-01	No IUR	2.5E-03			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.00E+00	No IUR	3.8E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.10E-01	No IUR	6.7E-05			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	2.30E+00	No IUR	1.1E-03			2.00E+00	I	
x	108-88-3	Toluene	9.40E-01	No IUR	1.8E-04			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	3.00E-01	No IUR	9.6E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	4.00E-02	No IUR	7.7E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	5.90E-02	1.2E-07	2.8E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.00E+00	No IUR	1.4E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.10E-01	No IUR	1.1E-03			1.00E-01	S	
x	1330-20-7	Xylenes	4.00E-01	No IUR	3.8E-03			1.00E-01	I	
		TOTAL:		**7.1E-06**	**2.3E-01**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 181 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 181 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.80E+01	No IUR	5.6E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	2.40E-01	6.7E-07	7.7E-03	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane	6.20E-01	No IUR	1.2E-01			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.40E+00	No IUR	1.9E-03			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.60E-01	5.6E-07	2.5E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform		--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	8.70E-01	No IUR	9.3E-03			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.90E+00	No IUR	1.8E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	8.00E-02	7.4E-07	1.1E-02	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	3.20E-01	5.7E-07	1.0E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	2.00E-01	1.8E-07	1.9E-04	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.30E-01	No IUR	1.8E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	2.40E+00	No IUR	1.2E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.80E+00	No IUR	7.3E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.70E-01	No IUR	5.4E-05			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.60E-01	No IUR	1.5E-04			1.00E+00	I	
x	127-18-4	Tetrachloroethylene		--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	6.20E+00	No IUR	3.0E-03			2.00E+00	I	
x	108-88-3	Toluene	8.00E-01	No IUR	1.5E-04			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	2.90E-01	No IUR	9.3E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.10E-02	No IUR	5.9E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.00E-02	4.2E-08	9.6E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.00E+00	No IUR	1.4E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.50E-01	No IUR	1.4E-03			1.00E-01	S	
x	1330-20-7	Xylenes	4.80E-01	No IUR	4.6E-03			1.00E-01	I	
			TOTAL:	**2.8E-06**	**2.1E-01**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 181 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene						
	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 181 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	4.50E+01	1.35E+00	No IUR	4.2E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	3.10E-01	9.30E-03	2.6E-08	3.0E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	9.7E-01	2.91E-02	No IUR	5.6E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.7E+00	5.10E-02	No IUR	7.0E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene	1.0E+01	3.00E-01	No IUR	7.2E-04			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	9.3E-02	2.79E-03	2.6E-08	3.8E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.9E-01	5.70E-03	5.1E-09	5.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.0E-01	9.00E-03	No IUR	1.2E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	9.0E-01	2.70E-02	No IUR	8.6E-04			3.00E-02	I	
x	67-63-0	Isopropanol	9.3E+00	2.79E-01	No IUR	1.3E-03			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.2E+00	1.86E-01	No IUR	3.6E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	4.0E-01	1.20E-02	No IUR	3.8E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	4.7E-01	1.41E-02	No IUR	1.4E-05			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.2E+00	3.60E-02	No IUR	6.9E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	8.0E-01	2.40E-02	No IUR	7.7E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.0E-02	1.80E-03	No IUR	3.5E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.3E+00	3.90E-02	No IUR	5.3E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.4E-01	4.20E-03	No IUR	4.0E-05			1.00E-01	S	
x	1330-20-7	Xylenes	3.2E-01	9.60E-03	No IUR	9.2E-05			1.00E-01	I	
				TOTAL:	**5.7E-08**	**1.5E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	7.60E+00	No IUR	2.4E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	4.80E-01	**1.3E-06**	1.5E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane		--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.70E-01	7.9E-07	3.5E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform		--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	9.10E-01	No IUR	9.7E-03			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	1.70E-01	No IUR	2.7E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.20E+00	No IUR	2.1E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	6.80E-01	**1.2E-06**	2.2E-02	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.00E-02	8.0E-08	8.6E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	6.00E-01	No IUR	8.2E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	9.30E+00	No IUR	4.5E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	7.70E-01	No IUR	1.5E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	2.50E-01	2.5E-09	4.0E-04	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	5.60E-02	5.2E-09	1.3E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	9.40E-01	No IUR	1.8E-04			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.10E-01	No IUR	1.3E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.50E+00	**5.2E-06**	**1.2E+00**	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	9.60E-01	No IUR	1.3E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	7.80E-02	No IUR	7.5E-04			1.00E-01	S	
x	1330-20-7	Xylenes	2.30E-01	No IUR	2.2E-03			1.00E-01	I	
			TOTAL:	**8.6E-06**	**1.3E+00**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (IA1)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

	CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.00E+01	No IUR	3.1E-04			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--			6.00E-02	I	
x	71-43-2	Benzene	5.10E-01	**1.4E-06**	1.6E-02	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	3.70E-05	CA			
x	75-25-2	Bromoform		--	--	1.10E-06	I			
x	74-83-9	Bromomethane		--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	5.00E-01	**1.1E-06**	4.8E-03	6.00E-06	I	1.00E-01	I	
x	108-90-7	Chlorobenzene		--	--			5.00E-02	P	
x	67-66-3	Chloroform		--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.10E+00	No IUR	1.2E-02			9.00E-02	I	
x	98-82-8	Cumene		--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	1.40E-01	No IUR	2.2E-05			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.30E+00	No IUR	2.2E-02			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.10E-02	8.1E-08	8.7E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	6.70E-01	No IUR	9.2E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.30E+01	No IUR	6.2E-02			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.50E-01	No IUR	1.2E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	4.20E-01	4.1E-09	6.7E-04	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--			1.00E+00	I	
x	127-18-4	Tetrachloroethylene	8.10E-02	7.5E-09	1.9E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--			2.00E+00	I	
x	108-88-3	Toluene	9.80E-01	No IUR	1.9E-04			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.10E-01	No IUR	1.3E-05			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.00E+00	**4.2E-06**	9.6E-01	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.00E+00	No IUR	1.4E-03			7.00E-01	H	
x	526-73-8	Trimethylbenzene, 1,2,3-		--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	8.30E-02	No IUR	8.0E-04			1.00E-01	S	
x	1330-20-7	Xylenes	2.50E-01	No IUR	2.4E-03			1.00E-01	I	
			TOTAL:	**6.8E-06**	**1.1E+00**					

(1)	**Inhalation Pathway Exposure Parameters (RME):**	**Units**	**Residential**		**Commercial**		**Selected (based on scenario)**	
	Exposure Scenario		**Symbol**	**Value**	**Symbol**	**Value**	**Symbol**	**Value**
	Averaging time for carcinogens	(yrs)	ATc_R_IA	70	ATc_C_IA	70	ATc_IA	70
	Averaging time for non-carcinogens	(yrs)	ATnc_R_IA	26	ATnc_C_IA	25	ATnc_IA	26
	Exposure duration	(yrs)	ED_R_IA	26	ED_C_IA	25	ED_IA	26
	Exposure frequency	(days/yr)	EF_R_IA	350	EF_C_IA	250	EF_IA	350
	Exposure time	(hr/day)	ET_R_IA	24	ET_C_IA	8	ET_IA	24

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (IA2)
Indoor Air Concentration to Risk (IAC-Risk) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column E)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column F)

CAS	Chemical Name	Site Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_IA	0.001	AFgw_C_IA	0.001	AFgw_IA	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_IA	0.03	AFss_C_IA	0.03	AFss_IA	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Trichloroethylene	mIURTCE_R_IA	1.00E-06	mIURTCE_C_IA	0.00E+00	mIURTCE_IA	1.00E-06
	IURTCE_R_IA	3.10E-06	IURTCE_C_IA	4.10E-06	IURTCE_IA	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.60E+01	7.80E-01	No IUR	2.4E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.20E+00	3.60E-02	1.0E-07	1.2E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	3.4E+00	1.02E-01	No IUR	1.4E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	7.5E-01	2.25E-02	4.8E-08	2.2E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	5.4E-01	1.62E-02	1.3E-07	1.6E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	3.0E+00	9.00E-02	No IUR	8.6E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	1.8E-01	5.40E-03	3.1E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	2.5E-01	7.50E-03	No IUR	3.6E-05			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.4E+00	4.20E-02	7.5E-08	1.3E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.3E-01	3.90E-03	3.5E-09	3.7E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	2.9E+00	8.70E-02	No IUR	4.2E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.0E+00	1.80E-01	No IUR	3.5E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	6.2E-01	1.86E-02	1.7E-09	4.5E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	6.8E-01	2.04E-02	No IUR	3.9E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	7.4E+00	2.22E-01	No IUR	7.1E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.0E+00	1.80E-01	No IUR	3.5E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	5.9E+02	1.77E+01	**3.7E-05**	**8.5E+00**	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.5E+01	4.50E-01	No IUR	6.2E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	6.9E-01	2.07E-02	No IUR	2.8E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.2E-01	9.60E-03	No IUR	9.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	6.1E-01	1.83E-02	No IUR	1.8E-04			1.00E-01	I	
				TOTAL:	**3.7E-05**	**8.5E+00**					

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.20E+01	6.60E-01	No IUR	2.0E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	4.20E-01	1.26E-02	3.5E-08	4.0E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.6E+00	4.80E-02	No IUR	6.6E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.3E-01	9.90E-03	2.1E-08	9.5E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.9E-01	5.70E-03	4.7E-08	5.6E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.0E+00	3.00E-02	No IUR	3.2E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.7E+00	8.10E-02	No IUR	7.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	3.3E-02	9.90E-04	5.6E-10	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.6E-02	7.80E-04	7.2E-09	1.1E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.2E+00	3.60E-02	6.4E-08	1.2E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	6.9E-01	2.07E-02	No IUR	2.0E-06			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.4E-01	4.20E-03	3.7E-09	4.0E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.9E-01	5.70E-03	No IUR	7.8E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	7.8E-01	2.34E-02	No IUR	7.5E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.7E+00	5.10E-02	No IUR	2.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.8E+00	8.40E-02	No IUR	1.6E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	3.0E-02	9.00E-04	8.3E-11	2.9E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	4.9E-01	1.47E-02	1.4E-10	2.3E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	1.8E-01	5.40E-03	No IUR	5.2E-06			1.00E+00	X	
x	115-07-1	Propylene	9.3E-01	2.79E-02	No IUR	8.9E-06			3.00E+00	CA	
x	100-42-5	Styrene	5.1E-01	1.53E-02	No IUR	1.5E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-	1.2E-01	3.60E-03	7.4E-08	No RfC	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.4E-01	4.20E-03	3.9E-10	1.0E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	6.8E-01	2.04E-02	No IUR	9.8E-06			2.00E+00	I	
x	108-88-3	Toluene	6.8E-01	2.04E-02	No IUR	3.9E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.0E+00	1.20E-01	No IUR	3.8E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.4E+00	4.20E-02	No IUR	8.1E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.7E+01	5.10E-01	**1.1E-06**	2.4E-01	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	6.2E+00	1.86E-01	No IUR	2.5E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.4E-01	1.02E-02	No IUR	1.4E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	3.3E-02	9.90E-04	4.3E-09	9.5E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	2.0E-01	6.00E-03	No IUR	5.8E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.3E-01	1.29E-02	No IUR	1.2E-04			1.00E-01	I	
				TOTAL:	**1.3E-06**	**2.5E-01**					

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (SSGR1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.50E+00	1.65E-01	No IUR	5.1E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	2.60E-01	7.80E-03	2.2E-08	2.5E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.6E-01	7.80E-03	No IUR	1.1E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.4E-01	1.02E-02	2.2E-08	9.8E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.4E+00	7.20E-02	No IUR	6.9E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	3.9E-02	1.17E-03	6.7E-10	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	4.8E-02	1.44E-03	No IUR	6.9E-06			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.4E-02	1.02E-03	9.1E-10	9.8E-07	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.9E-01	5.70E-03	No IUR	7.8E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	7.1E-01	2.13E-02	No IUR	4.1E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	2.0E-02	6.00E-04	5.6E-11	1.9E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	2.0E-01	6.00E-03	5.9E-11	9.6E-06	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	8.1E-02	2.43E-03	2.3E-10	5.8E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.4E-01	4.20E-03	No IUR	8.1E-07			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	9.2E-01	2.76E-02	No IUR	8.8E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.5E-01	1.95E-02	No IUR	3.7E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	7.0E+01	2.10E+00	**4.4E-06**	**1.0E+00**	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.6E+00	7.80E-02	No IUR	1.1E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.2E-02	9.60E-04	No IUR	9.2E-06			1.00E-01	S	
x	1330-20-7	Xylenes	7.8E-02	2.34E-03	No IUR	2.2E-05			1.00E-01	I	
				TOTAL:	**4.4E-06**	**1.0E+00**					

OSWER VAPOR INTRUSION ASSESSMENT - 194 CHURCH ROAD (SSGR2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.50E+00	1.65E-01	No IUR	5.1E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.10E-01	3.30E-03	9.2E-09	1.1E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	4.0E-01	1.20E-02	No IUR	1.6E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	1.9E-08	8.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.2E-01	3.60E-03	2.9E-08	3.5E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.9E-01	5.70E-03	No IUR	6.1E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.3E+00	6.90E-02	No IUR	6.6E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.1E-02	9.30E-04	8.3E-10	8.9E-07	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	9.0E-01	2.70E-02	No IUR	5.2E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	2.3E-02	6.90E-04	6.4E-11	2.2E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	4.9E-01	1.47E-02	1.4E-10	2.3E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	4.3E-02	1.29E-03	1.2E-10	3.1E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.3E-01	3.90E-03	No IUR	7.5E-07			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.0E-01	1.20E-02	No IUR	3.8E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.3E-01	3.90E-03	No IUR	7.5E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.4E+00	7.20E-02	1.5E-07	3.5E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	9.6E-01	2.88E-02	No IUR	3.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	5.2E-02	1.56E-03	No IUR	1.5E-05			1.00E-01	S	
x	1330-20-7	Xylenes	1.1E-01	3.30E-03	No IUR	3.2E-05			1.00E-01	I	
				TOTAL:	**2.1E-07**	**3.6E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 205 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.30E+01	3.90E-01	No IUR	1.2E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.20E-01	3.60E-03	1.0E-08	1.2E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.0E-01	2.40E-02	No IUR	4.6E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	8.1E-01	2.43E-02	No IUR	3.3E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.6E-01	7.80E-03	1.7E-08	7.5E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	6.3E-01	1.89E-02	1.5E-07	1.8E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.9E-01	8.70E-03	8.1E-08	1.2E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	6.5E-02	1.95E-03	1.7E-09	1.9E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	2.4E+00	7.20E-02	No IUR	3.5E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.0E-01	1.80E-02	No IUR	3.5E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.1E-01	6.30E-03	No IUR	2.0E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	2.8E-01	8.40E-03	No IUR	8.1E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	4.5E-01	1.35E-02	No IUR	2.6E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.7E-01	1.71E-02	No IUR	5.5E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.0E-02	9.00E-04	No IUR	1.7E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.0E-02	6.00E-04	1.3E-09	2.9E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.6E+01	4.80E-01	No IUR	6.6E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.3E-02	1.29E-03	No IUR	1.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	1.1E-01	3.30E-03	No IUR	3.2E-05			1.00E-01	I	
				TOTAL:	**2.7E-07**	**8.2E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 205 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.30E+01	9.90E-01	No IUR	3.1E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.80E-01	5.40E-03	1.5E-08	1.7E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.5E-01	2.55E-02	No IUR	4.9E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.1E-01	6.30E-03	1.3E-08	6.0E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.2E-01	3.60E-03	2.9E-08	3.5E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.9E-01	8.70E-03	No IUR	9.3E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.1E+00	3.30E-02	3.1E-07	4.5E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.6E-01	4.80E-03	4.3E-09	4.6E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	3.4E+00	1.02E-01	No IUR	4.9E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.4E+00	4.20E-02	No IUR	8.1E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	3.5E-01	1.05E-02	No IUR	3.4E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	1.8E+00	5.40E-02	5.3E-10	8.6E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.3E+00	3.90E-02	No IUR	3.7E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.6E-01	7.80E-03	7.2E-10	1.9E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	8.3E-01	2.49E-02	No IUR	4.8E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.7E-01	1.71E-02	No IUR	5.5E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.1E-02	6.30E-04	No IUR	1.2E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.6E+01	7.80E-01	No IUR	1.1E-03			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.3E-01	3.90E-03	No IUR	3.7E-05			1.00E-01	S	
x	1330-20-7	Xylenes	3.9E-01	1.17E-02	No IUR	1.1E-04			1.00E-01	I	
				TOTAL:	**3.7E-07**	**1.2E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 207 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.30E+01	6.90E-01	No IUR	2.1E-05			3.10E+01	A	
x	75-05-8	Acetonitrile	1.30E+00	3.90E-02	No IUR	6.2E-04			6.00E-02	I	
x	71-43-2	Benzene	1.60E+00	4.80E-02	1.3E-07	1.5E-03	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.2E-01	2.46E-02	No IUR	4.7E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	4.7E+00	1.41E-01	No IUR	1.9E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.2E-01	9.60E-03	2.1E-08	9.2E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	8.9E-01	2.67E-02	No IUR	2.8E-04			9.00E-02	I	
x	98-82-8	Cumene	1.0E+00	3.00E-02	No IUR	7.2E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	2.0E-01	6.00E-03	No IUR	9.6E-07			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-	1.6E-01	4.80E-03	No IUR	2.3E-05			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.5E-01	1.35E-02	1.3E-07	1.8E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.3E+00	3.90E-02	3.5E-08	3.7E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.3E+00	3.90E-02	No IUR	5.3E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	3.9E+00	1.17E-01	No IUR	5.6E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.0E+00	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.3E-01	3.90E-03	No IUR	1.2E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	4.0E-02	1.20E-03	1.1E-10	3.8E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	4.5E-01	1.35E-02	1.3E-10	2.2E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	1.0E+00	3.00E-02	3.6E-07	9.6E-03	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	3.5E-01	1.05E-02	No IUR	1.0E-05			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	2.0E-01	6.00E-03	No IUR	5.8E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.0E-01	6.00E-03	5.6E-10	1.4E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	1.1E+00	3.30E-02	No IUR	1.6E-05			2.00E+00	I	
x	108-88-3	Toluene	1.0E+01	3.00E-01	No IUR	5.8E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.4E-01	1.92E-02	No IUR	6.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.2E-02	9.60E-04	No IUR	1.8E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.0E-01	6.00E-03	1.3E-08	2.9E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.7E+00	5.10E-02	No IUR	7.0E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	2.1E-02	6.30E-04	2.7E-09	6.0E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.4E+00	4.20E-02	No IUR	4.0E-04			1.00E-01	S	
x	1330-20-7	Xylenes	4.8E+00	1.44E-01	No IUR	1.4E-03			1.00E-01	I	
				TOTAL:	**6.9E-07**	**3.2E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 208 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.50E+01	4.50E-01	No IUR	1.4E-05			3.10E+01	A	
x	75-05-8	Acetonitrile	2.50E+00	7.50E-02	No IUR	1.2E-03			6.00E-02	I	
x	71-43-2	Benzene	2.00E-01	6.00E-03	1.7E-08	1.9E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.0E+00	6.00E-02	No IUR	8.2E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.2E-01	9.60E-03	2.1E-08	9.2E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.9E+01	5.70E-01	**4.7E-06**	5.6E-03	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.0E-01	1.50E-02	No IUR	1.6E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	1.1E-01	3.30E-03	No IUR	5.3E-07			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.4E+00	7.20E-02	No IUR	6.9E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.5E-02	1.35E-03	1.3E-08	1.8E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	4.0E-01	1.20E-02	2.1E-08	3.8E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	5.2E-02	1.56E-03	1.4E-09	1.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.0E-01	6.00E-03	No IUR	8.2E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	9.3E-01	2.79E-02	No IUR	1.3E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)		--	--	--			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.3E-01	3.90E-03	No IUR	1.2E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	2.4E-02	7.20E-04	6.7E-11	2.3E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	2.2E+00	6.60E-02	6.5E-10	1.1E-04	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene	2.8E+00	8.40E-02	No IUR	2.7E-05			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.7E-01	5.10E-03	4.7E-10	1.2E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.7E-01	5.10E-03	No IUR	9.8E-07			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.6E-01	1.68E-02	No IUR	5.4E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	8.2E-01	2.46E-02	No IUR	4.7E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.0E-02	6.00E-04	1.3E-09	2.9E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	2.4E-02	7.20E-04	3.1E-09	6.9E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.4E-02	1.02E-03	No IUR	9.8E-06			1.00E-01	S	
x	1330-20-7	Xylenes	9.6E-02	2.88E-03	No IUR	2.8E-05			1.00E-01	I	
				TOTAL:	**4.7E-06**	**9.4E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 212 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.90E+01	5.70E-01	No IUR	1.8E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	2.50E-01	7.50E-03	2.1E-08	2.4E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	1.2E+00	3.60E-02	No IUR	6.9E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	1.9E-08	8.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	1.9E+00	5.70E-02	No IUR	5.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.0E-01	9.00E-03	8.0E-09	8.6E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol		--	--	--			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.8E+00	1.14E-01	No IUR	2.2E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	9.8E-01	2.94E-02	No IUR	5.6E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.6E+00	4.80E-02	No IUR	1.5E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.5E-01	1.05E-02	No IUR	2.0E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.0E-01	6.00E-03	1.3E-08	2.9E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.3E+00	3.90E-02	No IUR	5.3E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.6E-01	1.08E-02	No IUR	1.0E-04			1.00E-01	S	
x	1330-20-7	Xylenes	1.1E+00	3.30E-02	No IUR	3.2E-04			1.00E-01	I	
				TOTAL:	**6.1E-08**	**1.7E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 222 CHURCH ROAD (SG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.10E+01	3.30E-01	No IUR	1.0E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	2.10E-01	6.30E-03	1.8E-08	2.0E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	6.2E-01	1.86E-02	No IUR	3.6E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.9E+01	5.70E-01	No IUR	7.8E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.6E-01	7.80E-03	1.7E-08	7.5E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	3.0E-01	9.00E-03	7.4E-08	8.8E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.4E-01	1.62E-02	No IUR	1.7E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.0E-01	1.20E-02	1.1E-07	1.6E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	5.0E+00	1.50E-01	2.7E-07	4.8E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.9E-02	1.17E-03	1.0E-09	1.1E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-		--	--	--			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	3.7E-01	1.11E-02	No IUR	5.3E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.7E+00	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	5.1E+00	1.53E-01	1.4E-08	3.7E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.0E-01	6.00E-03	No IUR	1.2E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	9.1E-01	2.73E-02	No IUR	8.7E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.5E-02	1.95E-03	No IUR	3.7E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.8E-01	8.40E-03	1.8E-08	4.0E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	5.2E-02	1.56E-03	No IUR	1.5E-05			1.00E-01	S	
x	1330-20-7	Xylenes	5.6E-02	1.68E-03	No IUR	1.6E-05			1.00E-01	I	
				TOTAL:	**5.2E-07**	**2.0E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 222 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.60E+01	7.80E-01	No IUR	2.4E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	6.70E-01	2.01E-02	5.6E-08	6.4E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	7.0E-01	2.10E-02	No IUR	4.0E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-	1.2E-01	3.60E-03	3.8E-08	1.7E-03	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	8.4E+00	2.52E-01	No IUR	3.5E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.4E-01	7.20E-03	5.9E-08	7.0E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	4.3E-01	1.29E-02	No IUR	1.4E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	3.8E-01	1.14E-02	4.5E-08	1.4E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	4.5E-02	1.35E-03	1.3E-08	1.8E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	3.2E-01	9.60E-03	1.7E-08	3.1E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	2.2E-01	6.60E-03	No IUR	6.3E-07			1.00E+01	I	
x	100-41-4	Ethylbenzene	2.3E-01	6.90E-03	6.1E-09	6.6E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.3E-01	3.90E-03	No IUR	5.3E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	7.8E-01	2.34E-02	No IUR	7.5E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.2E+00	3.60E-02	No IUR	1.7E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	4.4E+00	1.32E-01	No IUR	2.5E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	3.0E-01	9.00E-03	No IUR	2.9E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	1.4E-01	4.20E-03	No IUR	4.0E-06			1.00E+00	X	
x	115-07-1	Propylene	3.0E+00	9.00E-02	No IUR	2.9E-05			3.00E+00	CA	
x	100-42-5	Styrene	6.0E+00	1.80E-01	No IUR	1.7E-04			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.8E+00	5.40E-02	5.0E-09	1.3E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.0E+00	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.8E-01	1.74E-02	No IUR	5.6E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.5E-01	4.50E-03	No IUR	8.6E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.3E+00	3.90E-02	8.2E-08	1.9E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.1E+00	3.30E-02	No IUR	4.5E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	5.0E-01	1.50E-02	No IUR	2.1E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.2E-01	9.60E-03	No IUR	9.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	6.9E-01	2.07E-02	No IUR	2.0E-04			1.00E-01	I	
				TOTAL:	**3.2E-07**	**3.2E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 224 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.60E+01	7.80E-01	No IUR	2.4E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	3.10E-01	9.30E-03	2.6E-08	3.0E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	1.7E+00	5.10E-02	No IUR	9.8E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	8.7E+00	2.61E-01	No IUR	3.6E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.8E-01	8.40E-03	1.8E-08	8.1E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.3E+00	3.90E-02	3.2E-07	3.8E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	3.7E-01	1.11E-02	No IUR	1.2E-04			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	1.2E-01	3.60E-03	No IUR	5.8E-07			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	1.0E+00	3.00E-02	1.2E-07	3.6E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.6E+00	7.80E-02	No IUR	7.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	3.5E-01	1.05E-02	9.7E-08	1.4E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	123-91-1	Dioxane, 1,4-	1.2E+00	3.60E-02	6.4E-08	1.2E-03	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	4.1E-01	1.23E-02	1.1E-08	1.2E-05	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	7.0E-01	2.10E-02	No IUR	2.9E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	6.6E-01	1.98E-02	No IUR	6.3E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.0E+00	3.00E-02	No IUR	1.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.8E+00	8.40E-02	No IUR	1.6E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.6E-01	7.80E-03	No IUR	2.5E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	1.1E+00	3.30E-02	4.0E-07	1.1E-02	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene	1.7E+00	5.10E-02	No IUR	1.6E-05			3.00E+00	CA	
x	100-42-5	Styrene	3.2E+00	9.60E-02	No IUR	9.2E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-	5.9E-02	1.77E-03	3.7E-08	No RfC	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.1E-01	3.30E-03	3.1E-10	7.9E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	7.4E-01	2.22E-02	No IUR	1.1E-05			2.00E+00	I	
x	108-88-3	Toluene	2.2E+00	6.60E-02	No IUR	1.3E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.6E-01	1.98E-02	No IUR	6.3E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.5E+00	4.50E-02	No IUR	8.6E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	6.4E+00	1.92E-01	4.0E-07	9.2E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.4E+00	7.20E-02	No IUR	9.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	5.9E-01	1.77E-02	No IUR	2.4E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.0E-01	1.20E-02	No IUR	1.2E-04			1.00E-01	S	
x	1330-20-7	Xylenes	9.1E-01	2.73E-02	No IUR	2.6E-04			1.00E-01	I	
				TOTAL:	**1.5E-06**	**1.2E-01**					

OSWER VAPOR INTRUSION ASSESSMENT - 224 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone		--	--	--			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	6.70E-01	2.01E-02	5.6E-08	6.4E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.2E+01	3.60E-01	No IUR	4.9E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	1.9E-08	8.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.6E+00	4.80E-02	3.9E-07	4.7E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.0E-01	6.00E-03	No IUR	6.4E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	1.0E-01	3.00E-03	No IUR	4.8E-07			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	4.1E-01	1.23E-02	4.8E-08	1.5E-05	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.6E+00	7.80E-02	No IUR	7.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-	2.0E+00	6.00E-02	2.1E-07	1.4E-02	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	5.4E-01	1.62E-02	2.9E-08	5.2E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.6E-01	4.80E-03	4.3E-09	4.6E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	8.5E-01	2.55E-02	No IUR	3.5E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-	5.3E-01	1.59E-02	No IUR	5.1E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.0E+00	3.00E-02	No IUR	1.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.4E+00	7.20E-02	No IUR	1.4E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene	1.5E+00	4.50E-02	No IUR	1.4E-05			3.00E+00	CA	
x	100-42-5	Styrene	2.6E-01	7.80E-03	No IUR	7.5E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-	7.6E-02	2.28E-03	4.7E-08	No RfC	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.4E-01	7.20E-03	6.7E-10	1.7E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	6.0E-01	1.80E-02	No IUR	8.6E-06			2.00E+00	I	
x	108-88-3	Toluene	7.2E-01	2.16E-02	No IUR	4.1E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	7.4E-01	2.22E-02	No IUR	7.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.3E+00	9.90E-02	No IUR	1.9E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.7E+00	5.10E-02	1.1E-07	2.4E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.1E+00	6.30E-02	No IUR	8.6E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	4.0E-01	1.20E-02	No IUR	1.6E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.4E-02	4.20E-04	1.8E-09	4.0E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.5E-01	4.50E-03	No IUR	4.3E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.3E-01	1.29E-02	No IUR	1.2E-04			1.00E-01	I	
				TOTAL:	**9.2E-07**	**4.5E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 242 CHURCH ROAD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.80E+01	5.40E-01	No IUR	1.7E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	2.70E-01	8.10E-03	2.3E-08	2.6E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.5E-01	2.55E-02	No IUR	4.9E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.5E+00	7.50E-02	No IUR	1.0E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.8E-01	8.40E-03	1.8E-08	8.1E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	8.8E-01	2.64E-02	2.2E-07	2.6E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	2.0E-01	6.00E-03	No IUR	9.6E-07			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	2.0E-01	6.00E-03	2.4E-08	7.2E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	1.8E-01	5.40E-03	3.1E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	3.9E-01	1.17E-02	1.1E-07	1.6E-03	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	3.0E-01	9.00E-03	No IUR	4.3E-05			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-	2.2E+00	6.60E-02	2.4E-07	1.6E-02	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.9E-01	5.70E-03	5.1E-09	5.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	4.9E-01	1.47E-02	No IUR	2.0E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	9.1E-01	2.73E-02	No IUR	1.3E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.7E+00	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.4E-01	4.20E-03	No IUR	1.3E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	1.0E-02	3.00E-04	2.8E-11	9.6E-08	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	6.3E+00	1.89E-01	1.9E-09	3.0E-04	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.0E+00	3.00E-02	No IUR	2.9E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.8E+00	8.40E-02	7.8E-09	2.0E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.6E+00	4.80E-02	No IUR	9.2E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.0E+00	3.00E-02	No IUR	9.6E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.2E+00	6.60E-02	No IUR	1.3E-05			5.00E+00	I	
x	79-01-6	Trichloroethylene	4.5E+00	1.35E-01	2.8E-07	6.5E-02	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.0E-01	9.00E-03	No IUR	1.2E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	4.3E-02	1.29E-03	5.6E-09	1.2E-05	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	2.4E-01	7.20E-03	No IUR	6.9E-05			1.00E-01	S	
x	1330-20-7	Xylenes	5.6E-01	1.68E-02	No IUR	1.6E-04			1.00E-01	I	
				TOTAL:	**9.3E-07**	**9.2E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 242 CHURCH ROAD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.10E+01	3.30E-01	No IUR	1.0E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	3.50E-01	1.05E-02	2.9E-08	3.4E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	7.0E-01	2.10E-02	No IUR	4.0E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	3.7E+00	1.11E-01	No IUR	1.5E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.6E-01	7.80E-03	1.7E-08	7.5E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	4.6E-01	1.38E-02	1.1E-07	1.4E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.9E-01	8.70E-03	No IUR	9.3E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	5.7E-02	1.71E-03	1.6E-08	2.3E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.7E-01	5.10E-03	4.5E-09	4.9E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.0E-01	9.00E-03	No IUR	1.2E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.0E+00	3.00E-02	No IUR	1.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	9.1E-01	2.73E-02	No IUR	5.2E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	1.0E+01	3.00E-01	3.0E-09	4.8E-04	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	9.8E-01	2.94E-02	No IUR	2.8E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.2E+00	6.60E-02	6.1E-09	1.6E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.8E+00	5.40E-02	No IUR	1.0E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	8.0E-01	2.40E-02	No IUR	7.7E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.3E-01	3.90E-03	No IUR	7.5E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.8E-01	5.40E-03	1.1E-08	2.6E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.1E+00	3.30E-02	No IUR	4.5E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.5E-01	4.50E-03	No IUR	4.3E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.0E-01	1.20E-02	No IUR	1.2E-04			1.00E-01	I	
				TOTAL:	**2.0E-07**	**1.1E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 390 SOUTH MOUNTAIN BLVD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.50E+00	1.65E-01	No IUR	5.1E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	3.50E-01	1.05E-02	2.9E-08	3.4E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	6.2E-01	1.86E-02	No IUR	3.6E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.0E+00	6.00E-02	No IUR	8.2E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	1.8E-01	5.40E-03	1.2E-08	5.2E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	2.2E+00	6.60E-02	5.4E-07	6.5E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.7E-01	8.10E-03	No IUR	8.6E-05			9.00E-02	I	
x	98-82-8	Cumene	5.9E-01	1.77E-02	No IUR	4.2E-05			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	5.8E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	2.8E-02	8.40E-04	7.8E-09	1.2E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	2.0E-01	6.00E-03	1.1E-08	1.9E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	6.5E-02	1.95E-03	1.7E-09	1.9E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.1E-01	9.30E-03	No IUR	1.3E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	4.2E-01	1.26E-02	No IUR	6.0E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	6.0E-01	1.80E-02	No IUR	3.5E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	8.3E-03	2.49E-04	2.3E-11	8.0E-08	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.0E-01	6.00E-03	5.6E-10	1.4E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.0E-01	6.00E-03	No IUR	1.2E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.0E-01	1.20E-02	No IUR	3.8E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.3E-01	6.90E-03	No IUR	1.3E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.4E-02	1.02E-03	2.1E-09	4.9E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+00	3.60E-02	No IUR	4.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.8E-02	1.44E-03	No IUR	1.4E-05			1.00E-01	S	
x	1330-20-7	Xylenes	1.3E-01	3.90E-03	No IUR	3.7E-05			1.00E-01	I	
				TOTAL:	**6.0E-07**	**6.5E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 390 SOUTH MOUNTAIN BLVD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.90E+01	8.70E-01	No IUR	2.7E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	2.50E-01	7.50E-03	2.1E-08	2.4E-04	7.80E-06	I	3.00E-02	I	
x	74-83-9	Bromomethane	8.2E-01	2.46E-02	No IUR	4.7E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	5.9E+00	1.77E-01	No IUR	2.4E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	1.6E-01	4.80E-03	1.0E-08	4.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.5E+00	4.50E-02	3.7E-07	4.4E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.0E-01	6.00E-03	No IUR	6.4E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	5.3E-02	1.59E-03	1.5E-08	2.2E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	3.0E-01	9.00E-03	1.6E-08	2.9E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.5E-01	4.50E-03	4.0E-09	4.3E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.2E-01	6.60E-03	No IUR	9.0E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.3E+00	3.90E-02	No IUR	1.9E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.2E+00	9.60E-02	No IUR	1.8E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.0E-01	6.00E-03	No IUR	1.9E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	1.2E-02	3.60E-04	3.3E-11	1.2E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene	1.5E+00	4.50E-02	No IUR	1.4E-05			3.00E+00	CA	
x	100-42-5	Styrene	1.8E-01	5.40E-03	No IUR	5.2E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.9E-01	8.70E-03	8.1E-10	2.1E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	8.0E-01	2.40E-02	No IUR	4.6E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.8E-01	1.44E-02	No IUR	4.6E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	2.2E-01	6.60E-03	No IUR	1.3E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.0E-02	9.00E-04	1.9E-09	4.3E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.5E+00	4.50E-02	No IUR	6.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.3E-01	3.90E-03	No IUR	3.7E-05			1.00E-01	S	
x	1330-20-7	Xylenes	2.7E-01	8.10E-03	No IUR	7.8E-05			1.00E-01	I	
				TOTAL:	**4.4E-07**	**8.0E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 393 SOUTH MOUNTAIN BLVD (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	9.30E+00	2.79E-01	No IUR	8.6E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	1.90E+00	5.70E-02	1.6E-07	1.8E-03	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane	2.50E+00	7.50E-02	9.9E-07	No RfC	3.70E-05	CA			
x	74-83-9	Bromomethane	6.2E-01	1.86E-02	No IUR	3.6E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	9.0E-01	2.70E-02	No IUR	3.7E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.8E-01	1.14E-02	2.4E-08	1.1E-04	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	9.8E+01	2.94E+00	**2.4E-05**	2.9E-02	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	1.2E-01	3.60E-03	2.1E-09	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.7E-01	5.10E-03	4.7E-08	7.0E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.0E-02	2.70E-03	2.4E-09	2.6E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.7E-01	8.10E-03	No IUR	1.1E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	9.6E-01	2.88E-02	No IUR	1.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	9.7E-01	2.91E-02	No IUR	5.6E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	3.0E-02	9.00E-04	8.3E-11	2.9E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	3.1E+00	9.30E-02	8.6E-09	2.2E-03	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.2E+00	3.60E-02	No IUR	6.9E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.4E-01	1.92E-02	No IUR	6.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.2E+00	3.60E-02	No IUR	6.9E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	7.5E-02	2.25E-03	4.7E-09	1.1E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	3.6E-02	1.08E-03	4.7E-09	1.0E-05	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	4.0E-02	1.20E-03	No IUR	1.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	1.4E-01	4.20E-03	No IUR	4.0E-05			1.00E-01	I	
				TOTAL:	**2.5E-05**	**3.9E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 393 SOUTH MOUNTAIN BLVD (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	9.30E+00	2.79E-01	No IUR	8.6E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	71-43-2	Benzene	1.20E+00	3.60E-02	1.0E-07	1.2E-03	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane	3.0E-01	9.00E-03	No IUR	1.7E-03			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	3.4E+00	1.02E-01	No IUR	1.4E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	1.0E-01	3.00E-03	6.4E-09	2.9E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.2E+00	3.60E-02	2.9E-07	3.5E-04	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.9E-01	8.70E-03	No IUR	9.3E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane	1.8E-01	5.40E-03	No IUR	8.6E-07			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	2.3E-01	6.90E-03	2.7E-08	8.3E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.9E-01	5.70E-03	5.3E-08	7.8E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	2.0E-01	6.00E-03	5.3E-09	5.8E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	4.2E-01	1.26E-02	No IUR	1.7E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.0E+00	3.00E-02	No IUR	1.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.4E+00	4.20E-02	No IUR	8.1E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	9.4E-02	2.82E-03	2.6E-10	9.0E-07	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	3.0E-01	9.00E-03	No IUR	8.6E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	8.1E-01	2.43E-02	2.3E-09	5.8E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.0E+00	6.00E-02	No IUR	1.2E-05			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.2E-01	1.86E-02	No IUR	5.9E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	8.7E-01	2.61E-02	No IUR	5.0E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.4E+00	4.20E-02	No IUR	5.8E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.0E-01	3.00E-03	No IUR	2.9E-05			1.00E-01	S	
x	1330-20-7	Xylenes	3.3E-01	9.90E-03	No IUR	9.5E-05			1.00E-01	I	
				TOTAL:	**4.9E-07**	**5.9E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - CHURCH (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.00E+01	3.00E-01	No IUR	2.2E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	3.80E-01	1.14E-02	7.3E-09	8.7E-05	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.4E+00	7.20E-02	No IUR	2.3E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	1.3E-01	3.90E-03	1.9E-09	8.9E-06	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	4.0E-01	1.20E-02	No IUR	3.0E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	3.0E+00	9.00E-02	No IUR	2.1E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.1E-01	3.30E-03	7.0E-09	1.1E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	9.0E-02	2.70E-03	5.5E-10	6.2E-07	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	5.6E-01	1.68E-02	No IUR	5.5E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	8.6E-01	2.58E-02	No IUR	2.9E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.9E+00	5.70E-02	No IUR	2.6E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.7E-01	5.10E-03	No IUR	3.9E-07			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	7.7E-01	2.31E-02	No IUR	5.3E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	8.1E-01	2.43E-02	5.2E-10	1.4E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	3.3E-01	9.90E-03	No IUR	4.5E-07			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.9E+00	1.47E-01	No IUR	1.1E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.0E-01	1.80E-02	No IUR	8.2E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.0E-02	6.00E-04	2.0E-10	6.8E-05	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.2E+01	3.60E-01	No IUR	1.2E-04			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	8.3E-02	2.49E-03	No IUR	5.7E-06			1.00E-01	S	
x	1330-20-7	Xylenes	1.9E-01	5.70E-03	No IUR	1.3E-05			1.00E-01	I	
				TOTAL:	**1.7E-08**	**8.5E-04**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - PARISH CENTER (SG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.30E+01	3.90E-01	No IUR	2.9E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	2.00E-01	6.00E-03	3.8E-09	4.6E-05	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	7.5E-01	2.25E-02	No IUR	7.3E-06			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.4E-01	1.02E-02	5.0E-09	2.3E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.9E-01	8.70E-03	No IUR	2.2E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.4E+00	7.20E-02	No IUR	1.6E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.6E-01	4.80E-03	1.0E-08	1.6E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.2E-01	3.60E-03	7.3E-10	8.2E-07	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	4.2E-01	1.26E-02	No IUR	4.1E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	8.1E-01	2.43E-02	No IUR	2.8E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.2E+00	6.60E-02	No IUR	3.0E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	6.3E-01	1.89E-02	1.5E-11	7.2E-06	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	4.5E-01	1.35E-02	No IUR	6.2E-07			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.6E+00	4.80E-02	No IUR	3.7E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.5E-02	1.95E-03	No IUR	8.9E-08			5.00E+00	I	
x	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	3.5E+00	1.05E-01	No IUR	3.4E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	2.4E-02	7.20E-04	2.6E-10	1.6E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	9.6E-02	2.88E-03	No IUR	6.6E-06			1.00E-01	S	
x	1330-20-7	Xylenes	1.2E-01	3.60E-03	No IUR	8.2E-06			1.00E-01	I	
				TOTAL:	**2.0E-08**	**5.2E-04**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - PARISH CENTER (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	8.30E+00	2.49E-01	No IUR	1.8E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	1.50E+00	4.50E-02	2.9E-08	3.4E-04	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.9E+00	5.70E-02	No IUR	1.9E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	4.4E-01	1.32E-02	2.5E-08	3.1E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.7E-01	8.10E-03	No IUR	2.1E-05			9.00E-02	I	
x	98-82-8	Cumene	1.9E-01	5.70E-03	No IUR	3.3E-06			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.3E+00	6.90E-02	No IUR	1.6E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	1.7E-02	5.10E-04	6.7E-11	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	3.7E-01	1.11E-02	2.4E-08	3.6E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-	3.9E-01	1.17E-02	9.5E-09	6.7E-04	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.0E-01	3.00E-03	6.1E-10	6.8E-07	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	1.2E+00	3.60E-02	No IUR	1.2E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	6.9E-01	2.07E-02	No IUR	2.4E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.4E+00	4.20E-02	No IUR	1.9E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	4.2E-01	1.26E-02	No IUR	2.9E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	9.5E-01	2.85E-02	6.0E-10	1.6E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.2E+00	3.60E-02	No IUR	1.6E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.3E+00	3.90E-02	No IUR	3.0E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	7.6E-01	2.28E-02	No IUR	1.0E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	4.8E-01	1.44E-02	4.8E-09	1.6E-03	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	2.4E+00	7.20E-02	No IUR	2.3E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.0E-01	3.00E-03	No IUR	6.8E-06			1.00E-01	S	
x	1330-20-7	Xylenes	2.5E-01	7.50E-03	No IUR	1.7E-05			1.00E-01	I	
				TOTAL:	**9.3E-08**	**3.5E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - PARISH CENTER (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.80E+01	1.14E+00	No IUR	8.4E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	2.00E+00	6.00E-02	3.8E-08	4.6E-04	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	6.5E+00	1.95E-01	No IUR	6.4E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.0E-01	9.00E-03	4.4E-09	2.1E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	3.2E-01	9.60E-03	1.8E-08	2.2E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.3E+00	3.90E-02	No IUR	9.9E-05			9.00E-02	I	
x	98-82-8	Cumene	3.7E-01	1.11E-02	No IUR	6.3E-06			4.00E-01	I	
x	110-82-7	Cyclohexane	2.0E-01	6.00E-03	No IUR	2.3E-07			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-	2.5E-01	7.50E-03	No IUR	8.6E-06			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	1.4E-01	4.20E-03	3.8E-09	1.2E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.2E+00	6.60E-02	No IUR	1.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	7.3E-01	2.19E-02	4.6E-08	7.1E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	4.4E-02	1.32E-03	No IUR	1.5E-06			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	1.0E+00	3.00E-02	1.2E-08	2.3E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	2.1E-01	6.30E-03	No IUR	1.4E-07			1.00E+01	I	
x	100-41-4	Ethylbenzene	4.8E-01	1.44E-02	2.9E-09	3.3E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	8.5E-01	2.55E-02	No IUR	8.3E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	8.4E+00	2.52E-01	No IUR	2.9E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.5E+00	1.05E-01	No IUR	4.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	5.7E-01	1.71E-02	No IUR	1.3E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	1.5E+00	4.50E-02	3.7E-11	1.7E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	3.6E+00	1.08E-01	3.0E-07	8.2E-03	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	8.9E-01	2.67E-02	No IUR	6.1E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	3.0E-01	9.00E-03	1.9E-10	5.1E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran	3.5E-01	1.05E-02	No IUR	1.2E-06			2.00E+00	I	
x	108-88-3	Toluene	2.7E+00	8.10E-02	No IUR	3.7E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.4E-01	1.62E-02	No IUR	1.2E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	7.6E-02	2.28E-03	No IUR	1.0E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.0E-02	9.00E-04	3.0E-10	1.0E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.1E+00	3.30E-02	No IUR	1.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	3.3E-01	9.90E-03	No IUR	3.2E-04			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.1E-02	3.30E-04	1.2E-10	7.5E-07	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	3.9E-01	1.17E-02	No IUR	2.7E-05			1.00E-01	S	
x	1330-20-7	Xylenes	1.0E+00	3.00E-02	No IUR	6.8E-05			1.00E-01	I	
				TOTAL:	**4.3E-07**	**1.1E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - RECTORY (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.20E+01	6.60E-01	No IUR	2.0E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	1.30E+00	3.90E-02	1.1E-07	1.2E-03	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	3.7E+00	1.11E-01	No IUR	1.5E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.3E-01	6.90E-03	1.5E-08	6.6E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	3.5E-01	1.05E-02	No IUR	1.1E-04			9.00E-02	I	
x	98-82-8	Cumene	1.7E-01	5.10E-03	No IUR	1.2E-05			4.00E-01	I	
x	110-82-7	Cyclohexane	3.0E-01	9.00E-03	No IUR	1.4E-06			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.6E+00	7.80E-02	No IUR	7.5E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	6.5E-02	1.95E-03	1.8E-08	2.7E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	3.3E-01	9.90E-03	8.8E-09	9.5E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.5E+00	7.50E-02	No IUR	1.0E-04			7.00E-01	I	
x	591-78-6	Hexanone, 2-	3.4E-01	1.02E-02	No IUR	3.3E-04			3.00E-02	I	
x	67-63-0	Isopropanol	1.0E+00	3.00E-02	No IUR	1.4E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.2E+00	9.60E-02	No IUR	1.8E-05			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.4E-01	7.20E-03	No IUR	2.3E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	1.1E+00	3.30E-02	3.3E-10	5.3E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.4E+00	4.20E-02	No IUR	4.0E-05			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	9.5E-01	2.85E-02	2.6E-09	6.8E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.7E+00	5.10E-02	No IUR	9.8E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.1E+00	3.30E-02	No IUR	1.1E-06			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	6.5E-01	1.95E-02	No IUR	3.7E-06			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.9E-02	5.70E-04	1.2E-09	2.7E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.4E+00	4.20E-02	No IUR	5.8E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	1.0E+00	3.00E-02	No IUR	4.1E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	6.1E-01	1.83E-02	No IUR	1.8E-04			1.00E-01	S	
x	1330-20-7	Xylenes	1.6E+00	4.80E-02	No IUR	4.6E-04			1.00E-01	I	
				TOTAL:	**1.5E-07**	**9.1E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - RECTORY (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.00E+01	3.00E-01	No IUR	9.3E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	5.40E-01	1.62E-02	4.5E-08	5.2E-04	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.1E+01	6.30E-01	No IUR	8.6E-04			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.7E-01	8.10E-03	1.7E-08	7.8E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.4E-01	4.20E-03	3.4E-08	4.1E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	2.7E-01	8.10E-03	No IUR	8.6E-05			9.00E-02	I	
x	98-82-8	Cumene	1.0E+00	3.00E-02	No IUR	7.2E-05			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	6.0E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	6.1E-02	1.83E-03	1.7E-08	2.5E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	7.0E-01	2.10E-02	3.7E-08	6.7E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	7.4E-02	2.22E-03	2.0E-09	2.1E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.9E-01	8.70E-03	No IUR	1.2E-05			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	5.7E-01	1.71E-02	No IUR	8.2E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.0E+00	3.00E-02	No IUR	5.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	3.2E-01	9.60E-03	No IUR	9.2E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.8E-01	5.40E-03	5.0E-10	1.3E-04	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	3.4E-01	1.02E-02	No IUR	2.0E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.1E-01	1.83E-02	No IUR	5.8E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.0E-01	3.00E-03	No IUR	5.8E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.8E-02	5.40E-04	1.1E-09	2.6E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	1.0E+00	3.00E-02	No IUR	4.1E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	7.8E-02	2.34E-03	No IUR	2.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	1.8E-01	5.40E-03	No IUR	5.2E-05			1.00E-01	I	
				TOTAL:	**1.5E-07**	**3.8E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - SCHOOL (SSG1)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.80E+01	1.14E+00	No IUR	8.4E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	2.00E+00	6.00E-02	3.8E-08	4.6E-04	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.4E+00	4.20E-02	No IUR	1.4E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.2E-01	9.60E-03	4.7E-09	2.2E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	8.5E-01	2.55E-02	No IUR	6.5E-05			9.00E-02	I	
x	98-82-8	Cumene	8.8E+00	2.64E-01	No IUR	1.5E-04			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	3.5E-01	1.05E-02	9.4E-09	3.0E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	1.4E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-	2.6E-02	7.80E-04	1.0E-10	No RfC	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	1.3E-01	3.90E-03	8.3E-09	1.3E-04	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-	3.3E-02	9.90E-04	No IUR	1.1E-06			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	1.2E-01	3.60E-03	No IUR	8.2E-08			1.00E+01	I	
x	100-41-4	Ethylbenzene	2.1E-01	6.30E-03	1.3E-09	1.4E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	8.5E-01	2.55E-02	No IUR	8.3E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	1.2E+01	3.60E-01	No IUR	4.1E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	2.4E+00	7.20E-02	No IUR	3.3E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)		--	--	--			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	3.8E+00	1.14E-01	9.3E-11	4.3E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	8.9E-01	2.67E-02	No IUR	6.1E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	5.0E-01	1.50E-02	3.2E-10	8.6E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	8.0E-01	2.40E-02	No IUR	1.1E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	8.4E-01	2.52E-02	No IUR	1.9E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	5.0E-01	1.50E-02	No IUR	6.8E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.4E-01	7.20E-03	2.4E-09	8.2E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	4.8E+00	1.44E-01	No IUR	4.7E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.9E-01	5.70E-03	No IUR	1.3E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.8E-01	1.44E-02	No IUR	3.3E-05			1.00E-01	I	
				TOTAL:	**6.5E-08**	**2.5E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - SCHOOL (SSG2)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.40E+01	7.20E-01	No IUR	5.3E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	2.30E-01	6.90E-03	4.4E-09	5.3E-05	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	2.6E+00	7.80E-02	No IUR	2.5E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.7E-01	8.10E-03	4.0E-09	1.8E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	7.6E-01	2.28E-02	No IUR	5.8E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	4.9E-01	1.47E-02	1.3E-08	4.2E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	1.4E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	8.5E-02	2.55E-03	5.4E-09	8.3E-05	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	2.3E-01	6.90E-03	2.8E-09	5.3E-05	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.7E-01	5.10E-03	1.0E-09	1.2E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.4E-01	7.20E-03	No IUR	2.3E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	6.1E-01	1.83E-02	No IUR	1.4E-04			3.00E-02	I	
x	67-63-0	Isopropanol	3.7E+00	1.11E-01	No IUR	1.3E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.5E+00	1.05E-01	No IUR	4.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	4.5E-01	1.35E-02	No IUR	1.0E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	9.7E-01	2.91E-02	2.4E-11	1.1E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	7.7E-01	2.31E-02	No IUR	5.3E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	8.7E-01	2.61E-02	No IUR	1.2E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	6.0E-01	1.80E-02	No IUR	1.4E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	5.0E-01	1.50E-02	No IUR	6.8E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	7.0E-02	2.10E-03	7.0E-10	2.4E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	3.8E+00	1.14E-01	No IUR	3.7E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.4E-01	4.20E-03	No IUR	9.6E-06			1.00E-01	S	
x	1330-20-7	Xylenes	3.6E-01	1.08E-02	No IUR	2.5E-05			1.00E-01	I	
				TOTAL:	**3.2E-08**	**1.0E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - SCHOOL (SSG3)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.40E+01	7.20E-01	No IUR	5.3E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	2.20E-01	6.60E-03	4.2E-09	5.0E-05	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	9.0E-01	2.70E-02	No IUR	8.8E-06			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	4.0E-01	1.20E-02	5.9E-09	2.7E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.8E-01	1.74E-02	No IUR	4.4E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	5.0E-01	1.50E-02	1.3E-08	4.3E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	1.4E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	8.0E-02	2.40E-03	5.1E-09	7.8E-05	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.7E-01	5.10E-03	1.0E-09	1.2E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.5E-01	7.50E-03	No IUR	2.4E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	3.6E-01	1.08E-02	No IUR	8.2E-05			3.00E-02	I	
x	67-63-0	Isopropanol	2.1E+00	6.30E-02	No IUR	7.2E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.2E+00	9.60E-02	No IUR	4.4E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	3.5E-01	1.05E-02	No IUR	8.0E-07			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	6.4E-01	1.92E-02	No IUR	4.4E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	8.0E-01	2.40E-02	No IUR	1.1E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.8E-01	1.44E-02	No IUR	1.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.0E-01	3.00E-03	No IUR	1.4E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.8E-02	5.40E-04	1.8E-10	6.2E-05	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	6.7E+00	2.01E-01	No IUR	6.6E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.4E-01	4.20E-03	No IUR	9.6E-06			1.00E-01	S	
x	1330-20-7	Xylenes	3.7E-01	1.11E-02	No IUR	2.5E-05			1.00E-01	I	
				TOTAL:	**3.0E-08**	**6.9E-04**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - SCHOOL (SSG4)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	3.10E+01	9.30E-01	No IUR	6.8E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	5.10E+00	1.53E-01	9.7E-08	1.2E-03	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.2E+00	3.60E-02	No IUR	1.2E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	4.0E-01	1.20E-02	5.9E-09	2.7E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.2E+00	3.60E-02	No IUR	9.1E-05			9.00E-02	I	
x	98-82-8	Cumene	2.8E+00	8.40E-02	No IUR	4.8E-05			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	3.8E-01	1.14E-02	1.0E-08	3.3E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.3E+00	6.90E-02	No IUR	1.6E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	8.5E-02	2.55E-03	5.4E-09	8.3E-05	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	1.9E-01	5.70E-03	No IUR	1.3E-07			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.7E-01	5.10E-03	1.0E-09	1.2E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.2E-01	9.60E-03	No IUR	3.1E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-		--	--	--			3.00E-02	I	
x	67-63-0	Isopropanol	3.9E+00	1.17E-01	No IUR	1.3E-04			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	1.9E+00	5.70E-02	No IUR	2.6E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	8.6E-01	2.58E-02	No IUR	2.0E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	8.0E-01	2.40E-02	2.0E-11	9.1E-06	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	3.7E-01	1.11E-02	No IUR	2.5E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	9.0E-01	2.70E-02	No IUR	1.2E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.7E-01	1.41E-02	No IUR	1.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	7.1E-02	2.13E-03	No IUR	9.7E-08			5.00E+00	I	
x	79-01-6	Trichloroethylene	3.9E-02	1.17E-03	3.9E-10	1.3E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	6.0E+00	1.80E-01	No IUR	5.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.7E-01	5.10E-03	No IUR	1.2E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.0E-01	1.20E-02	No IUR	2.7E-05			1.00E-01	I	
				TOTAL:	**1.2E-07**	**2.0E-03**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - SCHOOL (SSG5)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	1.50E+01	4.50E-01	No IUR	3.3E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	3.80E-01	1.14E-02	7.3E-09	8.7E-05	7.80E-06	I	3.00E-02	I	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	4.0E+00	1.20E-01	No IUR	3.9E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	2.6E-01	7.80E-03	3.8E-09	1.8E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform	1.9E-01	5.70E-03	1.1E-08	1.3E-05	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	5.6E-01	1.68E-02	No IUR	4.3E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	3.7E-01	1.11E-02	1.0E-08	3.2E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.0E+00	6.00E-02	No IUR	1.4E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	8.0E-02	2.40E-03	5.1E-09	7.8E-05	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-		--	--	--	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.3E-01	3.90E-03	8.0E-10	8.9E-07	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.0E-01	9.00E-03	No IUR	2.9E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	3.0E-01	9.00E-03	No IUR	6.8E-05			3.00E-02	I	
x	67-63-0	Isopropanol	1.1E+00	3.30E-02	No IUR	3.8E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.5E+00	1.05E-01	No IUR	4.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	1.4E+00	4.20E-02	No IUR	3.2E-06			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)	1.3E-02	3.90E-04	8.3E-12	3.0E-08	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	1.3E+00	3.90E-02	3.2E-11	1.5E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	3.5E-01	1.05E-02	No IUR	2.4E-06			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene		--	--	--	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	1.1E+00	3.30E-02	No IUR	1.5E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.1E-01	1.53E-02	No IUR	1.2E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.2E-01	9.60E-03	No IUR	4.4E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	5.3E-02	1.59E-03	5.3E-10	1.8E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	8.4E+00	2.52E-01	No IUR	8.2E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride	1.5E-02	4.50E-04	1.6E-10	1.0E-06	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.4E-01	4.20E-03	No IUR	9.6E-06			1.00E-01	S	
x	1330-20-7	Xylenes	3.2E-01	9.60E-03	No IUR	2.2E-05			1.00E-01	I	
				TOTAL:	**3.8E-08**	**8.5E-04**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - SCHOOL (SSG6)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	5.50E+01	1.65E+00	No IUR	1.2E-05			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	1.90E-01	5.70E-03	3.6E-09	4.3E-05	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride	2.10E-01	6.30E-03	2.5E-08	1.4E-03	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	5.6E+00	1.68E-01	No IUR	5.5E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	4.8E-01	1.44E-02	7.0E-09	3.3E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	4.0E-01	1.20E-02	No IUR	3.0E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	1.4E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	3.6E-02	1.08E-03	2.3E-09	3.5E-05	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	4.0E-01	1.20E-02	4.9E-09	9.1E-05	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)		--	--	--			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.7E-01	5.10E-03	1.0E-09	1.2E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	3.2E-01	9.60E-03	No IUR	3.1E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.0E-01	1.20E-02	No IUR	9.1E-05			3.00E-02	I	
x	67-63-0	Isopropanol	6.9E-01	2.07E-02	No IUR	2.4E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.0E+00	9.00E-02	No IUR	4.1E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.3E-01	6.90E-03	No IUR	5.3E-07			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	2.3E+00	6.90E-02	5.6E-11	2.6E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene	6.3E+00	1.89E-01	5.2E-07	1.4E-02	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene	1.0E-01	3.00E-03	No IUR	6.8E-07			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene		--	--	--			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	8.8E-02	2.64E-03	5.6E-11	1.5E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.0E-01	6.00E-03	No IUR	2.7E-07			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.7E-01	1.71E-02	No IUR	1.3E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	1.4E-01	4.20E-03	No IUR	1.9E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	1.0E-01	3.00E-03	1.0E-09	3.4E-04	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	4.0E+00	1.20E-01	No IUR	3.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-	2.3E+00	6.90E-02	No IUR	2.3E-03			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	1.3E-01	3.90E-03	No IUR	8.9E-06			1.00E-01	S	
x	1330-20-7	Xylenes	6.1E-01	1.83E-02	No IUR	4.2E-05			1.00E-01	I	
				TOTAL:	**5.7E-07**	**1.9E-02**					

OSWER VAPOR INTRUSION ASSESSMENT - 420 SOUTH MOUNTAIN BLVD - SCHOOL (SSG7)

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	67-64-1	Acetone	2.90E+01	8.70E-01	No IUR	6.4E-06			3.10E+01	A	
x	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
x	107-02-8	Acrolein		--	--	--			2.00E-05	I	
x	71-43-2	Benzene	3.00E-01	9.00E-03	5.7E-09	6.8E-05	7.80E-06	I	3.00E-02	I	
x	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
x	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
x	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
x	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
x	75-15-0	Carbon Disulfide	1.8E+00	5.40E-02	No IUR	1.8E-05			7.00E-01	I	
x	56-23-5	Carbon Tetrachloride	3.2E-01	9.60E-03	4.7E-09	2.2E-05	6.00E-06	I	1.00E-01	I	
x	67-66-3	Chloroform		--	--	--	2.30E-05	I	9.80E-02	A	
x	74-87-3	Chloromethane	1.1E+00	3.30E-02	No IUR	8.4E-05			9.00E-02	I	
x	98-82-8	Cumene		--	--	--			4.00E-01	I	
x	110-82-7	Cyclohexane		--	--	--			6.00E+00	I	
x	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
x	106-46-7	Dichlorobenzene, 1,4-	5.8E-01	1.74E-02	1.6E-08	5.0E-06	1.10E-05	CA	8.00E-01	I	
x	75-71-8	Dichlorodifluoromethane	2.1E+00	6.30E-02	No IUR	1.4E-04			1.00E-01	X	
x	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
x	107-06-2	Dichloroethane, 1,2-	9.3E-02	2.79E-03	5.9E-09	9.1E-05	2.60E-05	I	7.00E-03	P	
x	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
x	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
x	123-91-1	Dioxane, 1,4-	4.7E-01	1.41E-02	5.7E-09	1.1E-04	5.00E-06	I	3.00E-02	I	
x	75-00-3	Ethyl Chloride (Chloroethane)	3.2E-01	9.60E-03	No IUR	2.2E-07			1.00E+01	I	
x	100-41-4	Ethylbenzene	1.8E-01	5.40E-03	1.1E-09	1.2E-06	2.50E-06	CA	1.00E+00	I	
x	110-54-3	Hexane, N-	2.1E-01	6.30E-03	No IUR	2.1E-06			7.00E-01	I	
x	591-78-6	Hexanone, 2-	4.9E-01	1.47E-02	No IUR	1.1E-04			3.00E-02	I	
x	67-63-0	Isopropanol	2.4E+00	7.20E-02	No IUR	8.2E-05			2.00E-01	P	
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	3.5E+00	1.05E-01	No IUR	4.8E-06			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	2.0E-01	6.00E-03	No IUR	4.6E-07			3.00E+00	I	
x	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
x	75-09-2	Methylene Chloride	1.1E+00	3.30E-02	2.7E-11	1.3E-05	1.00E-08	I	6.00E-01	I	Mut
x	91-20-3	Naphthalene		--	--	--	3.40E-05	CA	3.00E-03	I	
x	111-84-2	Nonane, n-		--	--	--			2.00E-02	P	
x	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
x	115-07-1	Propylene		--	--	--			3.00E+00	CA	
x	100-42-5	Styrene	1.4E-01	4.20E-03	No IUR	9.6E-07			1.00E+00	I	
x	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	2.6E-01	7.80E-03	1.7E-10	4.5E-05	2.60E-07	I	4.00E-02	I	
x	109-99-9	Tetrahydrofuran		--	--	--			2.00E+00	I	
x	108-88-3	Toluene	2.4E+00	7.20E-02	No IUR	3.3E-06			5.00E+00	I	
x	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-	4.8E-01	1.44E-02	No IUR	1.1E-07			3.00E+01	H	
x	71-55-6	Trichloroethane, 1,1,1-	3.7E-01	1.11E-02	No IUR	5.1E-07			5.00E+00	I	
x	79-01-6	Trichloroethylene	2.4E-02	7.20E-04	2.4E-10	8.2E-05	see note	I	2.00E-03	I	TCE
x	75-69-4	Trichlorofluoromethane	6.0E+00	1.80E-01	No IUR	5.9E-05			7.00E-01	H	
x	95-63-6	Trimethylbenzene, 1,2,4-		--	--	--			7.00E-03	P	
x	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
x	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	Mut
x	95-47-6	Xylene, o-	2.0E-01	6.00E-03	No IUR	1.4E-05			1.00E-01	S	
x	1330-20-7	Xylenes	4.8E-01	1.44E-02	No IUR	3.3E-05			1.00E-01	I	

Supplement 2

Reports of Vapor Intrusion Mitigation for 175 and 194 Church Road

REPORT OF
VAPOR INTRUSION MITIGATION
175 Church Road
Mountain Top, PA 18707

Prepared for:

Tetra Tech EC, Inc.
1000 The American Road
Morris Plains, NJ 07950

Prepared by:

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Clean Vapor, L.L.C.
PO Box 688
Blairstown, NJ 07825

August 2011

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1. INTRODUCTION

This report summarizes the Vapor Intrusion Mitigation activities at 175 Church Road, Mountain Top, Pennsylvania. The system was installed in accordance with the specifications provided by Clean Vapor in the June 2011 Vapor Intrusion Mitigation Plan Design. Remediation activities began on Thursday, July 7, 2011 and concluded on Monday, July 11, 2011. The active soil depressurization (ASD) system was activated on Friday, July 8, 2011.

The ASD system features 2 suction points. The primary suction point is located directly opposite the blower on the driveway side of the home. The second suction point is located adjacent to the suspended stair case. See Section 3, As Built Floor Plan Drawing, for specific item locations.

Sub slab pressure measurements were made with a digital micro-manometer capable of reading down to 0.0001 inches water column ("w.c.). There are no visible openings from the sub slab to the interior of the home. Test ports previously installed for diagnostic and ASD system performance testing have been sealed with putty so they may be opened for future measurements. This report contains a table that summarizes the manometer and air-flow measurements along with the vacuum numbers measured at the previously drilled test holes.

2. SUMMARY OF MEASUREMENTS

This section provides a summary of the measurements collected following installation of the ASD system. Sample locations are provided on the as-built floor plan drawing in Section 3.

2.1 SUB SLAB VACUUM MEASUREMENTS

Date Floor Measurements Performed		July 8, 2011
Test Hole	**Vacuum ("w.c.)**	**Notes**
V1	-0.3432	N/A
V2	-0.2320	N/A
T1	-0.0149	N/A
T2	-0.0850	N/A
T3	-0.1821	N/A
T4	-0.2463	N/A

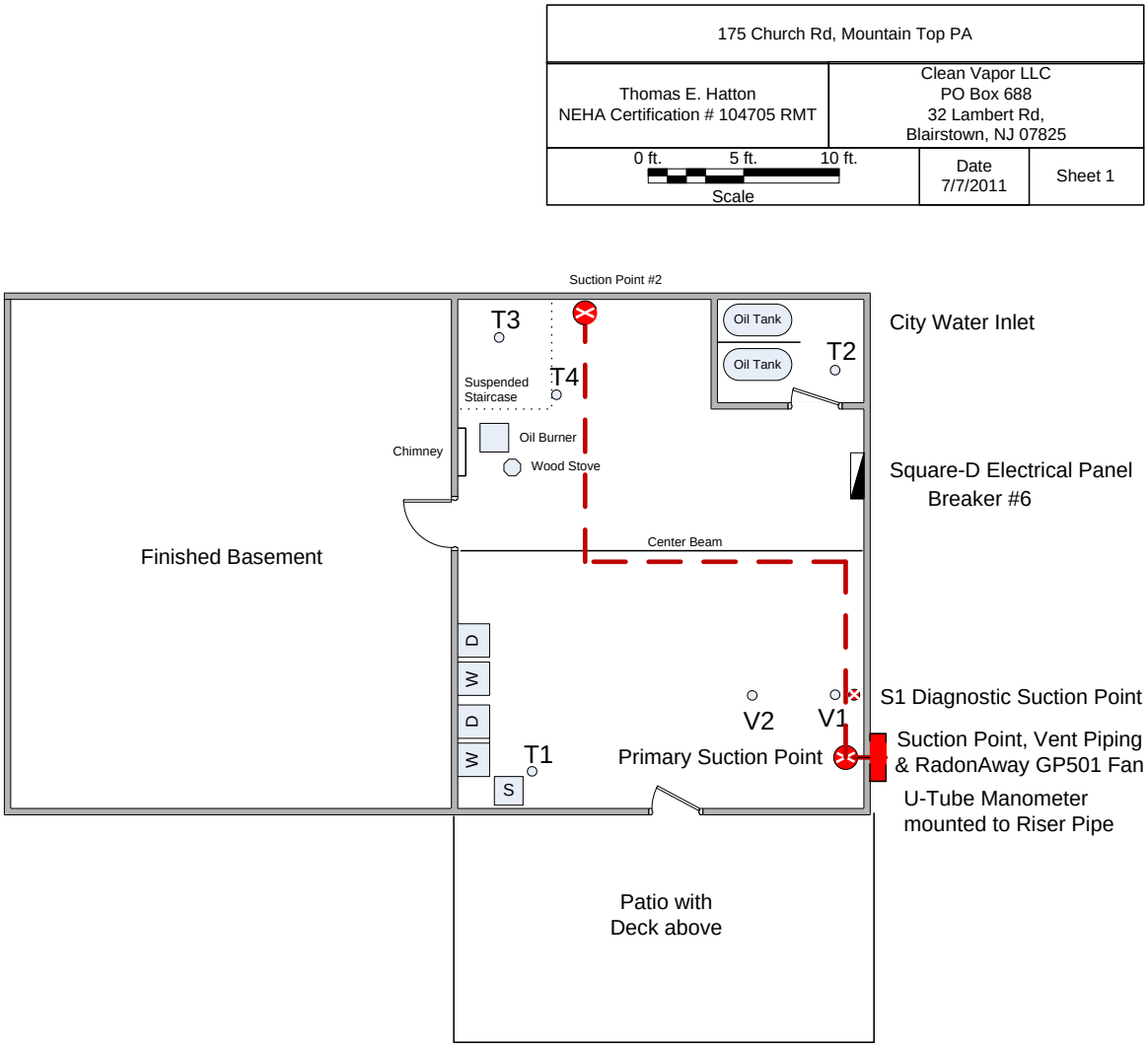
2.2 RISER PIPE MEASUREMENTS

Date Riser Pipe Measurements Performed		July 8, 2011
Suction Point	**Vacuum ("w.c.)**	**Notes**
S1	1.59	ASD suction point S1 was installed approximately 6 feet from the diagnostic suction point at the request of the homeowner
S2	1.50	N/A

2.3 AIRFLOW MEASUREMENTS

Date Airflow Measurements Performed		July 8, 2011
Blower	**Airflow (cfm)**	**Notes**
RadonAway GP500	55.93	N/A

3. AS BUILT FLOOR PLAN DRAWING



Notes:

The primary suction point, block wall penetration, and blower location has been moved approximately 6 feet towards the corner of the room as per the homeowners request. Other than that, the as built drawing matches the original drawing presented in the June 2011 Plan Design for Soil Depressurization System document.

Test hole locations are shown above and were installed during previous diagnostic testing. Test holes have been sealed with putty and can be used in the future if needed.

Final piping, blower location, and blower type are noted by symbols on the drawing. The blower exhaust was completed more than 1 foot above the roofline and away from windows, doors, air intakes and passive relief vents. All minor floor cracks were sealed with Vulkem 116 sealant.

4. SUCTION POINT INSTALLATION

The images below show the two suction points installed, as well as the pipe run, as outlined in the June 2011 Plan Design for Soil Depressurization System document. It should be noted, as previously mentioned, the primary suction point was moved approximately 6 feet towards the corner of the room as per the homeowner's request. All suction points were sealed first with gun grade Vulkem 116 and then capped with self leveling Vulkem 45.

Primary Suction Point

Suction Point 2

Riser pipe from primary Suction Point and horizontal pipe run from Suction Point 2 along center beam

5. BLOWER INSTALLATION

The RadonAway GP 500 was installed on the side of the house adjacent to the driveway. The blower draws 120 watts of power. A photo showing the blower's final installation location as well as the exhaust pipe run can be seen below. Additionally, a photo of the labeled dedicated circuit breaker, #6, installed in the home's electric panel, can be seen below.

Blower location on home's exterior

Dedicated Circuit, Breaker # 6 for RadonAway GP500

6. GAUGES, VALVES, AND SYSTEM LABELING

U-Tube manometer and gate valves

Close up of System Labeling on Suction Points

7. MEASUREMENT PHOTOS

Measuring airflow using Vane Anemometer

Measuring Sub Slab vacuum

8. OPERATIONS AND MAINTENANCE

8.1 OPERATIONS AND MAINTENANCE CHECKLIST

The homeowner should contact Clean Vapor LLC at the number provided, 908-362-5616, if at any time the U-tube manometer indicates zero vacuum in the suction pipe. Photos in Section 6 identify the location of the U-tube manometer.

The following table contains the items which should be inspected quarterly for the first year and then semi annually for the next five years. Tetra Tech's client will perform the required inspections, and perform any maintenance, at no cost to the homeowner.

An initial inspection was done upon completion of the system. (Vacuum measurements are recorded in "w.c.)

Item	Date	Condition/Reading		Date	Condition/Reading
Primary Suction point vacuum	7/8/2011	-1.59			
Suction point #2 vacuum	7/8/2011	-1.50			
Pipe Condition	7/8/2011	Good			
Gate Valve Position (Primary)	7/8/2011	Open 100%			
Gate Valve Position (SP 2)	7/8/2011	Open 100%			
Test Hole Vacuum (T1)	7/8/2011	-0.0149			
Test Hole Vacuum (T2)	7/8/2011	-0.0850			
Test Hole Vacuum (T3)	7/8/2011	-0.1821			
Test Hole Vacuum (T4)	7/8/2011	-0.2463			

Item	Date	Condition/Reading		Date	Condition/Reading
Primary Suction point vacuum					
Suction point #2 vacuum					
Pipe Condition					
Gate Valve Position (Primary)					
Gate Valve Position (SP 2)					
Test Hole Vacuum (T1)					
Test Hole Vacuum (T2)					
Test Hole Vacuum (T3)					
Test Hole Vacuum (T4)					

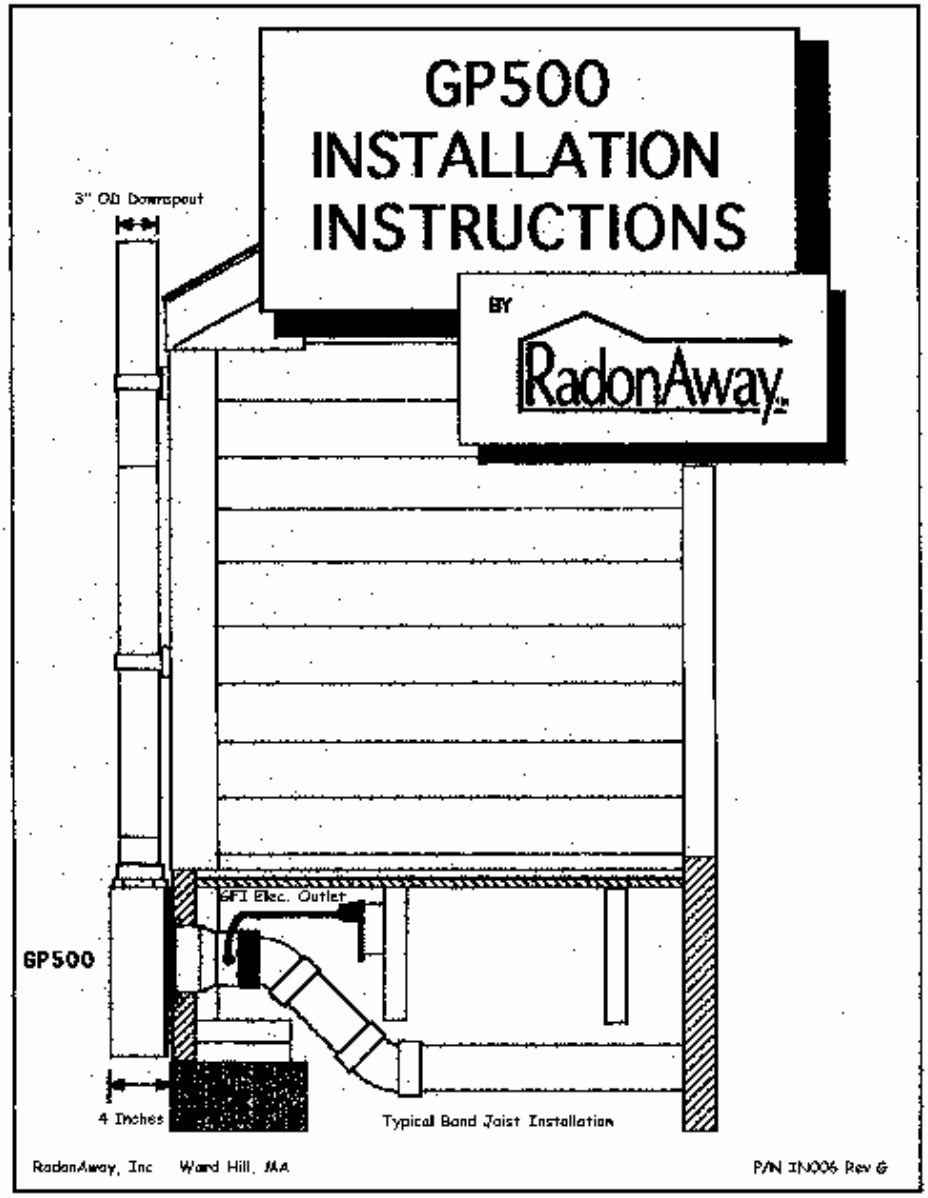
Any Additional Observations should be noted below:

9. PERMITS

The Wright Township Building Department was contacted on June 23, 2011 about obtaining permits. The department directed Clean Vapor to Code Inspection Inc., the contracted party responsible for code enforcement and inspections within the township. Code Inspection Inc. informed Clean Vapor on June 28, 2011 that no permits or inspections would be required for Residential Vapor Intrusion Mitigation work.

10. WARRANTIES AND OWNERS MANUALS

10.1 RADONAWAY GP 500



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RadonAway Ward Hill, MA

GP500 Fan Installation Instructions

Please Read and Save These Instructions.

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** Do not use fan in hazardous environments where fan electrical system could provide ignition to combustible or flammable materials.

2. **WARNING!** Do not use fan to pump explosive or corrosive gases.

3. **WARNING!** Check voltage at the fan to insure it corresponds with nameplate.

4. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.

5. **NOTICE!** There are no user serviceable parts located inside the fan unit. **Do NOT attempt to open.** Return unit to the factory for service.

6. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician.

7. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.

P.O. Box 688, 32 Lambert Rd East, Blairstown, NJ 07825 Phone 908-362-5616 Fax 908-362-5433

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The GP500 is intended for use by trained, professional Radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of the GP500. This instruction should be considered as a supplement to EPA standard practices, state and local building codes and state regulations. In the event of a conflict, those codes, practices and regulations take precedence over this instruction.

1.2 ENVIRONMENTALS

The GP500 is designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the GP500 should be stored in an area where the temperature is never less than 32 degrees F. or more than 100 degrees F. When the unit is turned off for extended periods of time the drain plug should be removed from the bottom of the unit.

1.3 ACOUSTICS

The GP500, when installed properly, operates with little or no noticeable noise to the building occupants. Insure a solid mounting for the GP500 to avoid structure-borne vibration or noise.

The velocity of the outgoing air must also be considered in the overall system design. In some cases the "rushing" sound of the outlet air may be disturbing. In these instances, the use of a RadonAway Exhaust Muffler is recommended.

1.4 GROUND WATER

In the event that a temporary high water table results in water at or above slab level, water may be drawn into the riser pipes thus blocking air flow to the GP500. The lack of cooling air may result in the GP500 cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, the GP500 should be disconnected until the water recedes allowing for return to normal operation.

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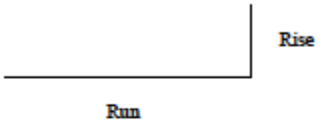
1.5 CONDENSATION & DRAINAGE

Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation.

For GP500 piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Diam.	Minimum Rise per Foot of Run*		
	@ 25 CFM	@ 50 CFM	@ 100 CFM
4"	1/8 "	1/4 "	3/8 "
3"	1/4 "	3/8 "	1 1/2 "



*Typical GP500 operational flow rate is 25 - 90 CFM. (For more precision, determine flow rate by using the chart in the addendum.)

The GP500 incorporates a unique condensation drain system which actively pumps water back to the inlet piping for drainage to a slab hole. It is required that the system piping provide a drop-off immediately at the inlet of the unit, as shown in Figure 1, to prevent reintrainment of condensation. If this is not possible the condensate drain tube may be extended to the point of drop off by slipping 5/16" ID tubing (available from RadonAway) over the drain tube.

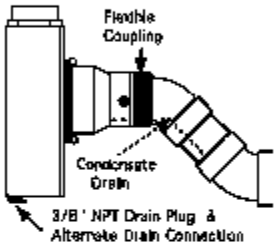


Figure 1

An alternative condensation drain may be provided using the 3/8" NPT fitting on the bottom of the unit. The alternative drain system must account for Radon leakage as the drain is under positive pressure. If the unit is installed and electrical power is removed for extended periods of time the drain plug should be removed to allow water to drain from the unit.

IMPORTANT: Do not overtighten drain plug! Do not use a wrench or tighten beyond finger tight. Apply sealant to threads if required.

1.6 "SYSTEM ON" INDICATOR

A U-Tube manometer or a vacuum alarm is recommended as a "System On" Indicator for affirmation of system operation.

1.7 SLAB COVERAGE

The GP500 can provide coverage up to 1000+ sq. ft. per slab penetration. This will, of course, depend on the sub-slab material in any particular installation and the diagnostic results. In general, the tighter the sub-slab material, the smaller the area covered per penetration. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size) be created below the slab at each suction hole.

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1.8 ELECTRICAL WIRING

The GP500 plugs into a standard 115VAC outlet. The use of a Ground Fault Interrupter circuit (GFI) is recommended for all installations and required for outdoor or wet installations. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician.

1.9 SPEED CONTROLS

The use of electronic speed controls on the GP500 is NOT recommended.

2.0 INSTALLATION

2.1 A.C. POWER CONNECTION

The GP500 requires an 18 gauge, 3 wire SJ power cord, RadonAway p/n 27003 or equivalent. For proper seal, the cord diameter should be 5/16". To install:

1) Prepare the power cord by stripping jacket and insulation as shown in Figure 2.

2) Loosen sealing nut on electrical inlet by turning counterclockwise.

3) Insert power cord and route as shown in Figure 3.

4) Fasten power cord with cable clamp provided.

Figure 2

5) IMPORTANT: Tighten sealing nut by turning clockwise. Hand tight is adequate to provide seal.

6) Connect wiring with wire nuts provided, observing proper connections:

GP500 Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common

7) Tape over wire and wire nut with electrical tape to seal out moisture. A rubber splicing tape or self-fusing silicone tape provide best moisture seal.

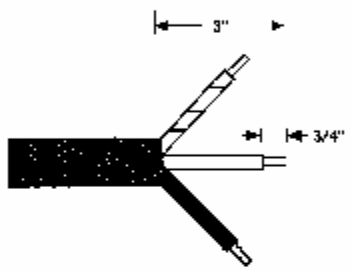

Figure 2.

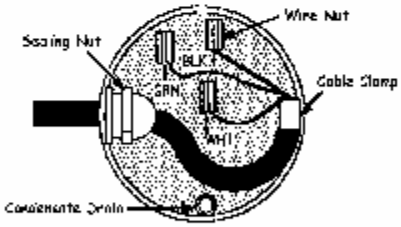

Figure 3.

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2.2 OUTDOOR (BAND JOIST OR SIDEWALL)

1) Locate site for GP500 mounting. Use the diagram in Figure 4 to assist in locating the inlet hole for the unit.
2) Drill a 5.25" or 5.50" hole through the band joist or sidewall.

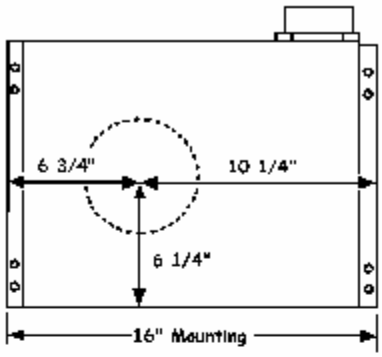

Figure 4

(Use Figure 5 as a Guide for 3-6):
3) Apply a liberal bead of silicone caulk to the sealing ring.
4) Carefully feed power cord through hole and install the unit into the hole drilled.

5) Insure the unit is level and plumb.
6) Insure the inlet of the fan does not contact any building surface when mounting to avoid noise or vibration transmission.
7) Secure unit to sidewall with four (4) #6 x 2.0" drywall screws provided. Use nylon washers provided under the screw heads to prevent marring the finish.
8) Complete piping run, providing flexible couplings or other means of disconnect for servicing the unit.

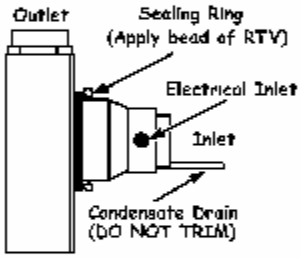

Figure 5

Under certain circumstances, a flexible pipe coupling, RadonAway p/n 79019-1, may ease installation. This may be particularly true of gable side installations where the system piping runs perpendicular to the floor joists. Install the pipe coupling as shown in Figure 6, making certain to avoid sharp bends or kinks in the piping. (TIP: You may connect the pipe coupling to the GP500 before installing the unit through the band joist.)

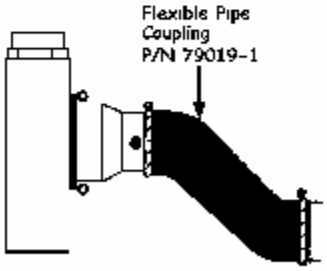

Figure 6

2.3 MUFFLER INSTALLATION (Optional)

Install the vent muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed at the end of the vent pipe.

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2.4 OPERATION CHECKS

____ Verify all connections are tight and leak-free.

____ Insure the GP500 and all ducting is secure and vibration-free.

____ Verify system vacuum pressure with Manometer or other pressure gauge. Insure vacuum pressure is less than 3.8" WC (based on sea-level operation, at higher altitudes reduce by about 4% per 1000 Feet). If this is exceeded, increase the number of suction points.

____ Verify Radon levels by testing to EPA protocol.

ADDENDUM

PRODUCT SPECIFICATIONS

The following chart shows fan performance for the GP500:

	Typical CFM vs Static Suction WC						
	1.0"	1.5"	2.0"	2.5"	3.0"	3.5"	4.0"
GP500	88	80	74	65	54	28	14

Power: 70 - 130 watts (varies with actual load conditions) @ 115 VAC
Inlet/Outlet: 3" PVC
Mounting: Brackets for vertical mount on bandjoist or sidewall.
(16" Mounting Centers)
Outdoor installations - GP500 mounts flush to wall projecting only 4" with inlet duct passing through the sidewall or band joist. Power cord is on the inside simplifying connection.
Weight: 20 lbs.
Recommended ducting: 3" Schedule 20/40 PVC Pipe or attractive thin walled 3" O.D. PVC Downspout available from RadonAway
Storage temperature range: 32 - 100 degrees F.
Thermally protected
Size: 17" x 12" x 4" (plus 7" inlet duct)

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IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the GP500 Fan for shipping damage within 15 days of receipt. Notify **RadonAway of any damages immediately**. Radonaway is not responsible for damages incurred during shipping. However, for your benefit, Radonaway does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open.** Return unit to factory for service.

Install the GP500 Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

WARRANTY

Subject to any applicable consumer protection legislation, RadonAway warrants that the GP500 Fan (the "Fan") will be free from defects in materials and workmanship for a period of two (2) years from the date of manufacture (the "Warranty Term"). Outside the Continental United States and Canada the Warranty Term is one (1) year from the date of manufacture.

RadonAway will replace any Fan which fails due to defects in materials or workmanship. The Fan must be returned (at owner's cost) to the RadonAway factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not include damage in shipment unless the damage is due to the negligence of RadonAway.

RadonAway is not responsible for installation, removal or delivery costs associated with this Warranty.

EXCEPT AS STATED ABOVE, THE GP500 FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping cost to and from factory.

RadonAway
3 Saber Way
Ward Hill, MA 01835
TEL. (978) 521-3703
FAX (978) 521-3964

Record the following information for your records:

Serial No._____
Purchase Date_____

10.2 VULKEM 116

Material Safety Data Sheet

TREMCO

VULKEM 116 LIMESTONE

Version 2.
REVISION DATE: 10/08/2008

Print Date 04/21/2010

SECTION 1 - PRODUCT IDENTIFICATION

Trade name	:	VULKEM 116 LIMESTONE
Product code	:	426805 323
COMPANY	:	Tremco Incorporated 3735 Green Road Cleveland, OH 44122
Telephone	:	(216) 292-5000 8:30 - 5:00 EST
Emergency Phone:	:	(216) 765-6727 8:30 - 5:00 EST After Hours: Chemtrec 1-800-424-9300
Product use	:	Sealant

SECTION 2 - HAZARDS IDENTIFICATION

Emergency Overview

Limestone. Non-sag gunnable paste. May cause slight irritation to the respiratory system. May cause nausea, headaches, and dizziness. May cause drowsiness, weakness, and fatigue. May cause allergic respiratory sensitization. Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention. Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel.

Acute Potential Health Effects/ Routes of Entry

Inhalation	:	May cause slight irritation to the respiratory system. May cause nausea, headaches, and dizziness. May cause drowsiness, weakness, and fatigue. May cause allergic respiratory sensitization.
Eyes	:	Direct contact may cause mild irritation.
Ingestion	:	May cause gastrointestinal irritation, nausea, and vomiting.
Skin	:	May cause sensitization resulting in irritation, itching and redness.

Aggravated Medical Conditions

Pre-existing eye, skin and respiratory disorders may be aggravated by exposure.

Chronic Health Effects

Overexposure may cause dermatitis, asthma, skin and respiratory sensitization and decreased lung function. Prolonged or repeated contact/exposure to aromatic petroleum distillates may cause defatting, drying, and irritation of the skin, dermatitis, and central nervous system (CNS) effects. Inhalation of crystalline silica (quartz) can cause cancer based on animal data, and IARC concludes sufficient evidence in humans (Group 1). Prolonged and repeated overexposure to free crystalline silica dust above the TLV level may cause scarring of the lungs with cough and shortness of breath. A delayed lung injury, silicosis may result from breathing free silica. Fillers are encapsulated and not expected to be released from product under normal conditions of use. Prolonged or repeated exposure to mineral spirits (petroleum naphtha or stoddard solvent) may cause defatting, drying, and irritation of the skin, dermatitis, central nervous system (CNS) effects, and adverse liver, kidney, and lung effects.

Target Organs: Skin, Eye, Ingestion, Lung

SECTION 3 - PRODUCT COMPOSITION

Chemical Name	CAS-No.	Weight %
RPM Company	1/7	426805 323

Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P	30.0 - 60.0
Diisodecyl phthalate	26761-40-0	15.0 - 40.0
Calcium Carbonate (Limestone)	1317-65-3	10.0 - 30.0
Tackifier	NJ TSRN# 51721300-5272P	5.0 - 10.0
Thickener	NJ TSRN# 51721300-5300P	3.0 - 7.0
Titanium dioxide	13463-67-7	3.0 - 7.0
Petroleum distillates	64742-47-8	1.0 - 5.0
Butyl benzyl phthalate	85-68-7	- <1.0
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	- <1.0
Toluene-2,6-Diisocyanate	91-08-7	- <0.1
2,4-Toluene diisocyanate	584-84-9	- <0.1
o-Cresol	95-48-7	- <0.1

SECTION 4 - FIRST AID MEASURES

Get immediate medical attention for any significant overexposure.

Inhalation	:	Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention.Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel.
Eye contact	:	Flush with water for at least 15 minutes while holding eye lids apart. Get medical attention immediately.
Skin contact	:	Clean area of contact thoroughly using soap and water. If irritation, rash or other disorders develop, get medical attention immediately.
Ingestion	:	Do not induce vomiting unless advised by a physician. Call nearest Poison Control Center or Physician immediately.

SECTION 5 - FIRE FIGHTING MEASURES

Flash point	:	150 ℉, 66 ℃
Method	:	Tag Closed Cup
Lower explosion limit	:	0.60 %(V) Solvent
Upper explosion limit	:	7 %(V) Solvent
Autoignition temperature	:	Not available.
Extinguishing media	:	If water fog is ineffective, use carbon dioxide, dry chemical or foam.
Hazardous combustion products	:	Carbon monoxide and carbon dioxide can form.Hydrocyanic acid and nitrogen oxides can form.
Protective equipment for firefighters	:	Use accepted fire fighting techniques. Wear full firefighting protective clothing, including self-contained breathing apparatus (SCBA).

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Use appropriate protective equipment. Avoid contact with material. Scrape up and transfer to appropriate container for disposal.

SECTION 7 - HANDLING AND STORAGE

Prevent inhalation of vapor, ingestion and contact with skin, eyes and clothing. Preferably use entire contents in

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one continuous work session. Do not smoke, weld, generate sparks, or use flame near container. Change soiled work clothes frequently. Clean hands thoroughly after handling Do not store or use near food. Keep container closed when not in use. Since emptied containers retain product residue and vapor, observe precautions even after container is emptied. Store under dry warehouse conditions away from heat and all ignition sources.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal protection equipment

Respiratory protection	:	Wear appropriate, properly fitted NIOSH/MSHA approved organic vapor or supplied air respirator when airborne contaminant level(s) are expected to exceed exposure limits indicated on the MSDS. Follow manufacturer's directions for respirator use.
Hand protection	:	Use suitable impervious nitrile or neoprene gloves and protective apparel to reduce exposure.
Eye protection	:	Wear appropriate eye protection.Use safety glasses if eye contact is likely.
Skin and body protection	:	Use disposable or impervious clothing if work clothing contamination is likely. Remove and wash contaminated clothing before reuse.
Protective measures	:	Use professional judgment in the selection, care, and use.
Engineering measures	:	Use general ventilation and/ or local exhaust to reduce the airborne contaminant concentration below the exposure limit listed in the MSDS

Exposure Limits

Chemical Name	CAS Number	Regulation	Limit	Form
Calcium Carbonate (Limestone)	1317-65-3	OSHA PEL:	5 mg/m3	Respirable fraction.
		OSHA PEL:	15 mg/m3	Total dust.
		ACGIH TWA:	3 mg/m3	Respirable particles.
		ACGIH TWA:	10 mg/m3	Inhalable particles.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Titanium dioxide	13463-67-7	ACGIH TWA:	10 mg/m3	
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Petroleum distillates	64742-47-8	ACGIH TWA:	200 mg/m3	Non-aerosolas total hydrocarbon vapor
		ACGIH TWA:	200 mg/m3	Non-aerosolas total hydrocarbon vapor
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	OSHA TWA:	0.1 mg/m3	Respirable.
		OSHA TWA:	0.3 mg/m3	Total dust.
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA PEL:	5 mg/m3	Respirable fraction.
		ACGIH TWA:	0.025 mg/m3	Respirable fraction.
Toluene-2,6-Diisocyanate	91-08-7	ACGIH TWA:	0.005 ppm	
		ACGIH STEL:	0.02 ppm	

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Chemical Name	CAS Number	Regulation	Limit	Form
2,4-Toluene diisocyanate	584-84-9	ACGIH TWA: ACGIH STEL:	0.005 ppm 0.02 ppm	
o-Cresol	95-48-7	ACGIH TWA: OSHA PEL:	5 ppm 22 mg/m3	

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Non-sag gunnable paste
Color	:	Limestone
Odor	:	Petroleum Solvent
pH	:	Not available.
Vapour pressure	:	Not available.
Vapor density	:	Heavier than air
Melting point/range	:	Not available.
Freezing point	:	Not available.
Boiling point/range	:	280 ℉, 138 ℃
Water solubility	:	Insoluble
Specific Gravity	:	1.1344
% Volatile Weight	:	6 %

SECTION 10 - REACTIVITY / STABILITY

Substances to avoid	:	Amines.Water or moisture and oxidizing agents.Alcohols.Strong acids.Strong bases.
Stability	:	Material is stable under normal storage, handling, and use.
Hazardous polymerization	:	Will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

Butyl benzyl phthalate, CAS-No.: 85-68-7
Acute oral toxicity (LD-50 oral) 13,500 mg/kg (Rat)

2,4-Toluene diisocyanate, CAS-No.: 584-84-9
Acute oral toxicity (LD-50 oral) 5,800 mg/kg (Rat)
Acute inhalation toxicity (LC-50) 14 mg/l for 4 h (Rat) 10 mg/l for 4 h (Mouse) 13 mg/l for 4 h (Guinea pig) 11 mg/l for 4 h (Rabbit)

o-Cresol, CAS-No.: 95-48-7
Acute oral toxicity (LD-50 oral) 940 mg/kg (Rabbit) 1,800 mg/kg (Rabbit) 121 mg/kg (Rat) 344 mg/kg (Mouse) 1,350 mg/kg (Rat)
Acute inhalation toxicity (LC-50) 0.179 mg/l for 2 h (Mouse)
Acute dermal toxicity (LD-50 dermal) 620 mg/kg (Rat) 890 mg/kg (Rabbit) 620 mg/kg (Mouse)

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SECTION 12 - ECOLOGICAL INFORMATION

No Data Available

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal Method : Waste not regulated under RCRA. Dispose of in compliance with state and local regulations.

SECTION 14 - TRANSPORTATION / SHIPPING DATA

TDG / DOT Shipping Description:

NOT REGULATED

SECTION 15 - REGULATORY INFORMATION

North American Inventories:

All components are listed or exempt from the TSCA inventory.
This product or its components are listed on, or exempt from the Canadian Domestic Substances List.

U.S. Federal Regulations:

SARA 313 Components : None present or none present in regulated quantities.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard
Fire Hazard

OSHA Hazardous Components :

Diisodecyl phthalate	26761-40-0
Calcium Carbonate (Limestone)	1317-65-3
Titanium dioxide	13463-67-7
Petroleum distillates	64742-47-8
Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
Toluene-2,6-Diisocyanate	91-08-7
2,4-Toluene diisocyanate	584-84-9
o-Cresol	95-48-7

OSHA Status: Considered hazardous based on the following criteria: : Irritant
Sensitizer
Carcinogen

OSHA Flammability : IIIA

Regulatory VOC (less water and exempt solvent) : 79 g/l

VOC Method 310 : 2 %

Chemical is listed as an IARC, NTP, OSHA, or ACGIH Carcinogen:

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Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

U.S. State Regulations:

MASS RTK Components :	Calcium Carbonate (Limestone)	1317-65-3
	Titanium dioxide	13463-67-7
	Petroleum distillates	64742-47-8
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
	Toluene-2,6-Diisocyanate	91-08-7
	2,4-Toluene diisocyanate	584-84-9
	p-Cresol	95-48-7
Penn RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Diisodecyl phthalate	26761-40-0
	Calcium Carbonate (Limestone)	1317-65-3
	Tackifier	NJ TSRN# 51721300-5272P
	Thickener	NJ TSRN# 51721300-5300P
	Titanium dioxide	13463-67-7
	Petroleum distillates	64742-47-8
	2,4-Toluene diisocyanate	584-84-9
NJ RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Diisodecyl phthalate	26761-40-0
	Calcium Carbonate (Limestone)	1317-65-3
	Tackifier	NJ TSRN# 51721300-5272P
	Thickener	NJ TSRN# 51721300-5300P
	Titanium dioxide	13463-67-7
	Petroleum distillates	64742-47-8
	Butyl benzyl phthalate	85-68-7
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

WARNING! Contains chemicals known to the State of California to cause cancer, birth defects and/or other reproductive harm:

26761-40-0	Diisodecyl phthalate
85-68-7	Butyl benzyl phthalate
14808-60-7	Crystalline Silica (Quartz)/ Silica Sand
1333-86-4	Carbon Black
91-08-7	Toluene-2,6-Diisocyanate
584-84-9	2,4-Toluene diisocyanate
100-41-4	Ethylbenzene
108-88-3	Toluene

SECTION 16 - OTHER INFORMATION

HMIS Rating :

Health	2
Flammability	2
Reactivity	0
PPE	

0 = Minimum
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

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Further information:

For Industrial Use Only. Keep out of Reach of Children. The hazard information herein is offered solely for the consideration of the user, subject to their own investigation of compliance with applicable regulations, including the safe use of the product under every foreseeable condition.

Prepared by: Rich Mikol

Legend

ACGIH - American Conference of Governmental Hygienists
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DOT - Department of Transportation
DSL - Domestic Substance List
EPA - Environmental Protection Agency
HMIS - Hazardous Materials Information System
IARC - International Agency for Research on Cancer
MSHA - Mine Safety Health Administration
NDSL - Non-Domestic Substance List
NIOSH - National Institute for Occupational Safety and Health
NTP - National Toxicology Program
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
RTK - Right To Know
SARA - Superfund Amendments and Reauthorization Act
STEL - Short Term Exposure Limit
TLV - Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average
V - Volume
VOC - Volatile Organic Compound
WHMIS - Workplace Hazardous Materials Information System

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10.3 VULKEM 45

Material Safety Data Sheet

TREMCO

VULKEM 45 GRAY

Version *1.3*
REVISION DATE: 07/31/2007

Print Date 08/01/2007

SECTION 1 - PRODUCT IDENTIFICATION

Trade name	:	VULKEM 45 GRAY
Product code	:	145712 333
COMPANY	:	Tremco Incorporated 3735 Green Road Cleveland, OH 44122
Telephone	:	(216) 292-5000 8:30 - 5:00 EST
Emergency Phone:	:	(216) 765-6727 8:30 - 5:00 EST After Hours: Chemtrec 1-800-424-9300
Product use	:	Coating

SECTION 2 - HAZARDS IDENTIFICATION

Emergency Overview

Gray. Liquid. May cause drowsiness, weakness, and fatigue. Vapor and/or mist may irritate nose and throat. May cause moderate irritation to the respiratory system. May cause allergic respiratory sensitization. Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel. Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention.

Acute Potential Health Effects/ Routes of Entry

Inhalation	:	May cause drowsiness, weakness, and fatigue. Vapor and/or mist may irritate nose and throat. May cause moderate irritation to the respiratory system. May cause allergic respiratory sensitization.
Eyes	:	Vapor and/or mist may cause eye irritation.
Ingestion	:	May cause irritation to the mouth, throat and stomach. May cause gastrointestinal irritation, nausea, and vomiting.
Skin	:	May cause sensitization resulting in irritation, itching and redness.

Aggravated Medical Conditions

Pre-existing eye, skin, liver, kidney, and respiratory disorders may be aggravated by exposure.

Chronic Health Effects

Overexposure may cause dermatitis, asthma, skin and respiratory sensitization and decreased lung function. Repeated overexposure to vapors and/or material may injure the liver, kidneys and respiratory system unless suitable engineering controls and/or personal protective equipment are used. Prolonged or repeated contact/exposure to aromatic petroleum distillates may cause defatting, drying, and irritation of the skin, dermatitis, and central nervous system (CNS) effects. Inhalation of crystalline silica (quartz) can cause cancer based on animal data, and IARC concludes sufficient evidence in humans (Group 1). Prolonged and repeated overexposure to free crystalline silica dust above the TLV level may cause scarring of the lungs with cough and shortness of breath. A delayed lung injury, silicosis may result from breathing free silica. A long-term NTP study showed that oral exposure to toluene diisocyanate (TDI) caused cancer in rats and mice. A lifetime inhalation study sponsored by the International Isocyanate Institute did not show carcinogenic activity in rats. May cause allergic skin and respiratory sensitization. Fillers are encapsulated and not expected to be released from product under normal conditions of use.

Target Organs: Eye, Lung, Liver, Kidney, Skin, Nerve

RPM Company 1/7 145712 333

SECTION 3 - PRODUCT COMPOSITION

Chemical Name	CAS-No.	Weight %
Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P	40.0 - 70.0
Calcium Carbonate (Limestone)	1317-65-3	15.0 - 40.0
Clay	1332-58-7	15.0 - 40.0
Tackifier	NJ TSRN# 51721300-5272P	10.0 - 30.0
Aromatic petroleum distillates	64742-95-6	3.0 - 7.0
Titanium dioxide	13463-67-7	3.0 - 7.0
Trimethyl benzene (mixed isomers)	25551-13-7	1.0 - 5.0
Butyl benzyl phthalate	85-68-7	- <1.0
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	- <1.0
2,4-Toluene diisocyanate	584-84-9	- <1.0
Toluene-2,6-Diisocyanate	91-08-7	- <0.1

SECTION 4 - FIRST AID MEASURES

Get immediate medical attention for any significant overexposure.

Inhalation	:	Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel.Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention.
Eye contact	:	Flush with water for at least 15 minutes while holding eye lids apart. Get medical attention immediately.
Skin contact	:	Wash area of contact thoroughly with hand cleaner followed by soap and water. If irritation, rash or other disorders develop, get medical attention immediately.
Ingestion	:	Do not induce vomiting unless advised by a physician. Call nearest Poison Control Center or Physician immediately.

SECTION 5 - FIRE FIGHTING MEASURES

Flash point	:	155 °F, 68 °C
Method	:	Setaflash Closed Cup
Lower explosion limit	:	Not available.
Upper explosion limit	:	Not available.
Autoignition temperature	:	Not available.
Extinguishing media	:	If water fog is ineffective, use carbon dioxide, dry chemical or foam.
Hazardous combustion products	:	Carbon monoxide and carbon dioxide can form.Smoke, fumes.Hydrocyanic acid and nitrogen oxides can form.
Protective equipment for firefighters	:	Use accepted fire fighting techniques. Wear full firefighting protective clothing, including self-contained breathing apparatus (SCBA).
Fire and explosion conditions	:	Product may ignite if heated in excess of its flash point.Closed container, may burst when exposed to extreme heat.Empty containers may contain ignitable vapors.Vapors may travel to sources of ignition and flashback.

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SECTION 6 - ACCIDENTAL RELEASE MEASURES

Use appropriate protective equipment. Avoid contact with material. Remove sources of ignition immediately. Stop flow of material if safe to do so. Contain spill and keep out of water courses. Ventilate area.

SECTION 7 - HANDLING AND STORAGE

Prevent inhalation of vapor, ingestion, and contact with skin eyes and clothing. Keep container closed when not in use. Precautions also apply to emptied containers. Change soiled work clothes frequently. Clean hands thoroughly after handling. Do not smoke, weld, generate sparks, or use flame near container. To prevent generation of static discharges, use bonding/grounding connection when pouring liquid. Extinguish all ignition sources including pilot lights, non-explosion proof motors and electrical equipment until vapors dissipate. Store under dry warehouse conditions away from heat and all ignition sources.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal protection equipment

Respiratory protection	:	Wear appropriate, properly fitted NIOSH/MSHA approved respirator when airborne contaminant level(s) are expected to exceed exposure limits indicated on the MSDS. Select positive pressure supplied air respirator (TC19C or equivalent) for isocyanates.
Hand protection	:	Use suitable impervious nitrile or neoprene gloves and protective apparel to reduce exposure.
Eye protection	:	Wear appropriate eye protection.Wear chemical safety goggles and/or face shield to prevent eye contact. Do not wear contact lenses. Do not touch eyes with contaminated body parts or materials. Have eye washing facilities readily available.
Skin and body protection	:	Prevent contact with shoes and clothing.
Protective measures	:	Use professional judgment in the selection, care, and use.
Engineering measures	:	Use only in well ventilated areas. Provide maximum ventilation in enclosed areas.Use local exhaust when the general ventilation is inadequate.

Exposure Limits

Chemical Name	CAS Number	Regulation	Limit	Form
Calcium Carbonate (Limestone)	1317-65-3	OSHA PEL:	5 mg/m3	Respirable fraction.
		OSHA PEL:	15 mg/m3	Total dust.
		ACGIH TWA:	3 mg/m3	Respirable particles.
		ACGIH TWA:	10 mg/m3	Inhalable particles.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Clay	1332-58-7	ACGIH TWA:	2 mg/m3	Respirable fraction.
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA PEL:	5 mg/m3	Respirable fraction.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.

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Chemical Name	CAS Number	Regulation	Limit	Form
Titanium dioxide	13463-67-7	ACGIH TWA:	10 mg/m3	
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Trimethyl benzene (mixed isomers)	25551-13-7	ACGIH TWA:	25 ppm	
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	OSHA TWA:	0.1 mg/m3	Respirable.
		OSHA TWA:	0.3 mg/m3	Total dust.
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA PEL:	5 mg/m3	Respirable fraction.
		ACGIH TWA:	0.025 mg/m3	Respirable fraction.
2,4-Toluene diisocyanate	584-84-9	ACGIH TWA:	0.005 ppm	
		ACGIH STEL:	0.02 ppm	
Toluene-2,6-Diisocyanate	91-08-7	ACGIH TWA:	0.005 ppm	
		ACGIH STEL:	0.02 ppm	

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Form	: Liquid
Color	: Gray
Odor	: Aromatic
pH	: Not available.
Vapour pressure	: Not available.
Vapor density	: Heavier than air
Melting point/range	: Not available.
Freezing point	: Not available.
Boiling point/range	: 250 °F, 121 °C
Water solubility	: Negligible
Specific Gravity	: 1.32
% Volatile Weight	: 6 %

SECTION 10 - REACTIVITY / STABILITY

Substances to avoid	: Strong acids.Strong bases.Amines.Water or moisture.Alcohols.
Stability	: Material is stable under normal storage, handling, and use.
Hazardous polymerization	: Will not occur under normal conditions.

SECTION 11 - TOXICOLOGICAL INFORMATION

Trimethyl benzene (mixed isomers), CAS-No.: 25551-13-7
Acute oral toxicity (LD-50 oral) 8,970 mg/kg (Rat)

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Butyl benzyl phthalate, CAS-No.: 85-68-7

Acute oral toxicity (LD-50 oral)	13,500 mg/kg (Rat)

2,4-Toluene diisocyanate, CAS-No.: 584-84-9

Acute oral toxicity (LD-50 oral)	5,800 mg/kg (Rat)
Acute inhalation toxicity (LC-50)	14 mg/l for 4 h (Rat) 10 mg/l for 4 h (Mouse) 13 mg/l for 4 h (Guinea pig) 11 mg/l for 4 h (Rabbit)

SECTION 12 - ECOLOGICAL INFORMATION

No Data Available

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal Method : Subject to hazardous waste treatment, storage, and disposal requirements under RCRA. Recycle or incinerate waste at EPA approved facility or dispose of in compliance with federal, state and local regulations.

SECTION 14 - TRANSPORTATION / SHIPPING DATA

TDG / DOT Shipping Description:

NOT REGULATED

SECTION 15 - REGULATORY INFORMATION

North American Inventories:

All components are listed or exempt from the TSCA inventory.
This product or its components are listed on, or exempt from the Canadian Domestic Substances List.

U.S. Federal Regulations:

SARA 313 Components : 2,4-Toluene diisocyanate 584-84-9

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard
Fire Hazard

OSHA Hazardous Components :

Calcium Carbonate (Limestone)	1317-65-3
Clay	1332-58-7
Titanium dioxide	13463-67-7
Trimethyl benzene (mixed isomers)	25551-13-7
Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
2,4-Toluene diisocyanate	584-84-9
Toluene-2,6-Diisocyanate	91-08-7

OSHA Status: Considered hazardous based on the : Irritant
Sensitizer

P.O. Box 688, 32 Lambert Rd East, Blairstown, NJ 07825 Phone 908-362-5616 Fax 908-362-5433

following criteria: Carcinogen

OSHA Flammability : IIIA

Regulatory VOC (less water and exempt solvent) : 83 g/l

VOC Method 310 : 6 %

Chemical is listed as an IARC, NTP, OSHA, or ACGIH Carcinogen:

Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

U.S. State Regulations:

MASS RTK Components :	Calcium Carbonate (Limestone)	1317-65-3
	Clay	1332-58-7
	Titanium dioxide	13463-67-7
	Trimethyl benzene (mixed isomers)	25551-13-7
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
	2,4-Toluene diisocyanate	584-84-9
	Toluene-2,6-Diisocyanate	91-08-7
Penn RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Calcium Carbonate (Limestone)	1317-65-3
	Clay	1332-58-7
	Tackifier	NJ TSRN# 51721300-5272P
	Aromatic petroleum distillates	64742-95-6
	Titanium dioxide	13463-67-7
	Trimethyl benzene (mixed isomers)	25551-13-7
	2,4-Toluene diisocyanate	584-84-9
NJ RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Calcium Carbonate (Limestone)	1317-65-3
	Clay	1332-58-7
	Tackifier	NJ TSRN# 51721300-5272P
	Aromatic petroleum distillates	64742-95-6
	Titanium dioxide	13463-67-7
	Trimethyl benzene (mixed isomers)	25551-13-7
	Butyl benzyl phthalate	85-68-7
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

WARNING! Contains chemicals known to the State of California to cause cancer, birth defects and/or other reproductive harm:

85-68-7	Butyl benzyl phthalate
14808-60-7	Crystalline Silica (Quartz)/ Silica Sand
584-84-9	2,4-Toluene diisocyanate
1333-86-4	Carbon Black
91-08-7	Toluene-2,6-Diisocyanate
100-41-4	Ethylbenzene
91-20-3	Naphthalene

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SECTION 16 - OTHER INFORMATION

HMIS Rating :

Health	3
Flammability	2
Reactivity	1
PPE	

0 – Minimum
1 – Slight
2 – Moderate
3 – Serious
4 – Severe

Further Information:

For Industrial Use Only. Keep out of Reach of Children. The hazard information herein is offered solely for the consideration of the user, subject to their own investigation of compliance with applicable regulations, including the safe use of the product under every foreseeable condition.

Prepared by: Rich Mikol

Legend

ACGIH - American Conference of Governmental Hygienists
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DOT - Department of Transportation
DSL - Domestic Substance List
EPA - Environmental Protection Agency
HMIS - Hazardous Materials Information System
IARC - International Agency for Research on Cancer
MSHA - Mine Safety Health Administration
NDSL - Non-Domestic Substance List
NIOSH - National Institute for Occupational Safety and Health
NTP - National Toxicology Program
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
RTK - Right To Know
SARA - Superfund Amendments and Reauthorization Act
STEL - Short Term Exposure Limit
TLV - Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average
V - Volume
VOC - Volatile Organic Compound
WHMIS - Workplace Hazardous Materials Information System

P.O. Box 688, 32 Lambert Rd East, Blairstown, NJ 07825 Phone 908-362-5616 Fax 908-362-5433

REPORT OF
VAPOR INTRUSION MITIGATION
194 Church Road
Mountain Top, PA 18707

Prepared for:

Tetra Tech EC, Inc.
1000 The American Road
Morris Plains, NJ 07950

Prepared by:

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Project Director, NJDEP MES/ MIS 10245
Clean Vapor, L.L.C.
PO Box 688
Blairstown, NJ 07825

August 2011

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1. INTRODUCTION

This report summarizes the Vapor Intrusion Mitigation activities at 194 Church Road, Mountain Top, Pennsylvania. The system was installed in accordance with the specifications provided by Clean Vapor in the June 2011 Vapor Intrusion Mitigation Plan Design. Remediation activities began on Wednesday, July 6, 2011 and concluded on Monday, July 11, 2011. The active soil depressurization (ASD) system was activated on Friday, July 8, 2011.

The ASD system features a single suction point and a garage attic mounted blower. The existing basement sump pit was sealed and a Dranjer device installed to maintain an airtight seal while still providing a means for water to enter the sump. Additionally, the existing gravity feed condensate drain on the furnace was replaced with an active, float activated condensate pump mounted to the side of the furnace. The existing drainage hole in the slab was sealed and the new condensate discharge was plumbed into the existing sump discharge pipe outside of the home.

Sub slab pressure measurements were made with a digital micro-manometer capable of reading down to 0.0001 inches water column ("w.c.). There are no visible openings from the sub slab to the interior of the home. Test ports have been sealed with putty so they may be opened for future measurements. This report contains a table that summarizes the manometer and air-flow measurements along with the vacuum numbers measured at the previously drilled test holes.

2. SUMMARY OF MEASUREMENTS

This section provides a summary of the measurements collected following installation of the ASD system. The sample locations are provided on the as-built floor plan drawing in Section 3.

2.1 SUB SLAB VACUUM MEASUREMENTS

Date Floor Measurements Performed		July 8, 2011
Test Hole	**Vacuum ("w.c.)**	**Notes**
V1	-0.4209	N/A
V2	-0..3893	N/A
T1	-0.3841	N/A
T2	-0.3639	N/A
T3	-0.2188	N/A
T4	-0.2856	N/A
T5	-0.3066	N/A
T6	-0.3315	N/A
T7	-0.3394	N/A
T8	-0.3505	N/A

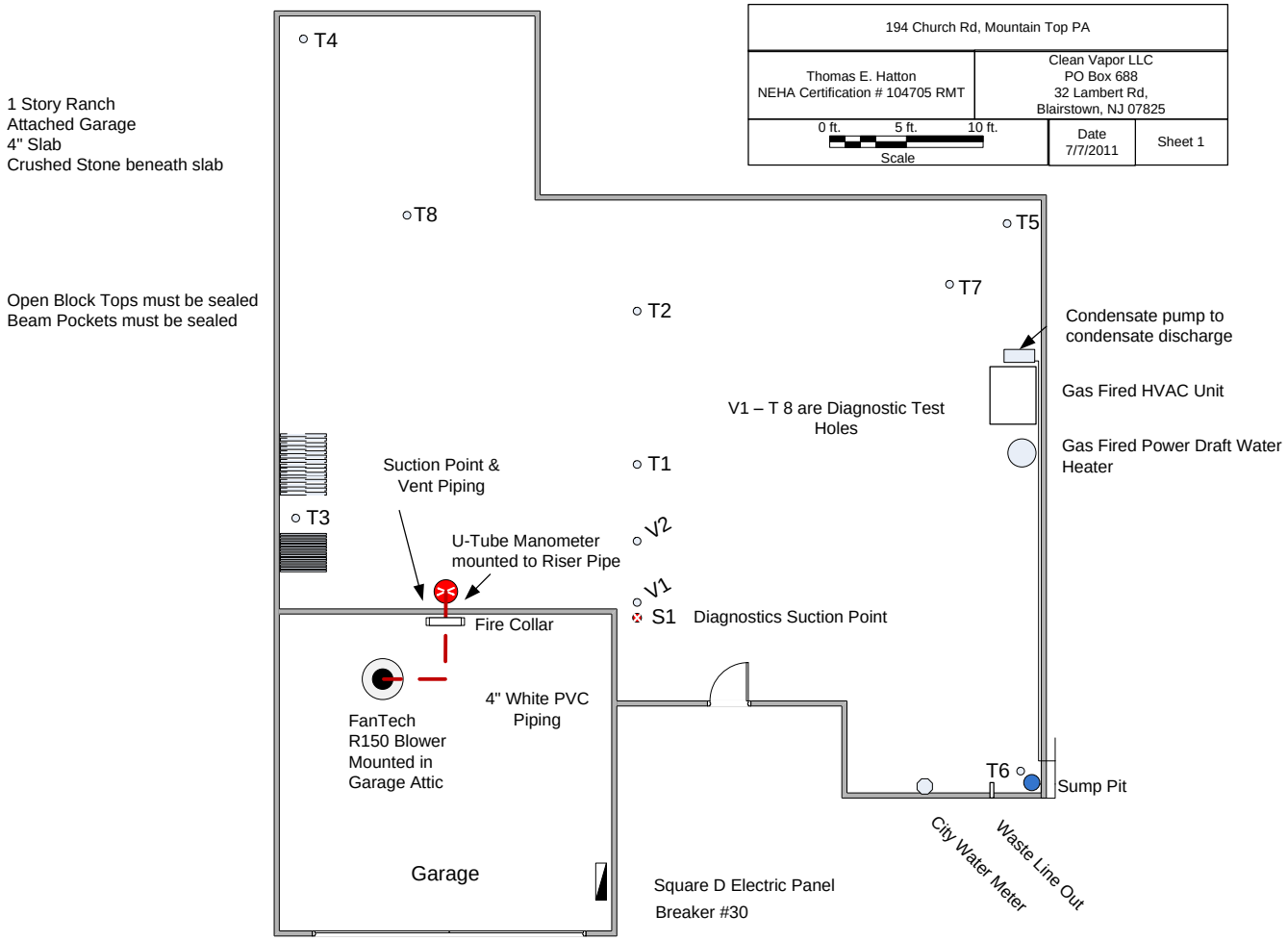
2.2 RISER PIPE MEASUREMENTS

Date Riser Pipe Measurements Performed		July 8, 2011
Suction Point	**Vacuum ("w.c.)**	**Notes**
S1	0.97	N/A

2.3 AIRFLOW MEASUREMENTS

Date Airflow Measurements Performed		July 8, 2011
Blower	**Airflow (cfm)**	**Notes**
Fantech FR150	89.16	Mounted in garage attic

3. AS BUILT FLOOR PLAN DRAWING



Notes:
Condensate pump was installed adjacent to furnace and existing drainage hole was sealed with concrete.

Test hole locations are shown above and were installed during previous diagnostic testing. Test holes have been sealed with putty.

Final piping, and blower location, and blower type are noted by a symbol on the drawing. The blower exhaust was completed more than 1 foot above the roofline and away from windows, doors, air intakes and passive relief vents. All minor floor cracks were sealed with Vulkem 116 sealant.

4. SUCTION POINT INSTALLATION

The images below shows the home's single suction point along with the associated riser pipe and pipe run through the garage attic. The suction point was first sealed with gun grade Vulkem 116 and self leveling Vulkem 45. After these sealants cured the suction point was capped flush to the existing floor with concrete.

Suction Point

Riser Pipe

Pipe Run through garage attic

5. BLOWER INSTALLATION

The FanTech FR150 was installed in the home's garage attic. The fan draws 80 watts of power. The photos below show the fan's final installation location along with the roof penetration of the exhaust pipe.

FanTech FR150 mounted in garage attic

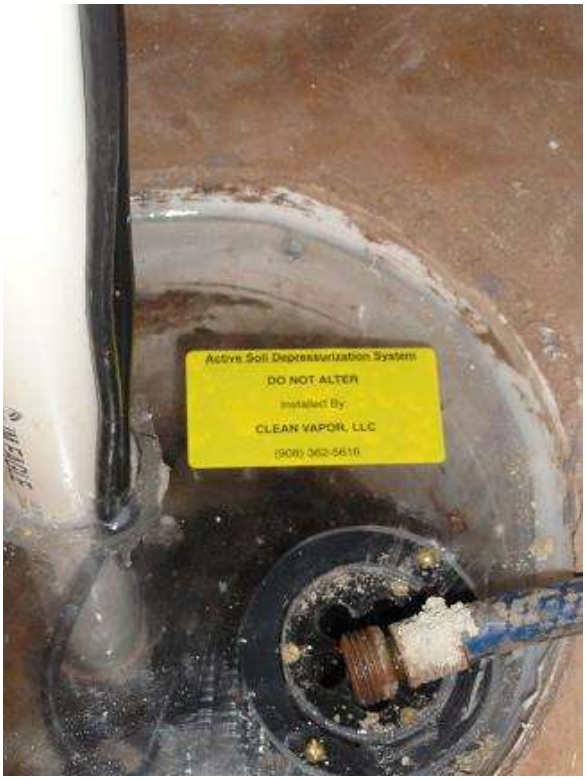
Exhaust pipe roof penetration

6. GAUGES AND SYSTEM LABELING

U-Tube manometer installed in suction pipe riser

Close up of System Labeling on Suction Point

7. SEALING, SUMPS, PUMPS, AND OTHER PHOTOS



Sealed Sump with Dranjer device

Fire collar on garage wall pipe penetration

Concrete Sealed Block Tops

Concrete Sealed Beam Pocket

Condensate Pump installed adjacent to furnace

Dedicated circuit breaker, #30, for Blower

8. MEASUREMENT PHOTOS

Measuring Riser Pipe vacuum using Manometer

9. PERMITS

The Wright Township Building Department was contacted on June 23, 2011 about obtaining permits. The department directed Clean Vapor to Code Inspection Inc., the contracted party responsible for code enforcement and inspections within the township. Code Inspection Inc. informed Clean Vapor on June 28, 2011 that no permits or inspections would be required for Residential Vapor Intrusion Mitigation work.

10. OPERATIONS AND MAINTENANCE

10.1 OPERATIONS AND MAINTENANCE CHECKLIST

The homeowner should contact Clean Vapor LLC at the number provided, 908-362-5616, if at any time the U-tube manometer indicates zero vacuum in the suction pipe. Photos in Section 6 identify the location of the U-tube manometer.

The following table contains the items which should be inspected quarterly for the first year and then semi annually for the next five years. Tetra Tech's client will perform the required inspections, and perform any maintenance, at no cost to the homeowner.

An initial inspection was done upon completion of the system. (Vacuum measurements are recorded in "w.c.)

Item	Date	Condition/Reading		Date	Condition/Reading
Primary Suction point vacuum	7/8/2011	0.97			
Condensate Pump	7/8/2011	Good			
Pipe Condition	7/8/2011	Good			
Sump Seal	7/8/2011	Good			
Block Top Seal/ Beam Pocket	7/8/2011	Good			
Test Hole Vacuum (T1)	7/8/2011	-0.3841			
Test Hole Vacuum (T2)	7/8/2011	-0.3639			
Test Hole Vacuum (T3)	7/8/2011	-0.2188			
Test Hole Vacuum (T4)	7/8/2011	-0.2856			
Test Hole Vacuum (T5)	7/8/2011	-0.3066			
Test Hole Vacuum (T6)	7/8/2011	-0.3315			
Test Hole Vacuum (T7)	7/8/2011	-0.3394			
Test Hole Vacuum (T8)	7/8/2011	-0.3505			

Item	Date	Condition/Reading		Date	Condition/Reading
Primary Suction point vacuum					
Condensate Pump					
Pipe Condition					
Sump Seal					
Block Top Seal/ Beam Pocket					
Test Hole Vacuum (T1)					
Test Hole Vacuum (T2)					
Test Hole Vacuum (T3)					
Test Hole Vacuum (T4)					
Test Hole Vacuum (T5)					
Test Hole Vacuum (T6)					
Test Hole Vacuum (T7)					

Test Hole Vacuum (T8)					

Any Additional Observations should be noted below:

11. WARRANTIES, OWNERS MANUALS, AND MSDS INFORMATION

11.1 FANTECH FR150

Fantech

Installation Instructions for MODEL FR

IMPORTANT: Read These Instructions Completely Before Installing Fan And Save These Instructions For Future Reference.

Items Included: One FR fan, one mounting bracket, mounting hardware

Regular Kits Also Include: Grill with mounting collar/backdraft damper combination, duct mounting clamps

Deluxe Kits Also Include: 2 Grills with mounting collar/backdraft damper combination, "Y" transition, duct mounting clamps, balancing damper

Additional Items Needed: Duct work, duct tape or mounting clamps, duct termination device (roof cap, louvered shutter, etc.)

Tools Required: Electric drill, drill bits, regular screwdriver, phillips screwdriver, razor knife, keyhole saw (optional)

Instructions pour l'installation du MODÈLE FR

IMPORTANT: Lisez ces instructions complètement avant d'Installer le ventilateur et sauvegardez ces Instructions pour de future référence.

Articles inclus : Un ventilateur FR, un support, matériel de support.

Les Kits Réguliers incluent en outre : Grille avec les fixations pour le collier/décharge du régulateur, les pinces de fixation du tuyau.

Les kits de luxe inclus également : 2 Grilles avec les fixations pour le collier/décharge du régulateur, raccordement en "Y", les pinces de fixation du tuyau, du régulateur d'équilibrage.

Les articles supplémentaires nécessaires : Le tuyau, le ruban adhésif ou les pinces de fixation, le dispositif de connexion du tuyau (couvercle du toit, porte-volets, etc.).

Les outils nécessaires : une perceuse électrique, outils de forage, un tournevis normal, un tournevis pour vis de crosse, un couteau rasoir, une scie passe partout (optionnel).

Instrucciones de instalacion del MODELO FR

IMPORTANTE: Lea a Fondo Estas Instrucciones Antes de Instalar el Ventilador, y Consérvelas para Referencia Futura.

Renglones Incluidos: Un ventilador FR, un soporte de montaje y tornillería

Los Juegos Regulares También Incluyen: Rejilla con conjunto de collarín de montaje y mariposa de contratiro, y abrazaderas de montaje del conducto

Los Juegos de Lujo También Incluyen: 2 Rejillas con conjunto de collarín de montaje y mariposa de contratiro; adaptador en "Y", abrazaderas de montaje del conducto y mariposa compensadora

Renglones Adicionales Requeridos: Conductos, cinta para conductos o abrazaderas de montaje, dispositivo de terminal del conducto (capucha de terminación en el techo, juego de persianas, etc.)

Herramientas Necesarias: Taladro eléctrico, barrenas, destornillador recto, destornillador Phillips, navaja, sierra caladora (opcional)

Installing Mounting Bracket & Fan

1. When selecting fan mounting location, the following criteria should be considered: *a) mounting to minimize noise generated by fan operation; b) service accessibility*
   a) Mounting the fan as far as possible from the intake point will minimize fan operating noise from being transmitted back through the duct work. If the fan is to be used as a booster for moving the air between two rooms, a central point along the duct may be optimal. Insulated flexible type duct work (recommended for all bathroom exhaust applications) will result in much quieter operation. Fantech recommends minimum 8' of insulated flexible duct between any exhaust grill and fan for low noise level.
   b) Fan location should allow sufficient access for service.

Mount Bracket (NB).

Mount Fan.

2. Using the wood screws provided, attach the mounting bracket (NB or MB) to a support beam at the selected location. Fan mounting can be at any point along the duct and in any angle, however, vertical mounting is recommended to reduce condensation buildup in the fan. If a horizontal installation is necessary and condensation buildup may pose a problem, either wrap insulation around the fan or drill a ¼" hole in the bottom of the housing (along with an NPT insert [by others] and drain tubing) allowing condensation to drain.
3. Attach fan to the mounting bracket with the sheet metal screws provided. Wiring box should be positioned for easy access. Bracket is provided with rubber vibration isolation grommets to prevent the transmission of sound through the structure. Be careful not to overtighten. Also, care should be taken not to strip the plastic housing. Screws are self tapping and do not require pilot holes. However, pilot holes (no larger than 9/32") are recommended.
4. Connect duct work to inlet and outlet of fan using CB clamps or duct tape. When using insulated duct, it is recommended that the inner vinyl core be clamped or taped to the inlet and outlet and that the vapor barrier surrounding the insulation be duct taped to the fan housing.

NOTE: Steps 2 & 3 may be reversed.

Mount Bracket (MB).

Mount Fan.

Installing DG Supply/Exhaust Grill

If a Vent/Light combination kit is purchased, the VLC vent/lights are supplied with a separate installation instruction replacing steps 1 through 4.

1. Select the grill mounting point within the area to be ventilated. To ease installation, locations of framing beams within the walls or joists supporting the ceiling should be considered. Collar/damper is provided with a perforated hanging strap for attachment directly to a beam or joist. Allow sufficient space between the collar/damper and the beam to attach the duct work. If the location of the grill does not allow direct attachment, a cross-member mounted to the framing should be used.
2. Place the mounting collar/damper in the selected location and trace a circle onto the surface. From the interior side of the room, cut through the surface. Please note: In order to assure a smoother finish when mounting through a sheetrock or tile type ceiling, it is recommended that a razor knife be used to make the cut.
3. From within the attic or crawl space, place the mounting collar into the hole until the edge of the collar is flush with the interior wall or ceiling surface. Attach collar to the support beam with the 2" wood screws provided. Attach duct work. Secure using CB or FC clamps and/or duct tape. When installing the damper into rigid type ducting, FC clamps or duct tape should be used.

   PLEASE NOTE: *When attaching flex duct to the collar/damper combination and an immediate elbow is necessary, be certain that the elbow is installed with a "soft" bend to allow damper blades to operate properly.*
4. Snap the grill into the mounting collar/damper. Grill should be pushed tightly into place for an airtight fit. If there is a gap between the collar and the ceiling it should be caulked to avoid air leakage. For subsequent cleaning the grill can be pulled out and cleaned.

Mount Collar

Side view grill and collar.

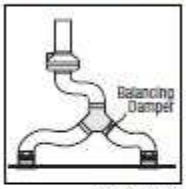
Installing DG Supply/Exhaust Grill

When installing a **DLX kit**, a balancing damper has been included to allow for adjustment of the system. The damper may be used where the grills will be connected using branches of unequal length or where the flow will need to be balanced for any reason.

To Install The Damper:

1. The Damper must be installed on the branch with the least restriction.
   This is generally the duct that is shortest or has the fewest bends.
2. Drill a 9/32" hole approximately 1½" from the edge on the flat side of the "Y".
3. Place the washer over the threaded shaft on the damper.
4. Insert the damper, shaft first, into the hole just drilled.
5. Attach the handle using the wing nut.
6. Adjust the damper to balance airflow and tighten the wing nut to secure.

"Y" with balancing damper.



FR Series Fan and balancing damper.

Flexible Duct Installation Hints

Flexible insulated duct is strongly recommended where allowed by local code for bathroom exhaust applications, where ducting passes through unconditioned space or where noise is a factor. Failure to use insulation could result in excessive condensation buildup within the duct, and undesirable sound levels within the room. For the quietest possible installations, Fantech recommends a minimum of 8' of insulated flexduct between any exhaust grill and fan. When using flexible type duct work, duct should be stretched as tight and straight as possible. Failure to do so could result in dramatic loss of system performance. Flexible duct should be connected to the fan with CB type clamps or duct tape. All connections should be as airtight as possible to maximize system performance.

P.O. Box 688, 32 Lambert Rd East, Blairstown, NJ 07825 Phone 908-362-5616 Fax 908-362-5433

Warnings

DO NOT CONNECT POWER SUPPLY until fan is completely installed. Make sure electrical service to the fan is locked in "OFF" position

1. All units are suitable for use with solid-state speed control.
2. This unit has rotating parts and safety precautions should be exercised during installation, operation and maintenance.
3. **CAUTION**: "For General Ventilation Use Only. Do Not Use To Exhaust Hazardous Or Explosive Materials And Vapors."
4. **WARNING: To reduce the risk of fire, electrical shock, or injury to persons-observe the following:**
   a. Use this unit only in the manner intended by the manufacturer. If you have questions, contact the factory.
   b. Before servicing or cleaning, switch power off at service panel and lock service panel to prevent fan from being switched on accidentally.
   c. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
   d. The combustion airflow needed for safe operation of fuel burning equipment may be affected by this unit's operation. Follow the heating equipment manufacturer's guidelines and safety standards such as those published by the National Fire Protection Association (NFPA), the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) and the local code authorities.
   e. When cutting or drilling into wall or ceiling, do not damage electrical wires or other hidden utilities.
   f. Exhaust fans must always be vented to the outdoors.
   g. Acceptable for use over a bathtub or shower.
   h. NEVER place a switch where it can be reached from a tub or shower.
5. **WARNING!** Check voltage at the fan to see if it corresponds to the motor nameplate.

GUARDS MUST BE INSTALLED WHEN FAN IS WITHIN REACH OF PERSONNEL OR WITHIN SEVEN (7) FEET OF WORKING LEVEL OR WHEN DEEMED ADVISABLE FOR SAFETY.

Electrical Connection

1. Remove the screws securing the terminal box cover plate located on the side of the fan. All fan motor connections are pre-wired to an electrical terminal strip. A ¾" romex type cable restraint connector will be needed to secure the wiring through the knockout provided on the side of the terminal box.
2. Bring incoming electrical service through the romex connector and the fan knockout. Be sure to place the connector nut over the wiring coming into the terminal box. There are two open ports on the terminal strip. Using a small regular screwdriver, tighten the neutral (white) wire of the incoming supply under the open terminal strip port labeled "N". Tighten the line (black) wire of the incoming supply under the open terminal strip port labeled "L". Since the fan motor is isolated within a plastic housing, grounding is not necessary.
3. Secure the romex connector. Secure the incoming supply with the romex connector. Replace the fan terminal box cover. All fan motor and capacitor connections have been pre-wired from the factory. No additional fan wiring is necessary.

Liquid tight wiring – Top View (For outside applications).

Romex wiring – Top View

Troubleshooting

If fan fails to operate, please check the following:

1. Consult wiring diagrams (see below) to insure proper connection.
2. Check motor lead wiring, capacitor leads and incoming supply leads to insure definite contact.
3. If possible, use a meter to test for continuity across the fan motor leads. In order to do this, the capacitor must be disconnected (do not test the capacitor - it will not meter continuity). If motor leads show continuity, consult factory for a replacement capacitor.

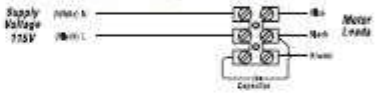
Maintenance Instructions

Since fan bearings are sealed and provided with an internal lubricating material, no additional lubrication is necessary.

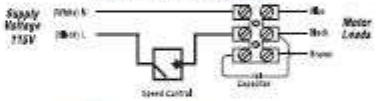
Wiring Diagrams

All Models

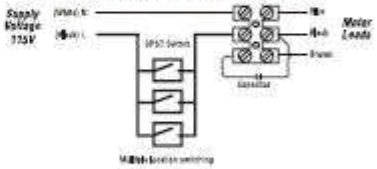
Without Motor Speed Controller



With Motor Speed Controller



Multiple Location Switching Wiring Diagram



Installer les attaches du support et du ventilateur

1. Pour choisir l'emplacement des fixations du ventilateur, les critères suivants devraient être considérés: a) *fixer pour réduire au minimum le bruit produit par le fonctionnement du ventilateur; b) type d'application; et c) l'accessibilité pour le service*

   a) Monter le ventilateur aussi loin que possible des sources d'aération réduira au minimum le bruit de fonctionnement du ventilateur transmis par le tuyau. Si le ventilateur doit être utilisé comme régulateur pour déplacer l'air entre deux salles, un point central le long du tuyau peut être optimal. Un travail d'isolation pour les tuyaux d'aération (recommandé pour tout le système d'aération des salles de bain) permettra un fonctionnement plus silencieux. Fantech recommande le tuyau d'aération isolé de 8 pieds minimum entre n'importe quelle grille d'aération et du ventilateur pour minimiser le bruit.

   b) L'emplacement du ventilateur devrait permettre un accès suffisant pour le service.

Fixer le support de montage (NB).

Attacher le ventilateur.

2. Utilisez les vis en bois fournies, attachez le support (NB ou MB) à une poutre du support à l'emplacement choisi. Le support du ventilateur peut être située à un point quelconque le long du tuyau et dans n'importe quel angle, cependant, le support vertical est recommandé pour réduire la formation de condensation dans le ventilateur. Si une installation horizontale est nécessaire, la formation de condensation peut poser un problème, enrouler alors l'isolation autour du ventilateur ou faites un trou ¾" dans le bas de la boîte (avec une insertion de NPT (supporter par autre) et une tuyauterie de vidange) permet à la condensation de s'écouler.

3. Attacher le ventilateur au support avec les vis en métal fournies. La boîte de câblage devrait être placée de façon à avoir un accès facile. L'attache est équipée d'œillets d'isolement de vibration en caoutchouc pour empêcher la transmission du bruit par la structure. Faites attention à ne pas trop serrer. En outre, prenez soin de ne pas enlever le revêtement en plastique. Les vis sont auto-collantes et n'exigent pas les trous pilotes. Cependant, les trous pilotes (pas plus grands que 9/64") sont recommandés.

Fixer le support de montage (MB).

Attacher le ventilateur.

4. Connectez le tuyau à la prise et à la sortie du ventilateur à l'aide des pinces CB ou de ruban adhésif. En utilisant le tuyau isolé, il est recommandé que l'intérieur en vinyle soit maintenu ou collier avec du ruban adhésif sur la prise d'entrée et de sortie et que la barrière de vapeur entourant l'isolation soit collée au logement du ventilateur par du ruban adhésif.

NOTE: Les étapes 2 & 3 peuvent être renversées.

Installer la grille d'alimentation et d'aération DG

Si un kit de combinaison de Vent/Lumière est acheté, les VLC vent/lumière sont fournis avec une instruction d'installation séparée substituant les étapes 1 à 4.

1. Choisissez le point du support de la grille dans la zone qui doit être ventilée. Pour faciliter l'installation, les emplacements des poutres d'encadrement dans les murs ou les solives de plafond devraient être considérés. Le collier/régulateur est équipé de courroie perforée pour la connexion directe à une solive de plafond ou à une poutrelle. Permettez suffisamment d'espace entre le collier/régulateur et la poutre pour attacher la tuyauterie. Si l'emplacement de la grille ne permet pas une connexion directe, une entretoise montée sur l'encadrement devrait être utilisée.

Collet de montage.

2. Placez la fixation du collier/ régulateur dans l'emplacement choisi et tracez un cercle sur la surface. A l'intérieur de la salle, coupez à travers la surface. Veuillez noter : Afin d'assurer une finition plus lisse pour un montage sur un toit de pierres ou un toit de tuiles il est recommandé qu'un couteau rasoir soit utilisé pour couper.

Vue latérale grille et collet.

3. A partir d'un grenier ou d'un vide sanitaire, placez le support du collier dans le trou jusqu'à ce que le bord du collier soit aligné avec le mur ou la surface intérieure du plafond. Attachez le collier à la poutre avec les vis en bois de 2 pouces fournies. Attachez le tuyau. Fixez à l'aide des pinces CB ou FC et/ou avec du ruban adhésif. Pour installer le régulateur sur la tuyauterie rigide, des pinces FC ou du ruban adhésif devront être utilisés.

   VEUILLEZ NOTER: *Lorsque vous attachez le tuyau au collier/régulateur et qu'un coude est nécessaire, veillez à ce que le coude soit installé avec une courbe "douce" pour permettre aux lames du régulateur de fonctionner correctement.*

4. Enclencher la grille sur le support du collier/régulateur. La grille devrait être pousser fermement en place pour un ajustement hermétique. S'il y a un espace entre le collier et le plafond il devra être colmaté pour évitter la fuite d'air. La grille peut être retirée et nettoyée pour le nettoyage ultérieur. .

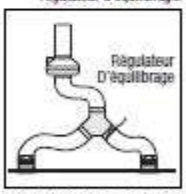
Installer la grille d'alimentation et d'aération DG

En installant un **kit DLX**, un régulateur a été inclus pour tenir compte du réglage du système. Le régulateur peut être utilisé où les grilles seront connectées en utilisant des branchements de longueur inégale où l'écoulement a besoin d'être équilibré pour n'importe quelle raison.

Pour installer le régulateur :

1. L'amortisseur doit être installé sur la branche avec le moins restriction. C'est généralement le conduit qui est le plus court ou a moins de courbures.
2. Percer un trous de 9/64" approximativement 1 ½" du bord de côté plat.
3. Placez l'exédent de rondelle l'axe filet sur l'amortisseur.
4. Insérez l'amortisseur, axe d'abord, dans le trou percez.
5. Attachez la poignée à l'aide de l'ecrou-papillon.
6. Ajustez l'amortisseur sur le flux d'air d'équilibre et serrez l'ecrou-papillon pour fixer.

Le montage en "Y" avec le régulateur d'équilibrage.



Ventilateur séries FR et régulateur d'équilibrage.

Conseils pour l'installation du tuyau

Le tuyau flexible isolé est vivement recommandé où permis par le code local pour l'installation du système d'aération dans les salles de bains où la tuyauterie passent à travers des endroits isolés et où le bruit est un facteur. Ne pas utiliser d'isolation peut entraîner la formation de condensation excessive sur le tuyau et des bruits indésirables dans la pièce. Pour des installations insonorisées au maximum, Fantech recommande un tuyau flexible isolé de 8 pieds au minimum entre toutes les grilles aération et du ventilateur. En utilisant un tuyau flexible, le tuyau devrait être étiré aussi fortement et droit que possible. Ne pas le faire peut entraîner la perte d'efficacité du fonctionnement du système. Le tuyau flexible devrait être relié au ventilateur avec des pinces de type CB ou par ruban adhésif. Toutes les connexions devraient être aussi hermétiques que possible afin de maximiser le fonctionnement du système.

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Attention

NE PAS REBRANCHER L'ELECTRICITÉ jusqu'à ce que le ventilateur soit complètement installé. Assurez-vous que l'interrupteur du ventilateur est verrouillé en position "OFF" (fermer)

1. Que toutes les unités soient compatibles avec l'utilisation de la commande à vitesse variable.
2. Que cette unité a des pièces d'échange et que les mesures de sécurité soient respectées pendant l'installation, le fonctionnement et l'entretien.
3. **ATTENTION** : "Pour une ventilation générale seulement. A ne pas utiliser pour évacuer des échappements dangereux ou des matériaux et des gaz explosifs."
4. **AVERTISSEMENT : Pour réduire le risque d'incendie, de choc électrique, ou de blessures aux personnes - observer ce qui suit :**
   a. Utilisez cette unité seulement de la façon dont le constructeur l'a destiné. Si vous avez des questions, contacter l'usine.
   b. Avant l'entretien ou le nettoyage, coupez le courant au panneau de service et verrouillez le panneau de service pour empêcher le ventilateur d'être rebranché accidentellement.
   c. Le travail d'installation et le câblage électrique doivent être faits par la(les) personne(s) qualifiée selon tous les codes et les normes applicables, y compris la construction anti-incendie.
   d. La ventilation requis pour un fonctionnement en toute sécurité d'un équipement de combustion à carburant peut être affectée par le fonctionnement de cette unité. Suivez les directives du constructeur du matériel de chauffage et les normes de sûreté comme ceux éditées par l'association nationale de protection contre les incendies (NFPA), la société américaine du chauffage et les ingénieurs de climatisation et de réfrigération (ASHRAE) ainsi que les codes locaux.
   e. Lors du découpage ou du forage dans le mur ou le plafond, faites attention de ne pas endommager les fils électriques ou d'autres utilités cachées.
   f. Les ventilateurs d'aération doivent toujours être ventilés à l'extérieur.
   g. Acceptable pour l'usage au-dessus d'une baignoire ou d'une douche.
   h. Ne jamais placer un interrupteur près d'une baignoire ou d'une douche.
5. AVERTISSEMENT ! Vérifier le voltage du ventilateur pour voir s'il correspond à la plaque signalétique du moteur.

DES BARRIÈRES DOIVENT ÊTRE INSTALLÉES QUAND LE VENTILATEUR EST DANS LE PERIMÈTRE D'ATTEINTE PAR LE PERSONNEL OU AU MOINS A 2 MÈTRES DU NIVEAU DE TRAVAIL OU SELON LES RECOMMANDATIONS DE SÉCURITÉ.

La connexion électrique

1. Retirer les vis fixant le couvercle de la boîte de connexion située à côté du ventilateur. Toutes les connexions de moteur du ventilateur sont précablées à une bande de connexion électrique. Un connecteur encastré câble de type romex ¾ pouces sera nécessaire pour fixer le câblage par l'éjection fournie sur le côté de la boîte de connexion.
2. Amener le courant électrique par le connecteur romex et le ventilateur d'éjection. Soyez sûr de placer l'écrou du connecteur au-dessus du câblage venant de la boîte de connexion. Il y a deux ports ouverts sur la bande de connexion. En utilisant un petit tournevis réguler, serrez le fil (blanc) neutre de l'entrée de l'alimentation sous le port de la bande de connexion étiquetté "N". Serrez le fil (noir) de la ligne d'entrée de l'alimentation sous le port de la bande de connexion étiquetté "L". Le moteur du ventilateur étant isolé dans une boîte en plastique, la prise de terre n'est pas nécessaire.
3. Fixez le connecteur romex. Fixez l'entrée de l'alimentation avec le connecteur romex. Substituez la couverture de la boîte de connexion du ventilateur. Toutes les connexions du moteur et du condensateur du ventilateur ont été précablées à l'usine. Aucun câblage supplémentaire pour le ventilateur est nécessaire.

Câblage serré du liquide - vue de dessus (pour des utilisations extérieures).

Câblage Romex - Vue de dessus.

Dépannage

Si le ventilateur ne fonctionne pas, vérifier ce qui suit:

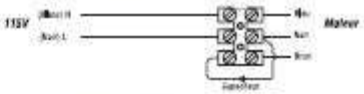
1. Consultez les diagrammes de câblage (voir ci-dessous) pour vous assurer que la connexion est appropriée.
2. Contrôlez le fil de sortie du moteur, les fils de sortie du condensateur et l'alimentation électrique pour vous assurer d'un bon contact.
3. Si possible, utilisez un appareil de mesure pour déterminer la continuité à travers les fils de sortie du moteur du ventilateur. Pour faire ceci, le condensateur doit être débranché (ne pas tester le condensateur - il ne montrera pas la continuité). Si les fils de sortie du moteur montrent la continuité, consultez l'usine pour un condensateur de rechange.

Instructions pour l'entretien.

Puisque les roulements du ventilateur sont scellés et équipés d'un matériel lubrifiant interne, aucune lubrification supplémentaire n'est nécessaire.

Diagrammes de raccordement

Avec contrôle de vitesse du moteur



Sans contrôle de vitesse du moteur

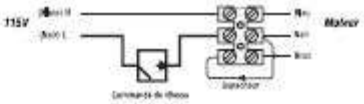
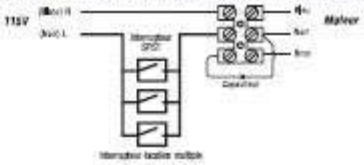


Diagramme de raccordement pour installation interrupteurs multiples



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Instalación del Soporte de Montaje y el Ventilador

1. Al ubicar el ventilador, hay que considerar las siguientes normas: a) el montaje que reduzca al mínimo el ruido que produce el ventilador en operación; b) el tipo de aplicación; y c) el acceso para facilitar el mantenimiento.

   a) El ventilador se debe montar lo más lejos posible de la salida a fin de minimizar el retroceso del ruido del ventilador a través del conducto. Si se ha de emplear el ventilador como refuerzo para mover el aire entre dos cuartos, acaso resulte óptimo montarlo en un punto céntrico a lo largo del conducto. Un conducto flexible aislado (recomendado para cualquier instalación de escape para baños) resulta mucho más silencioso. Fantech recomienda un mínimo de 8 pies de conducto flexible aislado entre cualquier rejilla de escape y el ventilador, para lograr un mínimo de ruido.

   b) El ventilador debe situarse donde haya acceso suficiente para el mantenimiento.

Monte el suporte (NB).

Monte el ventilador.

2. Mediante los tornillos tirafondo, fije el soporte de montaje (NB o MB) a una viga estructural en el sitio escogido. Aunque el ventilador se puede montar en cualquier punto a lo largo del conducto y a cualquier ángulo, es recomendable montarlo en posición vertical para reducir el cúmulo de condensado en el ventilador. Si hay que recurrir a una instalación horizontal, dando lugar a la posible condensación, envuelva el ventilador con aislante o bien perfore un agujero de ½" en el fondo de la carcasa (junto con un adaptador de NPT [provisto por otros] y tubería de drenaje) para desalojar el condensado.

3. Fije el ventilador al soporte de montaje mediante los tornillos de hojalata suministrados. La caja de conexiones se debe ubicar para facilitar el acceso. El soporte de montaje se ha provisto de guardaojales amortiguadores de goma que impiden la transmisión de ruidos a través de la estructura. Tenga cuidado de no sobreapretarlos. De paso, tenga cuidado de no desgarrar la carcasa de plástico. Los tornillos son autorroscantes y no requieren la perforación de pilotos. No obstante, recomendamos perforar pilotos (de no más de 9/32").

Monte el suporte (MB).

Monte el ventilador.

4. Conecte los conductos de entrada y salida del ventilador mediante abrazaderas CB o con cinta especial para conductos. Al usarse conductos aislados, es recomendable fijar el núcleo de vinilo con abrazaderas o con cinta a la entrada y a la salida, de manera que la película impermeable que rodea el aislante quede fijada a la carcasa del ventilador con cinta para conductos.

NOTA: Se puede invertir el orden de los pasos 2 y 3.

Instalación de la Rejilla DG de Entrada y Escape

Si se ha comprado el conjunto de Respiradero y Luz, éstos se suministran con instrucciones particulares de instalación que reemplazan los Pasos 1 al 4.

1. Seleccione el punto de montaje de la rejilla dentro del ambiente a ventilar. Para facilitar la instalación, se debe tomar en consideración la ubicación de las vigas enmarcadoras dentro de las paredes, o las viguetas de apoyo del techo. El Collarín/mariposa viene provisto de una cinta perforada para montaje directo en una viga o vigueta. Deje suficiente espacio entre el collarín/mariposa y la viga para fijar el conducto. Si la ubicación de la rejilla no permite el montaje directo, se debe emplear un travesaño auxiliar fijado al enmarcamiento.

Monte el collarín.

2. Coloque el collarín/mariposa en el sitio deseado, y trace un círculo sobre la superficie. Desde el interior de la habitación, haga un corte a través de la superficie. Favor observar: Para poder asegurar un acabado más liso al hacer un montaje a través de un techo de cartón-piedra, recomendamos hacer el corte con una navaja.

Vista lateral de la rejilla y el collarín.

3. Desde la buhardilla o el entresuelo, coloque el collarín de montaje en el agujero hasta que el borde del collarín quede al ras de la pared interior o la superficie del techo. Fije el collarín a la viga de apoyo con los tornillos tirafondo de 2" suministrados. Conecte el conducto. Asegúrelo con abrazaderas CB o FC y/o cinta para conductos. Si se trata de instalar la mariposa dentro de un conducto de tipo rígido, se deben emplear abrazaderas de tipo FC o cinta para conductos.

   FAVOR NOTAR: Al conectar un conducto flexible al conjunto de collarín/mariposa, si hace falta un codo inmediatamente a renglón seguido, tenga cuidado de instalar el codo con un doblez "suave" para permitir que las hojas de la mariposa operen debidamente.

4. Enganche la rejilla en el collarín/mariposa de montaje. La rejilla debe oprimirse para que quede bien firme y hermética. Si queda una rajadura entre el collarín y el techo, se debe calafatear para evitar fugas de aire. Para la limpieza posterior, la rejilla se puede extraer y limpiar.

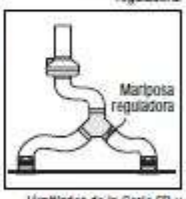
Instalación de la Rejilla DG de Entrada y Escape

Para la instalación del conjunto DLX, se ha incluido una mariposa reguladora para ajustar el sistema. Se puede utilizar la mariposa donde quiera que se conecten las rejillas a ramales de distinta longitud o si hay que equilibrar el caudal por cualquier motivo.

Para Instalar El Damper:

1. El damper tiene ser instalado en el lado menos restrijido. Normalmente sera el lado que sea mas corto y que tenga monos dobles.
2. Haga un abujero de 5/16" aproximadamente 1 1/2" retirado en el lado plano de la "Y".
3. Ponga el washer por dentro del lado del damper que tiene rosca.
4. Instale el damper con el lado de rosca primero al abujero.
5. Instale la manecilla y asegurelo con la tuerca.
6. Instale el damper para balanclar la circulacion del aire entre ambos lados y apriete la tuerca para asegurar el damper.

"Y" con mariposa reguladora.



Ventilador de la Serie FR y mariposa reguladora.

Sugerencias para la Instalación del Conducto Flexible

Recomendamos encarecidamente usar conducto flexible aislado para aplicaciones de escape de baños donde quiera que el código local lo permita, donde el conducto pase a través de espacios no acondicionados o donde el ruido sea un factor de importancia. La ausencia del aislante podría causar un exceso de condensación dentro del conducto, amén del exceso de ruido dentro del cuarto. Para lograr la instalación más silenciosa posible, Fantech recomienda un mínimo de 8 pies de conducto flexible aislado entre cualquier rejilla de escape y el ventilador. Al montar un conducto de tipo flexible, el mismo se debe estirar lo más apretado y recto posible. De lo contrario, el sistema podría mucho rendimiento. El conducto flexible se debe conectar al ventilador con abrazaderas de tipo CB o con cinta para conductos. Todas las conexiones deben quedar lo más herméticas posible para lograr un máximo de rendimiento.

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Advertencia

NO CONECTE LA ALIMENTACIÓN DE FUERZA hasta tanto el ventilador quede totalmente instalado. Compruebe que la alimentación eléctrica del ventilador quede atrancada en la posición "OFF"

1. Todas las unidades sirven para operar con control de velocidad de estado sólido.
2. Esta unidad tiene piezas rotativas, y se deben tomar precauciones de seguridad durante la instalación, operación y mantenimiento.
3. **PRECAUCION:** "Sólo para Ventilación General. No Usar ParaDesalojar Materiales y Vapores Peligrosos o Explosivos."
4. **ADVERTENCIA: Para reducir el riesgo de incendio, conmoción eléctrica o lesiones a personas, observe lo siguiente:**
   a. Sólo use esta unidad en la forma contemplada por el fabricante.Si tiene alguna pregunta, diríjase a la fábrica.
   b. Antes del mantenimiento o limpieza, desconecte la electricidad en el tablero de operación y cierre el tablero con llave a fin de evitar que se reactive sin querer.
   c. Sólo personal calificado conforme todos los códigos y normas del caso debe realizar los trabajos de instalación y cableado eléctrico, incluso la construcción de elementos a prueba de incendio.
   d. La operación de esta unidad puede afectar el caudal de aire necesario para la operación segura de equipos quemadores de combustible. Siga las indicaciones y normas de seguridad del fabricante, tales como las publicadas por la National Fire Protection Association (NFPA – Asociación Nacional de Protección Contra Incendios), la American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE – Sociedad Americana de Ingenieros de Calefacción, Refrigeración y Aire Acondicionado) y las autoridades competentes de la localidad.
   e. Al cortar o perforar paredes o techos, evite dañar el cableado eléctrico u otros servicios ocultos.
   f. Los ventiladores de escape siempre deben desalojarse al exterior.
   g. Aceptable para emplearse por encima de bañeras o duchas.
   h. JAMAS coloque un interruptor al alcance de una bañera o ducha.
5. **¡ADVERTENCIA!** Compruebe el voltaje de alimentación del ventilador para ver si corresponde al voltaje nominal según la placa del motor.

HAY QUE INSTALAR GUARDAS DONDE QUIERA QUE EL VENTILADOR QUEDE AL ALCANCE DEL PERSONAL, A MENOS DE SIETE (7) PIES DEL NIVEL DE OPERACION, O DONCE SE ESTIME ACONSEJABLE PARA LA SEGURIDAD.

Conexión Eléctrica

1. Desenrosque los tornillos de montaje de la tapa de la caja de conexiones en el costado del ventilador. Todas las conexiones del motor del ventilador están precableadas a una regleta eléctrica. Hace falta un conector pasahilos protector ⅜" de tipo romex para sujeción del cableado a través del agujero ciego provisto en el costado de la caja de conexiones.

Cableado Impermeable - Vista de Planta (Para aplicaciones al exterior).

2. Pase la alimentación eléctrica a través de conector romex y el agujero ciego del ventilador. Tenga cuidado de colocar la tuerca conectora encima del cableado entrante a la caja de conexiones. En la regleta de conexiones hay dos lumbreras abiertas. Usando un pequeño destornillador común, apriete el cable neutro (de color blanco) de la alimentación eléctrica debajo de la lumbrera marcada "N" en la regleta. Apriete el hilo de Línea (negro) de la alimentación eléctrica debajo de la lumbrera marcada "L". Debido a que el motor del ventilador está aislado por su carcasa de plástico, no hay que conectarlo a tierra.

Cableado en Romex - Vista de Planta

3. Asegure el conector romex. Asegure la alimentación entrante con el conector romex. Tape de nuevo la caja de conexiones del ventilador. Todas las conexiones del motor del ventilador y del capacitor vienen precableadas de fábrica. No hace falta ningún cableado adicional para el ventilador.

Análisis de Fallas

Si el ventilador deja de funcionar, revise lo siguiente:

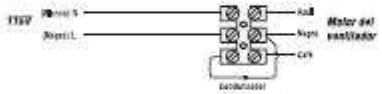
1. Consulte los diagramas eléctricos (vea a continuación) para asegurar que las conexiones estén correctas.
2. Revise el cableado del motor, del capacitor y de la alimentación eléctrica para asegurar el debido contacto.
3. Si es posible, use un comprobador para verificar la continuidad entre los hilos del motor del ventilador. Para ello hay que desconectar el capacitor. (No pruebe el capacitor, ya que no tiene continuidad.) Si los hilos del motor muestran continuidad, consúltele a la fábrica un capacitor de repuestro.

Instrucciones de Mantenimiento

Debido a que los rodamientos del ventilador están sellados y provistos de lubricante interno, no es necesario aplicarles lubricante adicional.

Diagramas de Alambrado

Con controlador de velocidad de motor



Sin controlador de velocidad de motor

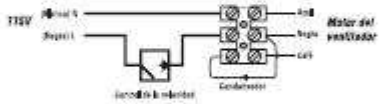
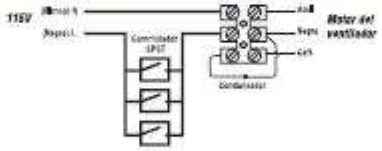


Diagrama de alambrado para conmutación en varios puntos



Five (5) Year Warranty

DURING ENTIRE WARRANTY PERIOD:
FANTECH will repair or replace any part which has a factory defect in workmanship or material. Product may need to be returned to the Fantech factory, together with a copy of the bill of sale and identified with RMA number.

FOR FACTORY RETURN YOU MUST:
- Have a Return Materials Authorization (RMA) number. This may be obtained by calling FANTECH either in the USA at 1.800.747.1762 or in CANADA at 1.800.565.3548. Please have bill of sale available.
- The RMA number must be clearly written on the outside of the carton, or the carton will be refused.
- All parts and/or product will be repaired/replaced and shipped back to buyer; no credit will be issued.

OR
The Distributor may place an order for the warranty part and/or product and is invoiced. The Distributor will receive a credit equal to the invoice only after product is returned pre-paid and verified to be defective.

FANTECH WARRANTY TERMS DO NOT PROVIDE FOR REPLACEMENT WITHOUT CHARGE PRIOR TO INSPECTION FOR A DEFECT.
REPLACEMENTS ISSUED IN ADVANCE OF DEFECT INSPECTION ARE INVOICED, AND CREDIT IS PENDING INSPECTION OF RETURNED
MATERIAL. DEFECTIVE MATERIAL RETURNED BY END USERS SHOULD NOT BE REPLACED BY THE DISTRIBUTOR WITHOUT CHARGE TO THE END USER, AS CREDIT TO DISTRIBUTOR'S ACCOUNT WILL BE PENDING INSPECTION AND VERIFICATION OF ACTUAL DEFECT BY FANTECH.

THE FOLLOWING WARRANTIES DO NOT APPLY:
- Damages from shipping, either concealed or visible. Claim must be filed with freight company.
- Damages resulting from improper wiring or installation.
- Damages or failure caused by acts of God, or resulting from improper consumer procedures, such as:
  1. Improper maintenance
  2. Misuse, abuse, abnormal use, or accident, and
  3. Incorrect electrical voltage or current.
- Removal or any alteration made on the FANTECH label control number or date of manufacture.
- Any other warranty, expressed, implied or written, and to any consequential or incidental damages, loss or property, revenues, or profit, or costs of removal, installation or reinstallation, for any breach of warranty.

WARRANTY VALIDATION
- The user must keep a copy of the bill of sale to verify purchase date.
- These warranties give you specific legal rights, and are subject to an applicable consumer protection legislation. You may have additional rights which vary from state to state.

Garantie de 5 ans

La présente garantie remplace toutes les garanties antérieures.

DURANT TOUTE LA PÉRIODE DE GARANTIE:
FANTECH, INC. s'engage à réparer ou à remplacer toute pièce présentant un défaut d'usine en matière de qualité d'exécution ou de matériau. Il sera peut être nécessaire de retourner le produit à l'usine FANTECH, accompagné d'une copie du contrat de vente et du numéro d'autorisation de retour.
POUR RETOURNER UN PRODUIT À L'USINE, VOUS DEVEZ:
- Obtenir un numéro d'autorisation de retour; pour ce faire, communiquer avec FANTECH, INC. aux États-Unis au numéro 1 800 747-1762, ou au Canada, au numéro 1 800 565-3548. Veuillez avoir votre contrat de vente à portée de la main.
- S'assurer que le numéro d'autorisation de retour est lisible sur l'extérieur de la boîte, sinon la boîte sera refusée.
- Toutes les pièces et/ou le produit seront réparés ou remplacés puis retournés à l'acheteur. Aucun crédit ne sera accordé.

OU
Le Distributeur peut commander une pièce ou un produit couvert par la garantie; la facture lui sera envoyée. Le distributeur ne sera crédité du montant de sa facture qu'après que le produit a été retourné port payé et qu'il a été trouvé défectueux.
LES TERMES DE LA GARANTIE DE FANTECH NE PRÉVOIENT PAS DE REMPLACEMENT SANS FRAIS AVANT QUE LA PIÈCE OU LE PRODUIT DÉFECTUEUX AIT ÉTÉ INSPECTÉ. LES PRODUITS OU PIÈCES REMPLACÉS AVANT L'INSPECTION DE LA DÉFECTUOSITÉ SERONT FACTURÉS ET LE MONTANT DU CRÉDIT EST FONCTION DE L'INSPECTION DE LA PIÈCE OU DU PRODUIT RETOURNÉ. LE DISTRIBUTEUR NE DOIT PAS REMPLACER SANS FRAIS POUR L'UTILISATEUR FINAL L'ÉQUIPEMENT DÉFECTUEUX RETOURNÉ PAR L'UTILISATEUR FINAL, CAR LE COMPTE DU DISTRIBUTEUR NE SERA CRÉDITÉ QU'APRÈS L'INSPECTION ET LA VÉRIFICATION PAR FANTECH DE LA DÉFECTUOSITÉ.
LES GARANTIES NE S'APPLIQUENT PAS DANS LES CAS SUIVANTS:
- Dommages dus au transport (dissimulés ou visibles). Les réclamations doivent être faites à la compagnie de fret.
- Dommages dus au mauvais câblage ou à l'installation inappropriée.
- Dommages ou défectuosité causés par une calamité naturelle ou résultant d'une procédure irrégulière de l'acheteur, notamment :
  1. Entretien irrégulier
  2. Mauvais usage, usage abusif, usage anormal ou accident
  3. Tension ou courant électrique incorrect
- Enlèvement ou toute modification du numéro de contrôle ou de la date de fabrication de l'étiquette FANTECH
- Toute autre garantie expresse, écrite ou implicite, pour les dommages accidentels ou indirects, perte de biens, de recettes, manque à gagner ou coûts relatifs à la dépose, à l'installation ou à la réinstallation, en cas de violation de garantie.

CERTIFICATION DE LA GARANTIE:
- L'utilisateur doit conserver une copie du contrat de vente pour confirmer la date d'achat.
- Les présentes garanties vous donnent des droits spécifiques reconnus par la loi et sont régies par les lois sur la protection du consommateur appropriées. Il est possible que différents états offrent d'autres droits.

Garantia por cinco (5) años

Esta garantía reemplaza toda otra garantía anterior.

DURANTE EL PERÍODO ÍNTEGRO DE LA GARANTÍA:
FANTECH reparará o reemplazará toda parte que presente un defecto en el material o en la mano de obra. Es posible que el producto deba ser devuelto a la fábrica FANTECH, juntamente con una copia de la constancia de compraventa e identificado con el número de RMA.
PARA DEVOLUCIÓN A FÁBRICA USTED DEBE:
- Tener un número de Autorización de Devolución de Material (RMA). Esto se puede obtener llamando a FANTECH ya sea en los Estados Unidos al 1.800.747.1762
- en Canadá al 1.800.565.3548. Tenga a mano la constancia de compraventa.
- El número de RMA deberá estar claramente escrito en la parte exterior de la caja, de lo contrario la caja será rechazada.
- Todas las partes y/o el producto serán reparados/reemplazados y devueltos al comprador; no se otorgará crédito.

O BIEN
El Distribuidor puede colocar una orden por la parte y/o producto en garantía y facturarla/o. El Distribuidor recibirá un crédito igual a la factura sólo después de que se haya devuelto el producto con pago previo y con verificación de defecto.
LAS CONDICIONES DE LA GARANTÍA DE FANTECH NO CONTEMPLAN EL REEMPLAZO SIN CARGO ANTES DE REALIZAR LA INSPECCIÓN PARA DETECTAR DEFECTOS. LOS REEMPLAZOS EMITIDOS ANTES DE INSPECCIONAR POR DEFECTOS SON FACTURADOS, Y EL CRÉDITO ESTÁ A LA ESPERA DE INSPECCIÓN DEL MATERIAL DEVUELTO. EL MATERIAL DEFECTUOSO DEVUELTO POR LOS USUARIOS FINALES NO DEBERÁ SER REEMPLAZADO POR EL DISTRIBUIDOR SIN CARGO PARA EL USUARIO FINAL, YA QUE EL CRÉDITO DE LA CUENTA DEL DISTRIBUIDOR ESTARÁ A LA ESPERA DE INSPECCIÓN Y VERIFICACIÓN DEL DEFECTO REAL POR FANTECH.
LAS SIGUIENTES GARANTÍAS NO SE APLICAN:
- Daños durante el envío, ya sean encubiertos o visibles. Se deberá presentar el reclamo a la compañía transportadora.
- Daños ocasionados por cableado o instalación indebidos.
- Daños o fallas causados por hechos fortuitos, u ocasionados por procedimientos impropios por parte del usuario, tales como:
  1. Mantenimiento indebido
  2. Uso indebido, abuso, uso anormal o accidente y
  3. Tensión o corriente eléctrica incorrecta.
- Remoción o modificación realizada al número de control del rótulo de FANTECH o de la fecha de fabricación.
- Toda otra garantía, expresa, implícita o escrita, daños y perjuicios, pérdida de propiedad, de ingresos, o de beneficios, o costo de remoción, instalación o reinstalación por incumplimiento de la garantía.

VALIDACIÓN DE LA GARANTÍA
- El usuario debe conservar una copia de la constancia de compraventa para verificar la fecha de compra.
- Estas garantías le otorgan derechos legales específicos, y están sujetas a una legislación aplicable para protección del consumidor. Usted puede tener derechos adicionales que varían de estado en estado.

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Sarasota, FL. 34234
Phone: 800.747.1762; 941.309.6000
Fax: 800.487.9915; 941.309.6099
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Canada
50 Kanaflaki Way
Bouctouche, NB E4S 3M5
Phone: 800.565.3548; 506.743.9500
Fax: 877.747.8116; 506.743.9600
www.fantech.ca; info@fantech.ca

Fantech, reserves the right to modify, at any time and without notice, any or all of its products' features, designs, components and specifications to maintain their technological leadership position.

Item #: 401444 • Rev Date: 040605

11.2 VULKEM 116

Material Safety Data Sheet

TREMCO

VULKEM 116 LIMESTONE

Version 2.
REVISION DATE: 10/08/2008

Print Date 04/21/2010

SECTION 1 - PRODUCT IDENTIFICATION

Trade name	:	VULKEM 116 LIMESTONE
Product code	:	426805 323
COMPANY	:	Tremco Incorporated 3735 Green Road Cleveland, OH 44122
Telephone	:	(216) 292-5000 8:30 - 5:00 EST
Emergency Phone:	:	(216) 765-6727 8:30 - 5:00 EST After Hours: Chemtrec 1-800-424-9300
Product use	:	Sealant

SECTION 2 - HAZARDS IDENTIFICATION

Emergency Overview

Limestone. Non-sag gunnable paste. May cause slight irritation to the respiratory system. May cause nausea, headaches, and dizziness. May cause drowsiness, weakness, and fatigue. May cause allergic respiratory sensitization. Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention. Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel.

Acute Potential Health Effects/ Routes of Entry

Inhalation	:	May cause slight irritation to the respiratory system. May cause nausea, headaches, and dizziness. May cause drowsiness, weakness, and fatigue. May cause allergic respiratory sensitization.
Eyes	:	Direct contact may cause mild irritation.
Ingestion	:	May cause gastrointestinal irritation, nausea, and vomiting.
Skin	:	May cause sensitization resulting in irritation, itching and redness.

Aggravated Medical Conditions

Pre-existing eye, skin and respiratory disorders may be aggravated by exposure.

Chronic Health Effects

Overexposure may cause dermatitis, asthma, skin and respiratory sensitization and decreased lung function. Prolonged or repeated contact/exposure to aromatic petroleum distillates may cause defatting, drying, and irritation of the skin, dermatitis, and central nervous system (CNS) effects. Inhalation of crystalline silica (quartz) can cause cancer based on animal data, and IARC concludes sufficient evidence in humans (Group 1). Prolonged and repeated overexposure to free crystalline silica dust above the TLV level may cause scarring of the lungs with cough and shortness of breath. A delayed lung injury, silicosis may result from breathing free silica. Fillers are encapsulated and not expected to be released from product under normal conditions of use. Prolonged or repeated exposure to mineral spirits (petroleum naphtha or stoddard solvent) may cause defatting, drying, and irritation of the skin, dermatitis, central nervous system (CNS) effects, and adverse liver, kidney, and lung effects.

Target Organs: Skin, Eye, Ingestion, Lung

SECTION 3 - PRODUCT COMPOSITION

Chemical Name	CAS-No.	Weight %
RPM Company	1/7	426805 323

Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P	30.0 - 60.0
Diisodecyl phthalate	26761-40-0	15.0 - 40.0
Calcium Carbonate (Limestone)	1317-65-3	10.0 - 30.0
Tackifier	NJ TSRN# 51721300-5272P	5.0 - 10.0
Thickener	NJ TSRN# 51721300-5300P	3.0 - 7.0
Titanium dioxide	13463-67-7	3.0 - 7.0
Petroleum distillates	64742-47-8	1.0 - 5.0
Butyl benzyl phthalate	85-68-7	- <1.0
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	- <1.0
Toluene-2,6-Diisocyanate	91-08-7	- <0.1
2,4-Toluene diisocyanate	584-84-9	- <0.1
o-Cresol	95-48-7	- <0.1

SECTION 4 - FIRST AID MEASURES

Get immediate medical attention for any significant overexposure.

Inhalation	:	Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention.Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel.
Eye contact	:	Flush with water for at least 15 minutes while holding eye lids apart. Get medical attention immediately.
Skin contact	:	Clean area of contact thoroughly using soap and water. If irritation, rash or other disorders develop, get medical attention immediately.
Ingestion	:	Do not induce vomiting unless advised by a physician. Call nearest Poison Control Center or Physician immediately.

SECTION 5 - FIRE FIGHTING MEASURES

Flash point	:	150 ℉, 66 ℃
Method	:	Tag Closed Cup
Lower explosion limit	:	0.60 %(V) Solvent
Upper explosion limit	:	7 %(V) Solvent
Autoignition temperature	:	Not available.
Extinguishing media	:	If water fog is ineffective, use carbon dioxide, dry chemical or foam.
Hazardous combustion products	:	Carbon monoxide and carbon dioxide can form.Hydrocyanic acid and nitrogen oxides can form.
Protective equipment for firefighters	:	Use accepted fire fighting techniques. Wear full firefighting protective clothing, including self-contained breathing apparatus (SCBA).

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Use appropriate protective equipment. Avoid contact with material. Scrape up and transfer to appropriate container for disposal.

SECTION 7 - HANDLING AND STORAGE

Prevent inhalation of vapor, ingestion and contact with skin, eyes and clothing. Preferably use entire contents in

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one continuous work session. Do not smoke, weld, generate sparks, or use flame near container. Change soiled work clothes frequently. Clean hands thoroughly after handling Do not store or use near food. Keep container closed when not in use. Since emptied containers retain product residue and vapor, observe precautions even after container is emptied. Store under dry warehouse conditions away from heat and all ignition sources.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal protection equipment

Respiratory protection	:	Wear appropriate, properly fitted NIOSH/MSHA approved organic vapor or supplied air respirator when airborne contaminant level(s) are expected to exceed exposure limits indicated on the MSDS. Follow manufacturer's directions for respirator use.
Hand protection	:	Use suitable impervious nitrile or neoprene gloves and protective apparel to reduce exposure.
Eye protection	:	Wear appropriate eye protection.Use safety glasses if eye contact is likely.
Skin and body protection	:	Use disposable or impervious clothing if work clothing contamination is likely. Remove and wash contaminated clothing before reuse.
Protective measures	:	Use professional judgment in the selection, care, and use.
Engineering measures	:	Use general ventilation and/ or local exhaust to reduce the airborne contaminant concentration below the exposure limit listed in the MSDS

Exposure Limits

Chemical Name	CAS Number	Regulation	Limit	Form
Calcium Carbonate (Limestone)	1317-65-3	OSHA PEL:	5 mg/m3	Respirable fraction.
		OSHA PEL:	15 mg/m3	Total dust.
		ACGIH TWA:	3 mg/m3	Respirable particles.
		ACGIH TWA:	10 mg/m3	Inhalable particles.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Titanium dioxide	13463-67-7	ACGIH TWA:	10 mg/m3	
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Petroleum distillates	64742-47-8	ACGIH TWA:	200 mg/m3	Non-aerosolas total hydrocarbon vapor
		ACGIH TWA:	200 mg/m3	Non-aerosolas total hydrocarbon vapor
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	OSHA TWA:	0.1 mg/m3	Respirable.
		OSHA TWA:	0.3 mg/m3	Total dust.
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA PEL:	5 mg/m3	Respirable fraction.
		ACGIH TWA:	0.025 mg/m3	Respirable fraction.
Toluene-2,6-Diisocyanate	91-08-7	ACGIH TWA:	0.005 ppm	
		ACGIH STEL:	0.02 ppm	

Chemical Name	CAS Number	Regulation	Limit	Form
2,4-Toluene diisocyanate	584-84-9	ACGIH TWA: ACGIH STEL:	0.005 ppm 0.02 ppm	
o-Cresol	95-48-7	ACGIH TWA: OSHA PEL:	5 ppm 22 mg/m3	

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Non-sag gunnable paste
Color	:	Limestone
Odor	:	Petroleum Solvent
pH	:	Not available.
Vapour pressure	:	Not available.
Vapor density	:	Heavier than air
Melting point/range	:	Not available.
Freezing point	:	Not available.
Boiling point/range	:	280 ℉, 138 ℃
Water solubility	:	Insoluble
Specific Gravity	:	1.1344
% Volatile Weight	:	6 %

SECTION 10 - REACTIVITY / STABILITY

Substances to avoid	:	Amines.Water or moisture and oxidizing agents.Alcohols.Strong acids.Strong bases.
Stability	:	Material is stable under normal storage, handling, and use.
Hazardous polymerization	:	Will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

Butyl benzyl phthalate, CAS-No.: 85-68-7
Acute oral toxicity (LD-50 oral) 13,500 mg/kg (Rat)

2,4-Toluene diisocyanate, CAS-No.: 584-84-9
Acute oral toxicity (LD-50 oral) 5,800 mg/kg (Rat)
Acute inhalation toxicity (LC-50) 14 mg/l for 4 h (Rat) 10 mg/l for 4 h (Mouse) 13 mg/l for 4 h (Guinea pig) 11 mg/l for 4 h (Rabbit)

o-Cresol, CAS-No.: 95-48-7
Acute oral toxicity (LD-50 oral) 940 mg/kg (Rabbit) 1,800 mg/kg (Rabbit) 121 mg/kg (Rat) 344 mg/kg (Mouse) 1,350 mg/kg (Rat)
Acute inhalation toxicity (LC-50) 0.179 mg/l for 2 h (Mouse)
Acute dermal toxicity (LD-50 dermal) 620 mg/kg (Rat) 890 mg/kg (Rabbit) 620 mg/kg (Mouse)

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SECTION 12 - ECOLOGICAL INFORMATION

No Data Available

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal Method : Waste not regulated under RCRA. Dispose of in compliance with state and local regulations.

SECTION 14 - TRANSPORTATION / SHIPPING DATA

TDG / DOT Shipping Description:

NOT REGULATED

SECTION 15 - REGULATORY INFORMATION

North American Inventories:

All components are listed or exempt from the TSCA inventory.
This product or its components are listed on, or exempt from the Canadian Domestic Substances List.

U.S. Federal Regulations:

SARA 313 Components : None present or none present in regulated quantities.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard
Fire Hazard

OSHA Hazardous Components :

Diisodecyl phthalate	26761-40-0
Calcium Carbonate (Limestone)	1317-65-3
Titanium dioxide	13463-67-7
Petroleum distillates	64742-47-8
Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
Toluene-2,6-Diisocyanate	91-08-7
2,4-Toluene diisocyanate	584-84-9
o-Cresol	95-48-7

OSHA Status: Considered hazardous based on the following criteria: : Irritant
Sensitizer
Carcinogen

OSHA Flammability : IIIA

Regulatory VOC (less water and exempt solvent) : 79 g/l

VOC Method 310 : 2 %

Chemical is listed as an IARC, NTP, OSHA, or ACGIH Carcinogen:

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Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

U.S. State Regulations:

MASS RTK Components :	Calcium Carbonate (Limestone)	1317-65-3
	Titanium dioxide	13463-67-7
	Petroleum distillates	64742-47-8
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
	Toluene-2,6-Diisocyanate	91-08-7
	2,4-Toluene diisocyanate	584-84-9
	p-Cresol	95-48-7
Penn RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Diisodecyl phthalate	26761-40-0
	Calcium Carbonate (Limestone)	1317-65-3
	Tackifier	NJ TSRN# 51721300-5272P
	Thickener	NJ TSRN# 51721300-5300P
	Titanium dioxide	13463-67-7
	Petroleum distillates	64742-47-8
	2,4-Toluene diisocyanate	584-84-9
NJ RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Diisodecyl phthalate	26761-40-0
	Calcium Carbonate (Limestone)	1317-65-3
	Tackifier	NJ TSRN# 51721300-5272P
	Thickener	NJ TSRN# 51721300-5300P
	Titanium dioxide	13463-67-7
	Petroleum distillates	64742-47-8
	Butyl benzyl phthalate	85-68-7
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

WARNING! Contains chemicals known to the State of California to cause cancer, birth defects and/or other reproductive harm:

26761-40-0	Diisodecyl phthalate
85-68-7	Butyl benzyl phthalate
14808-60-7	Crystalline Silica (Quartz)/ Silica Sand
1333-86-4	Carbon Black
91-08-7	Toluene-2,6-Diisocyanate
584-84-9	2,4-Toluene diisocyanate
100-41-4	Ethylbenzene
108-88-3	Toluene

SECTION 16 - OTHER INFORMATION

HMIS Rating :

Health	2
Flammability	2
Reactivity	0
PPE	

0 = Minimum
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

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Further information:

For Industrial Use Only. Keep out of Reach of Children. The hazard information herein is offered solely for the consideration of the user, subject to their own investigation of compliance with applicable regulations, including the safe use of the product under every foreseeable condition.

Prepared by: Rich Mikol

Legend

ACGIH - American Conference of Governmental Hygienists
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DOT - Department of Transportation
DSL - Domestic Substance List
EPA - Environmental Protection Agency
HMIS - Hazardous Materials Information System
IARC - International Agency for Research on Cancer
MSHA - Mine Safety Health Administration
NDSL - Non-Domestic Substance List
NIOSH - National Institute for Occupational Safety and Health
NTP - National Toxicology Program
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
RTK - Right To Know
SARA - Superfund Amendments and Reauthorization Act
STEL - Short Term Exposure Limit
TLV - Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average
V - Volume
VOC - Volatile Organic Compound
WHMIS - Workplace Hazardous Materials Information System

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11.3 VULKEM 45

Material Safety Data Sheet

TREMCO

VULKEM 45 GRAY

Version *1.3*
REVISION DATE: 07/31/2007

Print Date 08/01/2007

SECTION 1 - PRODUCT IDENTIFICATION

Trade name	:	VULKEM 45 GRAY
Product code	:	145712 333
COMPANY	:	Tremco Incorporated 3735 Green Road Cleveland, OH 44122
Telephone	:	(216) 292-5000 8:30 - 5:00 EST
Emergency Phone:	:	(216) 765-6727 8:30 - 5:00 EST After Hours: Chemtrec 1-800-424-9300
Product use	:	Coating

SECTION 2 - HAZARDS IDENTIFICATION

Emergency Overview

Gray. Liquid. May cause drowsiness, weakness, and fatigue. Vapor and/or mist may irritate nose and throat. May cause moderate irritation to the respiratory system. May cause allergic respiratory sensitization. Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel. Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention.

Acute Potential Health Effects/ Routes of Entry

Inhalation	:	May cause drowsiness, weakness, and fatigue. Vapor and/or mist may irritate nose and throat. May cause moderate irritation to the respiratory system. May cause allergic respiratory sensitization.
Eyes	:	Vapor and/or mist may cause eye irritation.
Ingestion	:	May cause irritation to the mouth, throat and stomach. May cause gastrointestinal irritation, nausea, and vomiting.
Skin	:	May cause sensitization resulting in irritation, itching and redness.

Aggravated Medical Conditions

Pre-existing eye, skin, liver, kidney, and respiratory disorders may be aggravated by exposure.

Chronic Health Effects

Overexposure may cause dermatitis, asthma, skin and respiratory sensitization and decreased lung function. Repeated overexposure to vapors and/or material may injure the liver, kidneys and respiratory system unless suitable engineering controls and/or personal protective equipment are used. Prolonged or repeated contact/exposure to aromatic petroleum distillates may cause defatting, drying, and irritation of the skin, dermatitis, and central nervous system (CNS) effects. Inhalation of crystalline silica (quartz) can cause cancer based on animal data, and IARC concludes sufficient evidence in humans (Group 1). Prolonged and repeated overexposure to free crystalline silica dust above the TLV level may cause scarring of the lungs with cough and shortness of breath. A delayed lung injury, silicosis may result from breathing free silica. A long-term NTP study showed that oral exposure to toluene diisocyanate (TDI) caused cancer in rats and mice. A lifetime inhalation study sponsored by the International Isocyanate Institute did not show carcinogenic activity in rats. May cause allergic skin and respiratory sensitization. Fillers are encapsulated and not expected to be released from product under normal conditions of use.

Target Organs: Eye, Lung, Liver, Kidney, Skin, Nerve

RPM Company 1/7 145712 333

SECTION 3 - PRODUCT COMPOSITION

Chemical Name	CAS-No.	Weight %
Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P	40.0 - 70.0
Calcium Carbonate (Limestone)	1317-65-3	15.0 - 40.0
Clay	1332-58-7	15.0 - 40.0
Tackifier	NJ TSRN# 51721300-5272P	10.0 - 30.0
Aromatic petroleum distillates	64742-95-6	3.0 - 7.0
Titanium dioxide	13463-67-7	3.0 - 7.0
Trimethyl benzene (mixed isomers)	25551-13-7	1.0 - 5.0
Butyl benzyl phthalate	85-68-7	- <1.0
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	- <1.0
2,4-Toluene diisocyanate	584-84-9	- <1.0
Toluene-2,6-Diisocyanate	91-08-7	- <0.1

SECTION 4 - FIRST AID MEASURES

Get immediate medical attention for any significant overexposure.

Inhalation	:	Move to fresh air. If required, artificial respiration or administration of oxygen can be performed by trained personnel.Leave area to breathe fresh air. Avoid further overexposure. If symptoms persist, get medical attention.
Eye contact	:	Flush with water for at least 15 minutes while holding eye lids apart. Get medical attention immediately.
Skin contact	:	Wash area of contact thoroughly with hand cleaner followed by soap and water. If irritation, rash or other disorders develop, get medical attention immediately.
Ingestion	:	Do not induce vomiting unless advised by a physician. Call nearest Poison Control Center or Physician immediately.

SECTION 5 - FIRE FIGHTING MEASURES

Flash point	:	155 °F, 68 °C
Method	:	Setaflash Closed Cup
Lower explosion limit	:	Not available.
Upper explosion limit	:	Not available.
Autoignition temperature	:	Not available.
Extinguishing media	:	If water fog is ineffective, use carbon dioxide, dry chemical or foam.
Hazardous combustion products	:	Carbon monoxide and carbon dioxide can form.Smoke, fumes.Hydrocyanic acid and nitrogen oxides can form.
Protective equipment for firefighters	:	Use accepted fire fighting techniques. Wear full firefighting protective clothing, including self-contained breathing apparatus (SCBA).
Fire and explosion conditions	:	Product may ignite if heated in excess of its flash point.Closed container, may burst when exposed to extreme heat.Empty containers may contain ignitable vapors.Vapors may travel to sources of ignition and flashback.

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SECTION 6 - ACCIDENTAL RELEASE MEASURES

Use appropriate protective equipment. Avoid contact with material. Remove sources of ignition immediately. Stop flow of material if safe to do so. Contain spill and keep out of water courses. Ventilate area.

SECTION 7 - HANDLING AND STORAGE

Prevent inhalation of vapor, ingestion, and contact with skin eyes and clothing. Keep container closed when not in use. Precautions also apply to emptied containers. Change soiled work clothes frequently. Clean hands thoroughly after handling. Do not smoke, weld, generate sparks, or use flame near container. To prevent generation of static discharges, use bonding/grounding connection when pouring liquid. Extinguish all ignition sources including pilot lights, non-explosion proof motors and electrical equipment until vapors dissipate. Store under dry warehouse conditions away from heat and all ignition sources.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal protection equipment

Respiratory protection	:	Wear appropriate, properly fitted NIOSH/MSHA approved respirator when airborne contaminant level(s) are expected to exceed exposure limits indicated on the MSDS. Select positive pressure supplied air respirator (TC19C or equivalent) for isocyanates.
Hand protection	:	Use suitable impervious nitrile or neoprene gloves and protective apparel to reduce exposure.
Eye protection	:	Wear appropriate eye protection.Wear chemical safety goggles and/or face shield to prevent eye contact. Do not wear contact lenses. Do not touch eyes with contaminated body parts or materials. Have eye washing facilities readily available.
Skin and body protection	:	Prevent contact with shoes and clothing.
Protective measures	:	Use professional judgment in the selection, care, and use.
Engineering measures	:	Use only in well ventilated areas. Provide maximum ventilation in enclosed areas.Use local exhaust when the general ventilation is inadequate.

Exposure Limits

Chemical Name	CAS Number	Regulation	Limit	Form
Calcium Carbonate (Limestone)	1317-65-3	OSHA PEL:	5 mg/m3	Respirable fraction.
		OSHA PEL:	15 mg/m3	Total dust.
		ACGIH TWA:	3 mg/m3	Respirable particles.
		ACGIH TWA:	10 mg/m3	Inhalable particles.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Clay	1332-58-7	ACGIH TWA:	2 mg/m3	Respirable fraction.
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA PEL:	5 mg/m3	Respirable fraction.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.

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Chemical Name	CAS Number	Regulation	Limit	Form
Titanium dioxide	13463-67-7	ACGIH TWA:	10 mg/m3	
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA TWA:	15 mg/m3	Total dust.
		OSHA TWA:	5 mg/m3	Respirable fraction.
Trimethyl benzene (mixed isomers)	25551-13-7	ACGIH TWA:	25 ppm	
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7	OSHA TWA:	0.1 mg/m3	Respirable.
		OSHA TWA:	0.3 mg/m3	Total dust.
		OSHA PEL:	15 mg/m3	Total dust.
		OSHA PEL:	5 mg/m3	Respirable fraction.
		ACGIH TWA:	0.025 mg/m3	Respirable fraction.
2,4-Toluene diisocyanate	584-84-9	ACGIH TWA:	0.005 ppm	
		ACGIH STEL:	0.02 ppm	
Toluene-2,6-Diisocyanate	91-08-7	ACGIH TWA:	0.005 ppm	
		ACGIH STEL:	0.02 ppm	

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Form	: Liquid
Color	: Gray
Odor	: Aromatic
pH	: Not available.
Vapour pressure	: Not available.
Vapor density	: Heavier than air
Melting point/range	: Not available.
Freezing point	: Not available.
Boiling point/range	: 250 °F, 121 °C
Water solubility	: Negligible
Specific Gravity	: 1.32
% Volatile Weight	: 6 %

SECTION 10 - REACTIVITY / STABILITY

Substances to avoid	: Strong acids.Strong bases.Amines.Water or moisture.Alcohols.
Stability	: Material is stable under normal storage, handling, and use.
Hazardous polymerization	: Will not occur under normal conditions.

SECTION 11 - TOXICOLOGICAL INFORMATION

Trimethyl benzene (mixed isomers), CAS-No.: 25551-13-7
Acute oral toxicity (LD-50 oral) 8,970 mg/kg (Rat)

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Butyl benzyl phthalate, CAS-No.: 85-68-7
Acute oral toxicity (LD-50 oral) 13,500 mg/kg (Rat)

2,4-Toluene diisocyanate, CAS-No.: 584-84-9
Acute oral toxicity (LD-50 oral) 5,800 mg/kg (Rat)
Acute inhalation toxicity (LC-50) 14 mg/l for 4 h (Rat) 10 mg/l for 4 h (Mouse) 13 mg/l for 4 h (Guinea pig) 11 mg/l for 4 h (Rabbit)

SECTION 12 - ECOLOGICAL INFORMATION

No Data Available

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal Method : Subject to hazardous waste treatment, storage, and disposal requirements under RCRA. Recycle or incinerate waste at EPA approved facility or dispose of in compliance with federal, state and local regulations.

SECTION 14 - TRANSPORTATION / SHIPPING DATA

TDG / DOT Shipping Description:

NOT REGULATED

SECTION 15 - REGULATORY INFORMATION

North American Inventories:

All components are listed or exempt from the TSCA inventory.
This product or its components are listed on, or exempt from the Canadian Domestic Substances List.

U.S. Federal Regulations:

SARA 313 Components : 2,4-Toluene diisocyanate 584-84-9

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard
Fire Hazard

OSHA Hazardous Components :

Calcium Carbonate (Limestone)	1317-65-3
Clay	1332-58-7
Titanium dioxide	13463-67-7
Trimethyl benzene (mixed isomers)	25551-13-7
Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
2,4-Toluene diisocyanate	584-84-9
Toluene-2,6-Diisocyanate	91-08-7

OSHA Status: Considered hazardous based on the : Irritant
Sensitizer

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following criteria: Carcinogen

OSHA Flammability : IIIA

Regulatory VOC (less water and exempt solvent) : 83 g/l

VOC Method 310 : 6 %

Chemical is listed as an IARC, NTP, OSHA, or ACGIH Carcinogen:

Butyl benzyl phthalate	85-68-7
Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

U.S. State Regulations:

MASS RTK Components :	Calcium Carbonate (Limestone)	1317-65-3
	Clay	1332-58-7
	Titanium dioxide	13463-67-7
	Trimethyl benzene (mixed isomers)	25551-13-7
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7
	2,4-Toluene diisocyanate	584-84-9
	Toluene-2,6-Diisocyanate	91-08-7
Penn RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Calcium Carbonate (Limestone)	1317-65-3
	Clay	1332-58-7
	Tackifier	NJ TSRN# 51721300-5272P
	Aromatic petroleum distillates	64742-95-6
	Titanium dioxide	13463-67-7
	Trimethyl benzene (mixed isomers)	25551-13-7
	2,4-Toluene diisocyanate	584-84-9
NJ RTK Components :	Aromatic Polyisocyanate Resin	NJ TSRN# 51721300-5270P
	Calcium Carbonate (Limestone)	1317-65-3
	Clay	1332-58-7
	Tackifier	NJ TSRN# 51721300-5272P
	Aromatic petroleum distillates	64742-95-6
	Titanium dioxide	13463-67-7
	Trimethyl benzene (mixed isomers)	25551-13-7
	Butyl benzyl phthalate	85-68-7
	Crystalline Silica (Quartz)/ Silica Sand	14808-60-7

WARNING! Contains chemicals known to the State of California to cause cancer, birth defects and/or other reproductive harm:

85-68-7	Butyl benzyl phthalate
14808-60-7	Crystalline Silica (Quartz)/ Silica Sand
584-84-9	2,4-Toluene diisocyanate
1333-86-4	Carbon Black
91-08-7	Toluene-2,6-Diisocyanate
100-41-4	Ethylbenzene
91-20-3	Naphthalene

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SECTION 16 - OTHER INFORMATION

HMIS Rating :

Health	3
Flammability	2
Reactivity	1
PPE	

0 – Minimum
1 – Slight
2 – Moderate
3 – Serious
4 – Severe

Further Information:

For Industrial Use Only. Keep out of Reach of Children. The hazard information herein is offered solely for the consideration of the user, subject to their own investigation of compliance with applicable regulations, including the safe use of the product under every foreseeable condition.

Prepared by: Rich Mikol

Legend

ACGIH - American Conference of Governmental Hygienists
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DOT - Department of Transportation
DSL - Domestic Substance List
EPA - Environmental Protection Agency
HMIS - Hazardous Materials Information System
IARC - International Agency for Research on Cancer
MSHA - Mine Safety Health Administration
NDSL - Non-Domestic Substance List
NIOSH - National Institute for Occupational Safety and Health
NTP - National Toxicology Program
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
RTK - Right To Know
SARA - Superfund Amendments and Reauthorization Act
STEL - Short Term Exposure Limit
TLV - Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average
V - Volume
VOC - Volatile Organic Compound
WHMIS - Workplace Hazardous Materials Information System

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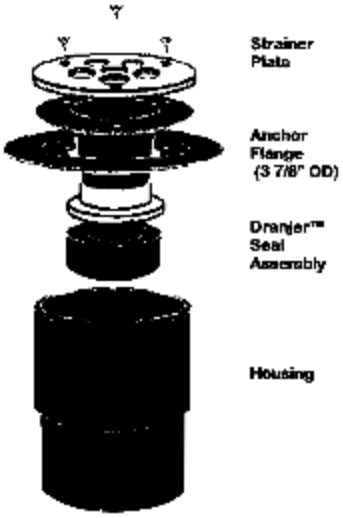
11.4 DRANJER

"F-SERIES" DRANJER™

NEW INSTALLATION MODEL
F-N2



INSTALLATION INSTRUCTIONS

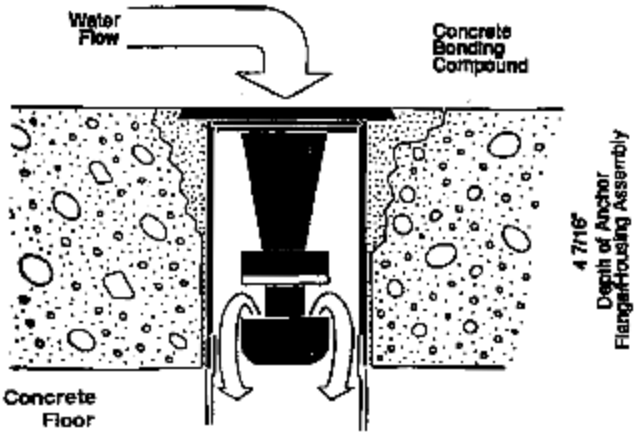
1. Using PVC Solvent cement, bond housing to anchor flange and to any downstream plumbing.

2. For new floors, pour the concrete around the anchor flange/housing assembly to a level equal to the top of the anchor flange. The reverse bevel on the anchor flange will prevent the assembly from lifting out of the concrete after it is set. (For existing floors, drill or chip away a 3" diameter hole. Set the anchor flange housing assembly into the hole and backfill the space remaining with suitable concrete bonding compound.)

3. Install the Dranjer™ seal assembly into the anchor flange. For an enhanced seal, a light coating of petroleum jelly or other light grease on the anchor flange seat can be applied.

4. Line up the holes on the Dranjer™ seal assembly with the holes in the anchor flange. Similarly, install the strainer plate with holes aligned. Next, install the brass screws and snug them down, but take care not to over-tighten them.

Your Dranjer™ unit is now in place and functional.



MAINTENANCE

If the floor drain is used as a drain on a regular basis, rather than as a safety drain only, then periodic cleaning of the seal assembly is advised. Simply remove the retaining screws and rinse with clean water.

Dranjer™ Corporation

Protecting your Family's Health

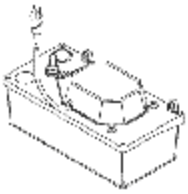
Printed in Canada

11.5 CONDENSATE PUMP BY WAYNE

WAYNE

Condensate Unit

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.



Operating Instructions **WCP85**

Description

A condensate unit removes condensation from air conditioning and high efficiency furnaces. The compact design of the unit consists of a 3/8" ID discharge and 6 ft. long power cord. The unit also contains a safety switch to automatically shut off pump in the event of a failure.

Unpacking

Inspect this unit before it is installed. Occasionally, products are damaged during shipment. If the pump or components are damaged, return the unit to the place of purchase for replacement. Failure to do so could result in serious injury or death.

NOTICE ***This pump is not designed to handle salt water, brine, laundry discharge, or any other application which may contain caustic chemicals and/or foreign materials. Pump damage could occur if used in these applications and will void warranty. Use for clear water application only.***

Safety Guidelines

This manual contains information that is very important to know and understand. This information is provided for SAFETY and to PREVENT EQUIPMENT PROBLEMS. To help recognize this information, observe the following symbols.

DANGER ***Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.***

WARNING ***Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.***

CAUTION ***Caution indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.***

NOTICE ***Notice indicates indicates important information, that if not followed, may cause damage to equipment.***

General Safety Information

1. Know the pump application, limitations, and potential hazards.

WARNING ***Do not use to pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. Do not use in flammable and/or explosive atmospheres. Use pump only with liquids compatible with pump component materials. Failure to follow this warning can result in personal injury and/or property damage.***

2. Make certain that the power supply conforms to the requirements of the unit.

DANGER ***Disconnect power before servicing. If the power disconnect is out of sight, lock in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electrical shock!***

3. Release all pressure within the system before servicing any component.
4. Drain all liquids from the system before servicing.
5. Secure the discharge line before starting the pump. An unsecured discharge line will whip, possibly causing personal injury and/or property damage.
6. Check hoses for weak and worn condition before each use, making certain that all connections are secure.
7. Periodically inspect the pump and system components. Perform routine maintenance as required (See Maintenance Section).
8. Provide a means of pressure relief for pumps whose discharge line can be shut-off or obstructed.
9. Personal Safety:
   a. Wear safety glasses at all times when working with pumps.
   b. Keep work area clean, uncluttered and properly lighted;

Specifications

Power supply requirements	120V, 60 Hz, 1 phase
Motor duty	Intermittent
Liquid temperature range	40°F to 125°F
Max. operating position	45° from vertical
Dimensions	10" X 5" X 4-3/4"
Discharge	3/8" ID
Power cord	6' 3 conductor with ground
Reservoir	2 quart plastic

REMINDER: Keep your dated proof of purchase for warranty purposes! Attach it to this manual or file it for safekeeping.

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370100-001 4/05

General Safety Information (Continued)

replace all unused tools and equipment.

c. Keep visitors a safe distance from the work area. Make workshop child-proof with padlocks, master switches, and by removing starter keys.

10. When wiring an electrically driven pump such as this, follow all electrical and safety codes, as well as the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

⚠WARNING ***Risk of electric shock! Never connect the green (or green and yellow) wire to a live terminal!***

11. This equipment is only for use on 120 volt (single-phase) and is equipped with an approved 3-conductor cord and 3-prong, grounding-type plug as shown in Figure 2.

To reduce the risk of electric shock, the motor must be securely and adequately grounded. This can be accomplished by inserting plug directly into a properly installed and grounded 3-prong, grounding-type receptacle (as shown in Figure 2).

⚠WARNING ***Risk of electrical shock! This pump is supplied with a grounding conductor and grounding type attachment plug. Use a grounded receptacle to reduce the risk of fatal electric shock.***

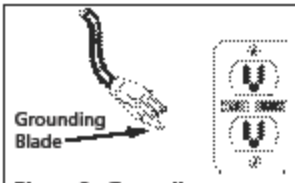

Figure 2 - Grounding

Never cut off the round grounding prong. Cutting the cord or prong will void the warranty and make the pump inoperable.

Where a 2-prong wall receptacle is encountered, it must be replaced with a properly grounded 3-prong receptacle installed in accordance with the NEC and local codes and ordinances.

12. All wiring should be performed by a qualified electrician.
13. It is strongly recommended that this unit is plugged into a Ground Fault Circuit Interrupter (GFCI). Consult a local electrician for installation and availability.
14. Protect electrical cord from sharp objects, hot surfaces, oil, and chemicals. Avoid kinking the cord. Replace or repair damaged or worn cords immediately. Use wire of adequate size to minimize voltage drop at the motor.
15. Do not handle a pump or pump motor with wet hands or when standing on a wet or damp surface, or in water.

16. **Do not use an extension cord.**

⚠DANGER ***Do not walk on wet area until all power has been turned off. If the shut-off box is in basement, call the electric company to shut-off service to the house, or call the local fire department for instructions. Remove pump and repair or replace. Failure to follow this warning can result in fatal electrical shock.***

Installation

NOTICE ***In any installation where property damage and/or personal injury might result from an inoperative or leaking pump due to power outages, discharge line blockage or any other reason, use a backup system(s).***

STEP 1: INSTALLATION OF PIPE

A. Insert the discharge pipe or pipe nipple into the 3/8" ID plastic tube.

⚠CAUTION ***Before removing pump from its mounting position for service, always disconnect electrical power to pump and control switch. For any work on pump or switch, ALWAYS unplug the power cord. Do not just turn off circuit breaker or unscrew fuse.***

STEP 2: MOUNTING CONDENSATE UNIT

A. Position the pump below the evaporator drain and/or furnace drain.

B. The pump can be installed to the wall or side of the appliance using the two mounting brackets. Refer to Figure 3.

STEP 3: INSTALLATION OF CONDENSATE DRAIN LINES

A. To prevent pipe blockage in the reservoir, modify the end of pipe or tubing as illustrated in Figure 4.

B. Plumb flexible tube or pipe from the condensate drain, and from the

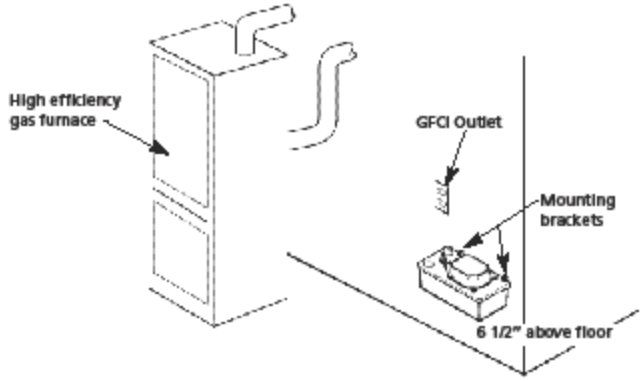

Figure 3 - Mounting location

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Installation
(Continued)

furnace drain (if applicable), to the inlet holes on the pump. Refer to Figure 5.

STEP 4: INSTALLATION OF DISCHARGE LINE

NOTE: Use 3/8" I.D. (max.) flexible tubing.. A hose clamp is recommended (not provided).

A. Extend discharge pipe from barbed check valve to the highest point possible. Refer to Figure 6.

B. From this point, direct the discharge line to the location of the drainage source. Maintain a continuous downward slope.

NOTE: Construct an inverted "U" (see Figure 6) at the highest point of discharge line if a continuous downward slope is not possible. Exercise care not to kink or "pinch off" the flow of condensate liquid.

STEP 5: INSTALLATION OF SAFETY SWITCH (IF APPLICABLE)

NOTICE ***Connect power cord to a constant voltage source. Do not connect to a fan or other device that may run intermittently.***

A. The pump can be wired directly to the appliance thermostat to shut the pump and appliance down in the event of pump failure. Refer to Figure 7 for typical wiring diagram.

NOTE: The alarm can be wired in the safety switch at the normally open ("NO") contact.

TIPS FOR EASY INSTALLATION

1. After reading instructions, check to make sure installation does not exceed a maximum of 15 feet of vertical lift.
2. Make sure pump is level. No part of the pump base should be more than 1/8" off of level plane.
3. Use soapy water on unit when performing cleaning maintenance. (Refer to Maintenance guidelines.)
4. For optimum performance, drain and discharge lines should have a continuous downward slope. Test operation of pump to make sure lines have enough downward slope

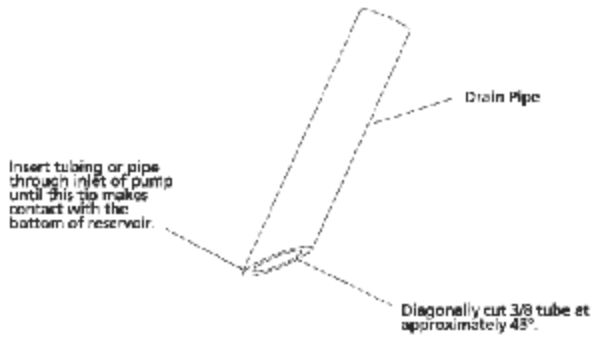

Figure 4 - Modification of pipe end to prevent blockage

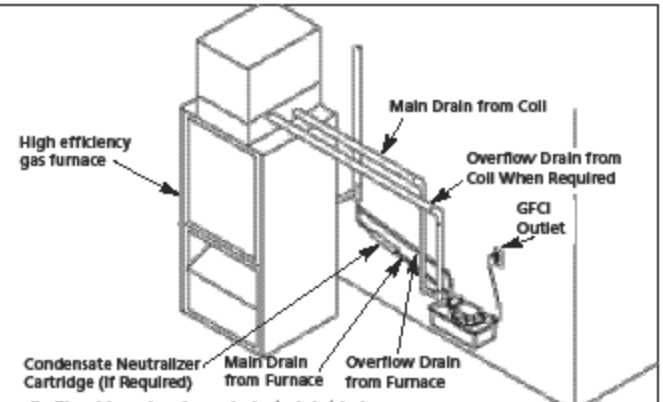

Figure 5 - Plumbing pipe from drain to inlet holes on pump

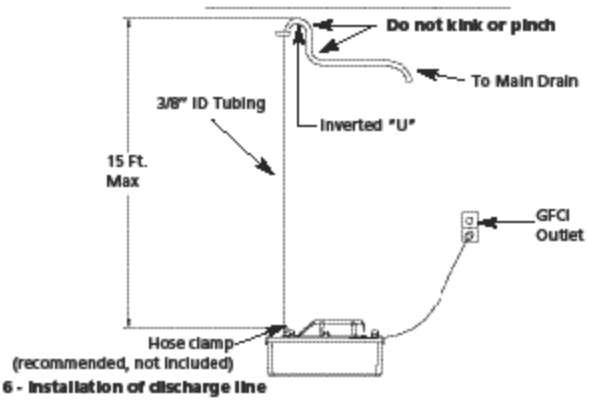

Figure 6 - Installation of discharge line

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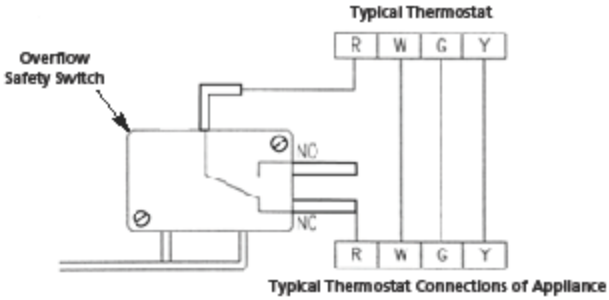
for efficient operation.

5. Avoid overtightening of check valve after cleaning. (Refer to Maintenance gudelines.)
6. Use constant voltage power source. Do not plug into a device that runs intermittently.
7. Locate model number and date code on pump and take note of them.
8. To assure proper performance, the highest point of discharge line should be higher than 5' off the floor.
9. Clean any debris in the pump reservoir if necessary.
10. Do not handle the pump until you have disconnected it from the power source. Follow all guidelines for electrical safety discussed in General Safety.
11. Do not use a pump discharge pipe smaller than the pump discharge size.
12. After installation, test pump to make sure that system is working properly.
13. Make sure that installation conforms to all local and national codes.
14. Local codes may require the use of a condensate neutralizer when using this pump.



NOTE: The alarm can be wired into the safety switch at the normally open ("NO") contact.

Figure 7 - Typical wiring diagram for pumps provided with safety switch

Maintenance

WARNING ***Make certain that the pump is unplugged before attempting to service or remove any component. This pump is assembled in the factory using special equipment; therefore only authorized service dealers or qualified electricians should attempt to repair this unit. Improper repair can cause an electrical shock hazard.***

CLEANING RESERVOIR AND IMPELLER

1. Unscrew two screws through mounting brackets, and remove pump from wall, if mounted.
2. Remove reservoir from deck by unscrewing the four screws located at the corners of the reservoir cover.
3. Remove the impeller cover by unscrewing the five screws on the underside of the motor. Pull out the impeller shaft assembly.
4. Use a damp cloth to wipe off the gasket and the motor assembly.
5. Reassemble impeller to motor. Then reassemble reservoir to reservoir cover.

CLEANING CHECK VALVE

1. Disconnect discharge line from check valve (see Figure 8).
2. Remove check valve with 9/16" wrench.
3. Visually check for obstructions or damage.
4. If check valve is not damaged, replace valve by hand-tightening. Then tighten 1/2" turn with 9/16" wrench.

NOTICE ***Do not overtighten. Damage to O-ring seal may occur.***

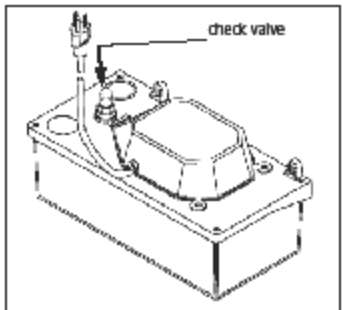


Figure 8 - Check valve

Troubleshooting Chart

⚠CAUTION ***Pump may start unexpectedly. Disconnect power supply before servicing.***

Symptom	Possible Cause(s)	Corrective Action
Pump fails to run	1. Pump not plugged in 2. Low voltage, blown fuse, open circuit 3. Reservoir is absent of condensate 4. Drain/discharge lines blocked	1. Plug in. 2. Have a certified electrician check fuse circuit. 3. Make sure that there is adequate condensate level in reservoir. Check drain lines and/or discharge line for obstructions. 4. Check drain lines and/or discharge line for obstructions.
Pump emits loud noises when operating	Foreign material in reservoir	Refer to Maintenance section for cleaning instructions.
Pump operates but there is no flow of liquid	1. Float is sticking 2. Discharge height greater than 15 feet 3. Obstruction in discharge tube 4. Blockage in check valve 5. Damaged check valve	1. Refer to Maintenance section for cleaning instructions. 2. Measure from bottom of pump to highest point. Rework discharge if height is greater than 15'. Refer to Installation Step 4 for instructions. 3. Check discharge line for blockage. Remove debris. 4. Refer to Maintenance section for cleaning instructions. 5. Contact Wayne.
Liquid drains back into pump from discharge line	1. Damaged check valve 2. Blockage in check valve 3. Discharge line is 5' or less	1. Contact Wayne. 2. Refer to Maintenance section for cleaning instructions. 3. Condensate liquid may drain out of line into reservoir due to discharge height. This is normal. No action is necessary.
Liquid leaks from around check valve	1. Check valve fastened too tight or too loose 2. Damage to O-ring	1. Check valve should be hand-tightened, then tightened an additional 1/2 turn with a 9/16" wrench. 2. Replace with a 1/2" ID x 11/16" OD x 3/32" thick O-ring or contact Wayne Technical Service at 1-800-237-0987.

⚠WARNING ***Before servicing a pump, always shut off the main power breaker and then unplug the pump. Make sure you are not standing in water. Make sure you are wearing insulated, protective-soled shoes. Under flooded conditions, check your local electric company or a qualified licensed electrician for disconnecting electrical service prior to pump removal. If the above checklist does not solve the problem, contact Wayne Technical Service at 1-800-237-0987.***

P.O. Box 688, 32 Lambert Rd East, Blairstown, NJ 07825 Phone 908-362-5616 Fax 908-362-5433

Limited Warranty

For one year from the date of purchase, Wayne ("Wayne") will repair or replace, at its option, for the original purchaser any part or parts of its Condensate Pump ("Product") found upon examination by Wayne to be defective in materials or workmanship. Please call Wayne (800-237-0987) for instructions or see your dealer. Be prepared to provide the model and serial number when exercising this warranty. All transportation charges on Products or parts submitted for repair or replacement must be paid by purchaser.

This Limited Warranty does not cover Products which have been damaged as a result of accident, abuse, misuse, neglect, improper installation, improper maintenance, or failure to operate in accordance with Wayne's written instructions.

THERE IS NO OTHER EXPRESS WARRANTY. IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO ONE YEAR FROM THE DATE OF PURCHASE. THIS IS THE EXCLUSIVE REMEDY AND ANY LIABILITY FOR ANY AND ALL INDIRECT OR CONSEQUENTIAL DAMAGES OR EXPENSES WHATSOEVER IS EXCLUDED.

Some states do not allow limitations on how long an implied warranty lasts, or do not allow the exclusions or limitations of incidental or consequential damages, so the above limitations might not apply to you. This limited warranty gives you specific legal rights, and you may also have other legal rights which vary from state to state.

In no event, whether as a result of breach of contract warranty, tort (including negligence) or otherwise, shall Wayne or its suppliers be liable for any special, consequential, incidental or penal damages including, but not limited to loss of profit or revenues, loss of use of the products or any associated equipment, damage to associated equipment, cost of capital, cost of substitute products, facilities, services or replacement power, downtime costs, or claims of buyer's customers for such damages.

You **MUST** retain your purchase receipt along with this form. In the event you need to exercise a warranty claim, you **MUST** send a **copy** of the purchase receipt along with the material or correspondence. Please call Wayne (800-237-0987) for return authorization and instructions.

DO NOT MAIL THIS FORM TO WAYNE. Use this form only to maintain your records.

MODEL NO. _____ SERIAL NO. _____ INSTALLATION DATE _____

ATTACH YOUR RECEIPT HERE

P.O. Box 688, 32 Lambert Rd East, Blairstown, NJ 07825 Phone 908-362-5616 Fax 908-362-5433

ATTACHMENT E

DATA RESULTS USED IN THE BASELINE HUMAN HEALTH RISK ASSESSMENT

Attachment E-1. Sample Results for the MIP 1 Surface Soils Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	B-5		G-1		S-1		S-10		S-11		S-12		S-13		S-14	
Sample Name:	B5-1		G-1		S-1		S-10		S-11		S-12		S-13		S-14	
Laboratory I.D.:	B5-1		854452		854153		854458		854459		854460		854461		854462	
Sample Date:	9/22/1986		12/6/1985		11/7/1985		12/6/1985		12/6/1985		12/6/1985		12/6/1985		12/6/1985	
Sample Depth (feet):	0–2		0–0.5		0–0		0–0		0–0		0–0		0–0		0–0	
Source:	WCC, 1987		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)	
Analytes:	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.
1,1,2,2-Tetrachloroethane	0.01	U														
1,1,2-Trichloroethane	0.02	U														
Trichloroethene	0.021		2.48		2.4		0.1		0.43		0.99		0.33		0.1	

REFERENCES:

WCC, 1987 — WCC, 1987. Field Investigation Report-Phase II for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. February 1987.

WCC, 1986 (GFEE, 1985) — WCC, 1986. Field Investigation Report-Phase I for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. June 1986. (Data comes from GFEE, found within FSP of this report.)

NOTES:

B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2-chloroethyl vinyl ether, bromodichloromethane, bromoform, bromomethane, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, chloromethane, cis-1,3-dichloropropene, dibromochloromethane, dichlorodifluoromethane, methylene chloride, tetrachloroethene, trans-1,3-dichloropropene, trichlorofluoromethane, and vinyl chloride.

Attachment E-1. Sample Results for the MIP 1 Surface Soils Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	S-2		S-3		S-4		S-5		S-6		S-7		S-8		S-9		MW-4	
Sample Name:	S-2		S-3		S-4		S-5		S-6		S-7		S-8		S-9		SS-1	
Laboratory I.D.:	854154		854155		854156		854453		854454		854455		854456		854457		SS-1	
Sample Date:	11/7/1985		11/7/1985		11/7/1985		12/6/1985		12/6/1985		12/6/1985		12/6/1985		12/6/1985		4/18/1986	
Sample Depth (feet):	0–0		0–0		0–0		0–0		0–0		0–0		0–0		0–0		0.7–2	
Source:	WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986	
Analytes:	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.	Concentration (mg/kg)	Qual.
1,1,2,2-Tetrachloroethane																	11	
1,1,2-Trichloroethane																	7.5	
Trichloroethene	10.7		4.5		13.1		0.08		0.12		0.91		0.72		0.19		29	

Attachment E-2. Sample Results for the MIP 1 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	B-12		B-13		B-13		B-22		B-22		B-26		B-28		B-30		B-31
Sample Name:	B-12-1		B-13-1		B-13-1 D		B-22-3		B-22-3 Duplicate		B-26-3		B-28-1		B-30-3		B-31-4
Laboratory I.D.:	B-12-1		B-13-1		Duplicate		B-22-3		Duplicate		B-26-3		B-28-1		B-30-3		B-31-4
Sample Date:	9/23/1986		9/23/1986		9/23/1986		9/24/1986		9/24/1986		9/24/1986		9/25/1986		9/25/1986		9/25/1986
Sample Depth (feet):	0.0-5.0		0.0-5.0		0.0-5.0		4.0-8.0		4.0-8.0		8.0-11.0		0.0-7.5		7.0-9.0		9.0-10.0
Source:	WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg
Aluminum																	
Arsenic																	
Barium																	
Beryllium																	
Calcium																	
Chromium																	
Cobalt																	
Copper																	
Iron																	
Lead																	
Magnesium																	
Manganese																	
Nickel																	
Potassium																	
Vanadium																	
Zinc																	
gamma-BHC (Lindane)																	
Bis(2-ethylhexyl)phthalate																	
1,1,1-Trichloroethane	0.002	U	0.0015		0.002	U	0.002	U	0.005	U	0.002	U	0.005	U	0.02	U	0.002
1,1,2,2-Tetrachloroethane	0.002	U	0.002	U	0.002	U	0.002	U	0.005	U	0.002	U	0.005	U	0.02	U	0.002
1,1,2-Trichloroethane	0.004	U	0.004	U	0.004	U	0.004	U	0.01	U	0.004	U	0.01	U	0.04	U	0.004
Acetone																	
1,2-Dichloroethene	0.002	U	0.0071		0.0042		0.002	U	0.005	U	0.002	U	0.005	U	0.02	U	0.002
Carbon tetrachloride	0.002	U	0.002	U	0.002	U	0.002	U	0.005	U	0.002	U	0.005	U	0.02	U	0.002
Chloroform	0.002	U	0.002	U	0.002	U	0.002	U	0.005	U	0.002	U	0.005	U	0.02	U	0.002
Methylene Chloride	0.002	U	0.002	U	0.002	U	0.002	U	0.005	U	0.002	U	0.005	U	0.02	U	0.002
Tetrachloroethene	0.002	U	0.002	U	0.002	U	0.002	U	0.005	U	0.002	U	0.005	U	0.021		0.058
Toluene																	
Trichloroethene	0.0024		0.027		0.014		0.11		0.09		0.19		1.1		4.26		0.49

REFERENCES:

WCC, 1991 — WCC, 1991. Letter to Mr. Christopher Thomas, Environmental Engineer, Enforcement and Title III Section, USEPA Region III. Re: Soil Investigation in the Vicinity of the Former Source Area. Woodward-Clyde Consultants. July 16, 1991.Driscoll, Fletcher G. 1986. Groundwater and Wells, Second Edition. Johnson Screens, St. Paul Minnesota. 1089pp.

WCC, 1987 — WCC, 1987. Field Investigation Report-Phase II for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. February 1987.

WCC, 1986 — WCC, 1986. Field Investigation Report-Phase I for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. June 1986.

WCC, 1986 (GFEE, 1985) — WCC, 1986. Field Investigation Report-Phase I for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. June 1986. (Data comes from GFEE, found within FSP of this report.)

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,4-dioxane, 2-butanone (MEK), 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2-butanone (MEK), 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, benzo(a)pyrene, 3-nitroaniline, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-methyl-2-pentanone (MIBK), 4-methylphenol, 4-nitroaniline, 4-nitrophenol, Acenaphthene, Acenaphthylene, acrolein, acrylonitrile, Aldrin, alpha-BHC, alpha-Chlordane, anthracene, antimony, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, benzene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, beta-BHC, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bromodichloromethane, bromoform, bromomethane, butyl benzyl phthalate, cadmium, carbazole, carbon disulfide, chlordane, chlorobenzene, chloroethane, chloromethane, chrysene, cis-1,2-dichloroethene, cis-1,3-dichloropropene, cyanide, delta-BHC, dibenz[a,h]anthracene, dibenzofuran, dibromochloromethane, dichlorofluoromethane, dieldrin, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin, ketone, ethylbenzene, fluoranthene, fluorene, gama-chlordane, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, indeno[1,2,3-cd]pyrene, isophorone, isopropylbenzene, mercury, methoxychlor, naphthalene, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, pentachlorophenol, phenanthrene, phenol, p-isoproyltoluene, pyrene, selenium, silver, sodium, styrene, thallium, toxaphene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, trichlorofluoromethane, vinyl acetate, and vinyl chloride.

Attachment E-2. Sample Results for the MIP 1 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:		B-32		B-33		B-34		B-5		B-5		B-6		B-6		B-6	
Sample Name:		B-32-3		B-33-3		B-34-2		B5-1		B5-4		B6-1		B6-1 D		B6-5	
Laboratory I.D.:		B-32-3		B-33-3		B-34-2		B5-1		B5-4		B-6-1		Duplicate		B-6-5	
Sample Date:		9/25/1986		9/26/1986		9/26/1986		9/22/1986		9/22/1986		9/22/1986		9/22/1986		9/22/1986	
Sample Depth (feet):		7.0-9.5		7.0-9.5		5.0-5.6		0.0-2.0		12.5-14.5		0.0-5.0		0.0-5.0		12.0-14.0	
Source:		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987		WCC, 1987	
Analytes:	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum																	
Arsenic																	
Barium																	
Beryllium																	
Calcium																	
Chromium																	
Cobalt																	
Copper																	
Iron																	
Lead																	
Magnesium																	
Manganese																	
Nickel																	
Potassium																	
Vanadium																	
Zinc																	
gamma-BHC (Lindane)																	
Bis(2-ethylhexyl)phthalate																	
1,1,1-Trichloroethane	U	0.005	U	0.005	U	0.005	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
1,1,2,2-Tetrachloroethane	U	0.005	U	0.005	U	0.005	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
1,1,2-Trichloroethane	U	0.01	U	0.01	U	0.01	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
Acetone																	
1,2-Dichloroethene	U	0.005	U	0.005	U	0.005	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Carbon tetrachloride	U	0.005	U	0.005	U	0.005	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Chloroform	U	0.005	U	0.005	U	0.005	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Methylene Chloride	U	0.005	U	0.005	U	0.005	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Tetrachloroethene		0.005	U	0.005	U	0.005	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Toluene																	
Trichloroethene		0.77		0.029		0.16		0.021		0.335		0.376		0.65		0.02	

Attachment E-2. Sampe Results for the MIP 1 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	B-7		B-8		G-1		MIP1-B2		MIP1-B7		MW-4		S-1		S-10		S-11	
Sample Name:	B-7-4		B-8-1		G-1		MIP1-B2-9.5-10.0		MIP1-B7-6.5-7.0		Replicate		S-1		S-10		S-11	
Laboratory I.D.:	B-7-4		B-8-1		854452		460-20485-1		460-19097-1		Replicate		854153		854458		854459	
Sample Date:	9/23/1986		9/23/1986		12/6/1985		11/30/2010		10/25/2010		4/18/1986		11/7/1985		12/6/1985		12/6/1985	
Sample Depth (feet):	12.0-12.9		0.0-5.0		subsurface		9.5-10		6.5-7		10.0-12.0		surface		surface		surface	
Source:	WCC, 1987		WCC, 1987		WCC, 1986 (GFEE, 1985)		RI Field Investigations		RI Field Investigations		WCC Phase I (June 1986)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum							6060		6350									
Arsenic							5.7	L	7.1									
Barium							37	J	36.4	J								
Beryllium							0.49		0.57									
Calcium							532	J	328	J								
Chromium							10.2	L	9.9									
Cobalt							6.7	J	8.5	J								
Copper							11.5		12.7									
Iron							18400		20500									
Lead							10.1		11.9									
Magnesium							1070		1140									
Manganese							207	L	420									
Nickel							10.3		10.6									
Potassium							581	L	573	J								
Vanadium							10.5	J	10.5	J								
Zinc							25.8		28.1									
gamma-BHC (Lindane)							0.0015	J	0.00086	U								
Bis(2-ethylhexyl)phthalate							0.18	J	0.048	U								
1,1,1-Trichloroethane	0.002	U	0.002	U			0.0024		0.023	U	0.002	U						
1,1,2,2-Tetrachloroethane	0.002	U	0.002	U			0.00072	U	0.0081	U	0.002	U						
1,1,2-Trichloroethane	0.004	U	0.004	U			0.00056	U	0.0092	U	0.005	U						
Acetone							0.0041		0.23	U								
1,2-Dichloroethene	0.026		0.002	U							0.002	U						
Carbon tetrachloride	0.002	U	0.002	U			0.000096	U	0.017	U	0.002	U						
Chloroform	0.002	U	0.002	U			0.00022	U	0.015	U	0.13							
Methylene Chloride	0.002	U	0.002	U			0.00045	U	0.018	U	0.002	U						
Tetrachloroethene	0.002	U	0.0024				0.00031	U	0.52		0.002	U						
Toluene							0.00028	U	0.0089	U								
Trichloroethene	0.0065		0.0047		0.00248		0.0053		26		0.63		0.0024		0.0001		0.00043	

Attachment E-2. Sample Results for the MIP 1 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	S-12		S-13		S-14		S-2		S-3		S-4		S-5		S-6		S-7	
Sample Name:	S-12		S-13		S-14		S-2		S-3		S-4		S-5		S-6		S-7	
Laboratory I.D.:	854460		854461		854462		854154		854155		854156		854453		854454		854455	
Sample Date:	12/6/1985		12/6/1985		12/6/1985		11/7/1985		11/7/1985		11/7/1985		12/6/1985		12/6/1985		12/6/1985	
Sample Depth (feet):	surface		surface		surface		surface		surface		surface		surface		surface		surface	
Source:	WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum																		
Arsenic																		
Barium																		
Beryllium																		
Calcium																		
Chromium																		
Cobalt																		
Copper																		
Iron																		
Lead																		
Magnesium																		
Manganese																		
Nickel																		
Potassium																		
Vanadium																		
Zinc																		
gamma-BHC (Lindane)																		
Bis(2-ethylhexyl)phthalate																		
1,1,1-Trichloroethane																		
1,1,2,2-Tetrachloroethane																		
1,1,2-Trichloroethane																		
Acetone																		
1,2-Dichloroethene																		
Carbon tetrachloride																		
Chloroform																		
Methylene Chloride																		
Tetrachloroethene																		
Toluene																		
Trichloroethene	0.00099		0.00033		0.0001		0.0107		0.0045		0.0131		0.00008		0.00012		0.00091	

Attachment E-2. Samp ƀ Results for the MIP 1 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	S-8		S-9		MW-4		MW-4		MW-4		MW-4		MW-4		MW-4	
Sample Name:	S-8		S-9		SS-1		SS-2		SS-3		SS-4		SS-5		SS-6	
Laboratory I.D.:	854456		854457		SS-1		SS-2		SS-3		SS-4		SS-5		SS-6	
Sample Date:	12/6/1985		12/6/1985		4/18/1986		4/18/1986		4/18/1986		4/18/1986		4/18/1986		4/18/1986	
Sample Depth (feet):	surface		surface		0.7-2.0		2.0-4.0		4.0-6.0		4.0-6.0		8.0-10.0		10.0-12.0	
Source:	WCC, 1986 (GFEE, 1985)		WCC, 1986 (GFEE, 1985)		WCC, 1986		WCC, 1986		WCC, 1986		WCC, 1986		WCC, 1986		WCC, 1986	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum																
Arsenic																
Barium																
Beryllium																
Calcium																
Chromium																
Cobalt																
Copper																
Iron																
Lead																
Magnesium																
Manganese																
Nickel																
Potassium																
Vanadium																
Zinc																
gamma-BHC (Lindane)																
Bis(2-ethylhexyl)phthalate																
1,1,1-Trichloroethane					1	U	Sample Lost	0	Sample Lost	0	0.002	U	0.002	U	0.002	U
1,1,2,2-Tetrachloroethane					11		Sample Lost	0	Sample Lost	0	0.0029		0.001	U	0.002	U
1,1,2-Trichloroethane					7.5		Sample Lost	0	Sample Lost	0	0.0032		0.005	U	0.005	U
Acetone								0		0						
1,2-Dichloroethene					1	U	Sample Lost	0	Sample Lost	0	0.002	U	0.002	U	0.002	U
Carbon tetrachloride					1	U	Sample Lost	0	Sample Lost	0	0.002	U	0.002	U	0.002	U
Chloroform					1	U	Sample Lost	0	Sample Lost	0	0.099		0.123		0.13	
Methylene Chloride					1	U	Sample Lost	0	Sample Lost	0	0.002	U	0.002	U	0.002	U
Tetrachloroethene					1	U	Sample Lost	0	Sample Lost	0	0.001	U	0.001	U	0.0036	
Toluene																
Trichloroethene	0.00072		0.00019		29		Sample Lost	0	Sample Lost	0	0.62		0.51		3.4	

Attachment E-2. Sample Results for the MIP 1 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MW-4		TB-1		TB-1		TB-2		TB-2		TB-3		TB-3		TB-4		TB-4	
Sample Name:	SS-7		TP-114-16		TP-165-85		TP-212-14		TP-24-56		TP-313-15		TP-35-7		TP-413-15		TP-44-45	
Laboratory I.D.:	SS-7		418898		418903		419092		419091		419727		419093		419722		419729	
Sample Date:	4/18/1986		5/13/1991		5/13/1991		5/13/1991		5/13/1991		5/13/1991		5/13/1991		5/13/1991		5/13/1991	
Sample Depth (feet):	15.6-16.4		14-16		6.5-8.5		12-14		4-5.6		13-15		5-7		13-15		4-4.5	
Source:	WCC, 1986		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum																		
Arsenic																		
Barium																		
Beryllium																		
Calcium																		
Chromium																		
Cobalt																		
Copper																		
Iron																		
Lead																		
Magnesium																		
Manganese																		
Nickel																		
Potassium																		
Vanadium																		
Zinc																		
gamma-BHC (Lindane)																		
Bis(2-ethylhexyl)phthalate																		
1,1,1-Trichloroethane	0.01	U	0.006	U	1	U	2.7		0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
1,1,2,2-Tetrachloroethane	0.01	U	0.006	U	1	U	0.73	U	0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
1,1,2-Trichloroethane	0.02	U	0.006	U	1	U	0.73	U	0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
Acetone			0.032	B	2.1	U	1.5	U	0.22	B	0.039	B	0.015	B	0.014	B	0.012	B
1,2-Dichloroethene	0.01	U	0.006	U	1	U	0.73	U	0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
Carbon tetrachloride	0.01	U	0.006	U	1	U	0.61	J	0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
Chloroform	0.026		0.009		1	U	0.73	U	0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
Methylene Chloride	0.01	U	0.092	B	1.6	B	0.94	B	0.1	B	0.044	B	0.037	B	0.049	B	0.044	B
Tetrachloroethene	0.01	U	0.006	U	0.31	J	6.5		0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
Toluene			0.006	U	1	U	0.19	J	0.029	U	0.006	U	0.006	U	0.006	U	0.006	U
Trichloroethene	1.74		0.18		30		1900	D	0.86		0.006	U	0.006	U	0.006	U	0.002	J

Attachment E-2. Sample Results for the MIP 1 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	TB-4		TB-5		TB-5		TB-6		TB-6	
Sample Name:	TP-49-11		TP-54-48		TP-595115		TP-610-12		TP-64-6	
Laboratory I.D.:	419726		419721		419720		420484		419728	
Sample Date:	5/13/1991		5/13/1991		5/13/1991		5/13/1991		5/13/1991	
Sample Depth (feet):	9-11		4-4.8		9.5-11.5		10-12		4-6	
Source:	WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)		WCC Letter (July 1991)	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum										
Arsenic										
Barium										
Beryllium										
Calcium										
Chromium										
Cobalt										
Copper										
Iron										
Lead										
Magnesium										
Manganese										
Nickel										
Potassium										
Vanadium										
Zinc										
gamma-BHC (Lindane)										
Bis(2-ethylhexyl)phthalate										
1,1,1-Trichloroethane	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
1,1,2,2-Tetrachloroethane	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
1,1,2-Trichloroethane	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
Acetone	0.017	B	0.037	B	0.065	B	0.071	B	0.06	B
1,2-Dichloroethene	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
Carbon tetrachloride	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
Chloroform	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
Methylene Chloride	0.042	B	0.048	B	0.042	B	0.044	B	0.043	B
Tetrachloroethene	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
Toluene	0.006	U	0.006	U	0.005	U	0.005	U	0.006	U
Trichloroethene	0.006	U	0.008		0.11		0.013		0.006	U

Attachment E-3 Sample Results for the MIP 2 All Soils (0-15 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MIP2-B13		MIP2-B20A		MIP2-B30		MIP2-B30		MIP2-B5	
Sample Name:	MIP2-B13-13-14		MIP2-B20A-7.5-8.0		MIP2-B30-11.5-12.0_D		MIP2-B30-11.5-12.0		MIP2-B5-9-9.5	
Laboratory I.D.:	460-20628-4		460-20485-4		460-20485-5		460-20485-5		460-20485-3	
Sample Date:	12/2/2010		11/30/2010		11/30/2010		11/30/2010		11/30/2010	
Sample Depth (feet):	13-14		7.5-8		11.5-12		11.5-12		9-9.5	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Cyanide, total	0.2	J	0.29	J	0.13	U	0.13	U	0.12	U
Aluminum	6610		6400		5850		6840		6300	
Arsenic	6.7		5.3	L	5.3	L	5.7	L	5.5	L
Barium	39.7	J	47.9		40.8	J	38.1	J	44.2	J
Beryllium	0.59		0.55		0.46		0.48		0.52	
Calcium	347	J	27.9	J	122	J	310	J	90.3	J
Chromium	11.9		10	L	9.2	L	11.1	L	10.3	L
Cobalt	6.6	J	8.9	J	8.7	J	11.9		8.9	J
Copper	10.8		15.3		11.4		13		12.6	
Iron	21100		18900		17700		21600		19300	
Lead	12.3		11.8		10.1		10.7		11.1	
Magnesium	1250		943	J	937	J	1110	J	930	J
Manganese	196		657	L	640	L	595	L	529	L
Nickel	12.3		10.5		10.3		11.9		11.1	
Potassium	717	J	563	L	527	L	666	L	582	L
Sodium	63.2	U	64.5	U	111		127		69.4	
Vanadium	12.5		10.3	J	10	J	12.8		10.5	J
Zinc	32.7		26.7		25.8		29.9		28.8	
4,4'-DDT	0.00091	U	0.0055	J	0.00095	U	0.00094	U	0.002	J
Aldrin	0.0022	J	0.0016	U	0.0017	U	0.0017	U	0.0016	U
Endosulfan sulfate	0.00094	U	0.0048	J	0.00097	U	0.00097	U	0.00096	U
Endrin	0.001	U	0.001	U	0.0011	U	0.0011	U	0.0015	J
Endrin ketone	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0053	J
gamma-BHC (Lindane)	0.00085	U	0.00087	U	0.00088	U	0.00088	U	0.0024	J
Methoxychlor	0.00082	U	0.00083	U	0.00085	U	0.00084	U	0.0044	J
2-Methylnaphthalene	0.053	U	0.49		0.055	U	0.055	U	0.054	U
Benzo[a]pyrene	0.0044	U	0.085		0.0046	U	0.0046	U	0.0046	U
Acenaphthene	0.051	U	0.099	J	0.053	U	0.053	U	0.053	U
Benzo[a]anthracene	0.0067	U	0.34		0.0069	U	0.0069	U	0.0069	U
Benzo[b]fluoranthene	0.0054	U	0.23		0.0056	U	0.0056	U	0.0055	U
Benzo[g,h,i]perylene	0.038	U	0.051	J	0.039	U	0.039	U	0.039	U
Benzo[k]fluoranthene	0.005	U	0.11		0.0052	U	0.0052	U	0.0052	U
Bis(2-ethylhexyl)phthalate	0.048	U	0.049	U	0.05	U	0.05	U	0.1	J
Chrysene	0.052	U	0.28	J	0.054	U	0.054	U	0.054	U
Dibenz(a,h)anthracene	0.0043	U	0.027	J	0.0045	U	0.0045	U	0.0045	U
Dibenzofuran	0.054	U	0.096	J	0.056	U	0.056	U	0.056	U
Fluoranthene	0.06	U	0.99		0.062	U	0.062	U	0.062	U
Fluorene	0.061	U	0.13	J	0.063	U	0.063	U	0.063	U
Indeno[1,2,3-cd]pyrene	0.0058	U	0.062		0.006	U	0.006	U	0.0059	U
Naphthalene	0.053	U	0.16	J	0.055	U	0.055	U	0.054	U
Phenanthrene	0.063	U	1.1		0.065	U	0.065	U	0.065	U
Pyrene	0.062	U	0.71		0.065	U	0.065	U	0.064	U
1,1,1-Trichloroethane	0.0016		51		0.0015		0.0053		0.029	
1,1-Dichloroethane	0.00023	U	0.55		0.00053	J	0.00054	J	0.00036	J
1,1-Dichloroethene	0.00034	U	4.1		0.0005	J	0.00057	J	0.00093	
1,4-Dioxane	0.0039	R	1.5	U	0.0039	R	0.004	R	0.0038	R
Acetone	0.0046	J	0.45	U	0.0047		0.0047	J	0.0047	
cis-1,2-Dichloroethene	0.00022	U	0.035	U	0.0012		0.001		0.00022	U
Ethylbenzene	0.00018	U	0.78		0.00018	U	0.00019	U	0.00017	U
Isopropylbenzene	0.00024	U	0.16	J	0.00024	U	0.00025	U	0.00024	U
Tetrachloroethene	0.00031	U	0.13	J	0.0033		0.0033		0.0014	
Toluene	0.00028	U	0.031	J	0.00028	U	0.00029	U	0.00027	U
Trichloroethene	0.00034	U	0.046	J	0.004		0.0036		0.00033	U
Xylenes, Total	0.00073	U	5.7		0.00074	U	0.00076	U	0.00072	U

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
R - Rejected
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,5-trichlorophenol, 2,4-dichlorophenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2-butanone (MEK), 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,4'-DDD, 4,4'-DDE, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, Acenaphthene, Acenaphthylene, acrolein, acrylonitrile, alpha-BHC, alpha-Chlordane, anthracene, antimony, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, benzene, beta-BHC, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bromodichloromethane, bromoform, bromomethane, butyl benzyl phthalate, cadmium, carbazole, carbon disulfide, carbon tetrachloride, chlordane, chlorobenzene, chloroethane, chloroform, chloromethane, cis-1,3-dichloropropene, delta-BHC, dibromochloromethane, dichlorodifluoromethane, dieldrin, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, endosulfan I, endrin aldehyde, gamma-chlordane, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, isophorone, mercury, methylene chloride, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, pentachlorophenol, phenol, p-isoproyltoluene, selenium, silver, styrene, thallium, toxaphene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, trichlorofluoromethane, and vinyl chloride.

Attachment E-4. Sample Results for the Expended Waste Area Surface Soils (0-1 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	FCR01-06		FCR01-06		FCR01-07		FCR01-08		FCR01-09	
Sample Name:	FCR01-06_12202011_D		FCR01-06_12202011		FCR01-07_12202011		FCR01-08_12202011		FCR01-09_12202011	
Laboratory I.D.:	460-35053-6		460-35053-6		460-35053-7		460-35053-8		460-35053-9	
Sample Date:	12/20/2011		12/20/2011		12/20/2011		12/20/2011		12/20/2011	
Sample Depth (feet):	0-0.5		0-0.5		0-0.5		0-0.5		0-0.5	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	mg/kg	**Qual.**	mg/kg	**Qual.**	mg/kg	**Qual.**	mg/kg	**Qual.**	mg/kg	**Qual.**
Aluminum	6260	L	5380	L	3210	L	4910	L	4620	L
Antimony	1.9	K	1.3	U	1.4	U	1.3	U	2.2	K
Arsenic	5.7		4.4		8.6		5.6		8.6	
Barium	96.9		125		53.4		48.8		59.8	
Beryllium	4.1		2.8		1.3		1.6		0.98	
Cadmium	4.4		3.8		1	K	2.3		1.1	K
Calcium	12200		10700		5290		2570		1780	
Chromium	64.3		62.3		32.5		56.8		22.5	
Cobalt	37.3		32.8		14.5		13.8		20.5	
Copper	358	L	325	L	135	L	122	L	47.8	L
Iron	28100		25700		13300		20200		25400	
Lead	241	L	203	L	92.4	L	90.3	L	20.6	L
Magnesium	1760		1520		771	J	976	J	718	J
Manganese	527		378		300		482		1100	
Nickel	219	J	174	J	85.2	J	74.2	J	26.5	J
Potassium	579	J	547	J	375	J	466	J	470	J
Silver	0.56	K	0.44	K	0.35	K	0.21	U	0.24	U
Sodium	197	J	228	J	184	U	165	U	187	U
Vanadium	9.8		8.3	J	9.5	J	9.8	J	14.3	
Zinc	2260	L	1670	L	907	L	870	L	170	L
Benzo[a]pyrene	0.02	J	0.016	J	0.21		0.33		0.027	J
Anthracene	0.065	U	0.065	U	0.068	U	0.078	J	0.07	U
Benzo[a]anthracene	0.0068	U	0.0068	U	0.22		0.34		0.032	J
Benzo[b]fluoranthene	0.031	J	0.039		0.38		0.48		0.046	
Benzo[g,h,i]perylene	0.039	U	0.039	U	0.13	J	0.21	J	0.042	U
Benzo[k]fluoranthene	0.0051	U	0.0051	U	0.12		0.17		0.0055	U
Bis(2-ethylhexyl)phthalate	0.13	J	0.11	J	0.15	J	0.11	J	0.052	U
Chrysene	0.053	U	0.053	U	0.24	J	0.39		0.057	U
Dibenz(a,h)anthracene	0.0044	U	0.0044	U	0.034	J	0.054		0.0047	U
Fluoranthene	0.099	J	0.061	U	0.33	J	0.66		0.066	U
Indeno[1,2,3-cd]pyrene	0.012	J	0.0059	U	0.17		0.22		0.026	J
Naphthalene	0.067	J	0.054	U	0.056	U	0.056	U	0.058	U
Phenanthrene	0.064	U	0.064	U	0.11	J	0.28	J	0.069	U
Pyrene	0.077	J	0.063	U	0.38		0.61		0.068	U

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
K - Reported Value may be biased high
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2-butanone (MEK), 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, acenaphthene, acenaphthylene, acetone, acrolein, acrylonitrile, benzene, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethoxyl)ether, bis(bromodichloromethane, bromoform, bromomethane, butyl benzyl phthalate, carbazole, carbon disulfide, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, chloromethane, cis-1,2-dichloroethene, cis-1,3-dichloropropene, dibenzofuran, dibromochloromethane, dichlorodifluoromethane, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, ethylbenzene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, isophorone, mercury, methylene chloride, m/p-xylene, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, n-propylbenzene, o-xylene, pentachlorophenol, phenol, p-isoproyltoluene, selenium, styrene, tetrachloroethene, thallium, trans-1,2-dichloroethene, trans-1,3-dichloropropene, trichlorofluoromethane, vinyl chloride, and xylenes.

Attachment E-5. Sample Results for the Shot Blast Area Surface Soils (0-1 Feet) Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	FCR01-01		FCR01-01		FCR01-02		FCR01-02		FCR01-03		FCR01-03		FCR01-04		FCR01-04		FCR01-05		FCR01-05	
Sample Name:	FCR01-01_11302011		FCR01-01_12202011		FCR01-02_11302011		FCR01-02_12202011		FCR01-03_11302011		FCR01-03_12202011		FCR01-04_11302011		FCR01-04_12202011		FCR01-05_11302011		FCR01-05_12202011	
Laboratory I.D.:	460-34174-1		460-35053-1		460-34174-2		460-35053-2		460-34174-3		460-35053-3		460-34174-4		460-35053-4		460-34174-5		460-35053-5	
Sample Date:	11/30/2011		12/20/2011		11/30/2011		12/20/2011		11/30/2011		12/20/2011		11/30/2011		12/20/2011		11/30/2011		12/20/2011	
Sample Depth (feet):	0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum	6730		5010	L	3860		4030	L	4170		5080	L	6940		8400	L	4950		3870	L
Antimony	1.3	U	1.3	U	1.4	U	1.3	U	1.3	U	1.4	U	1.3	J	2.2	K	1.4	U	1.3	U
Arsenic	5.6		6.4		4.5		5.4		5.4		8.2		6.7		7		5.7		5.7	
Barium	20.5	J	22.9	J	28.3	J	47.4		30.1	J	39.1	J	139		162		49.1		30.1	J
Beryllium	0.34	J	0.33	J	0.42	J	1.1		0.48		0.41	J	1.8		3.4		0.64		0.35	J
Cadmium	0.16	U	0.43	K	0.44	J	0.62	K	0.26	J	0.82	K	0.54	J	3.3		0.74	J	0.7	K
Calcium	689	J	14900		833	J	885	J	8590		10300		5930		5170		5270		841	J
Chromium	8		8.7		8.6		9.5		46.2		68.9		55.7		84.2		39.4		34	
Cobalt	7.2	J	4.7	J	6.9	J	10.3	J	7.5	J	9.4	J	27.7		42.6		8.6	J	6.2	J
Copper	9.6		13.2	L	31.1		59.5	L	42.7		49.9	L	280		469	L	45.2		27	L
Iron	16100		12000		16400		18500		16200		21900		27000		33400		21300		18800	
Lead	9.6		13	L	24.4		37.3	L	23.4		19.4	L	221		419	L	126		146	L
Magnesium	1370		1890		978	J	836	J	2040		2280		1590		1810		1870		899	J
Manganese	302		294		340		609		435		695		362		369		354		325	
Mercury	0.024	U	0.023	U	0.023	U	0.024	U	0.025	U	0.023	U	0.025	U	0.024	U	0.025	U	0.14	
Nickel	9.5		10.4	J	24		29.1	J	34.9		42.7	J	201		301	J	31.8		13.1	J
Potassium	389	J	321	J	418	J	371	J	379	J	360	J	767	J	889	J	488	J	308	J
Selenium	0.51	U	1.4	U	0.54	U	1.4	U	0.51	U	1.5	U	0.52	U	1.5	J	0.54	U	1.3	U
Silver	0.21	U	0.21	U	0.22	U	0.22	K	0.44	J	0.45	K	0.22	U	0.71	K	0.22	U	0.2	U
Sodium	167	U	168	U	177	U	168	U	167	U	175	U	265	J	353	J	177	U	161	U
Vanadium	10.9		8.6	J	6.6	J	6	J	8.1	J	9.4	J	14.3		16.1		10.4	J	7.3	J
Zinc	29		30	L	81.5		160	L	106		64.4	L	1130		2210	L	279		69.4	L
Benzo[a]pyrene	0.0046	U	0.019	J	0.22		0.11		0.039		0.035	J	0.73		1.7		0.21		0.54	
Acenaphthene	0.053	U	0.052	U	0.053	U	0.051	U	0.056	U	0.053	U	0.11	J	0.16	J	0.053	U	0.099	J
Anthracene	0.065	U	0.065	U	0.065	U	0.063	U	0.069	U	0.065	U	0.26	J	0.55		0.066	U	0.35	J
Benzo[a]anthracene	0.0069	U	0.0068	U	0.2		0.13		0.043		0.0068	U	0.82		1.9		0.23		0.66	
Benzo[b]fluoranthene	0.0055	U	0.033	J	0.31		0.16		0.051		0.043		0.82		2		0.26		0.64	
Benzo[g,h,i]perylene	0.039	U	0.039	U	0.21	J	0.074	J	0.046	J	0.046	J	0.59		0.98		0.14	J	0.38	
Benzo[k]fluoranthene	0.0052	U	0.0051	U	0.11		0.058		0.0055	U	0.0052	U	0.35		0.81		0.11		0.24	
Bis(2-ethylhexyl)phthalate	0.049	U	0.049	U	0.049	U	0.048	U	0.052	U	0.049	U	0.25	J	2.8		0.05	U	0.05	U
Butyl benzyl phthalate	0.043	U	0.043	U	0.16	J	0.042	U	0.046	U	0.043	U	0.046	U	0.045	U	0.12	J	0.044	U
Carbazole	0.059	U	0.058	U	0.059	U	0.057	U	0.062	U	0.059	U	0.16	J	0.31	J	0.06	U	0.13	J
Chrysene	0.054	U	0.053	U	0.28	J	0.14	J	0.057	U	0.054	U	0.91		2		0.27	J	0.67	
Dibenz(a,h)anthracene	0.0045	U	0.0044	U	0.035	J	0.0043	U	0.01	J	0.0044	U	0.19		0.33		0.028	J	0.12	
Dibenzofuran	0.056	U	0.055	U	0.055	U	0.054	U	0.059	U	0.055	U	0.069	J	0.085	J	0.056	U	0.074	J
Ethylbenzene					0.00018	U	0.00026	J												
Fluoranthene	0.062	U	0.061	U	0.39		0.23	J	0.074	J	0.061	U	1.8		3.3		0.44		1.2	
Fluorene	0.063	U	0.062	U	0.063	U	0.061	U	0.066	U	0.062	U	0.12	J	0.18	J	0.063	U	0.15	J
Indeno[1,2,3-cd]pyrene	0.0059	U	0.0059	U	0.25		0.082		0.052		0.041		0.73		1.1		0.19		0.38	
Methylene chloride					0.00067	J	0.00043	U												
Phenanthrene	0.065	U	0.064	U	0.12	J	0.13	J	0.068	U	0.064	U	1.2		2.2		0.27	J	1.2	
Pyrene	0.064	U	0.064	U	0.26	J	0.23	J	0.068	U	0.064	U	0.97		2.7		0.32	J	1.1	

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
K - Reported Value may be biased high
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2-butanone (MEK), 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, acenaphthene, acenaphthylene, acetone, acrolein, acrylonitrile, benzene, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethoxyl)ether, bis(bromodichloromethane, bromoform, bromomethane, butyl benzyl phthalate, carbazole, carbon disulfide, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, chloromethane, cis-1,2-dichloroethene, cis-1,3-dichloropropene, dibenzofuran, dibromochloromethane, dichlorodifluoromethane, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, ethylbenzene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, isophorone, mercury, methylene chloride, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, n-propylbenzene, o-xylene, pentachlorophenol, phenol, p-isoproyltoluene, selenium, styrene, tetrachloroethene, thallium, trans-1,2-dichloroethene, trans-1,3-dichloropropene, trichlorofluoromethane, vinyl chloride, and xylenes.

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	CH-1		CH-10		CH-10		CH-11		CH-12		CH-2		CH-3		CH-3A		CH-4		CH-5		CH-6	
Sample Name:	CH-1		CH-10-051513-45		CH-10-091613-36.5		CH-11-051713-75		CH-12-051613-65.5		CH-2-051613-22.5		CH-3-051413-78		CH-3A-051413-12.5		CH-4-051513-52.5		CH-5-051613-35		CH-6	
Laboratory I.D.:	460-74286-11		460-56233-6		460-63088-4		460-56359-5		460-56273-13		460-56273-6		460-56074-6		460-56074-7		460-56233-7		460-56273-8		460-74190-11	
Sample Date:	4/10/2014		5/15/2013		9/16/2013		5/17/2013		5/16/2013		5/16/2013		5/14/2013		5/14/2013		5/15/2013		5/16/2013		4/8/2014	
Sample Depth (feet):	40-40		45-45		36.5-36.5		75-75		65.5-65.5		22.5-22.5		78-78		12.5-12.5		52.5-52.5		35-35		41.5-41.5	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde			5	U			5	U	5	U	5	U	5	U	5	U	5	U	5	U		
Cyanide									4	U												
Aluminum									279													
Barium									32.8	J												
Cadmium									0.82	U												
Calcium									16300													
Chromium									4.5	U												
Cobalt									4.3	U												
Copper									7.8	U												
Iron									485	L												
Lead									4	U												
Magnesium									2640	J												
Manganese									28.2													
Mercury									0.16	U												
Nickel									5	U												
Potassium									667	J												
Sodium									9140													
Zinc									5.8	U												
1,2,4-Trichlorobenzene			0.19	U			0.19	U	0.2	U	0.2	U	0.19	U	0.2	U	0.19	U	0.2	U		
Hexachloroethane									0.16	U												
1,1,1-Trichloroethane	0.06	U	0.11	J	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1,2-Trichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,1-Dichloroethane	0.13	U	2		2.8		0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,4-Dioxane	0.5	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.5	U
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Acetone	2.7	U	2.7	R	2.7	U	2.7	U	2.7	U	2.7	U	2.7	R	2.7	R	2.7	R	2.7	U	2.7	U
Benzene	0.08	U	0.08	U	0.11	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	1.1	
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.12	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.55	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
o-Xylene	0.13	U	0.13	U	0.35	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.15	U	2.5		0.63	J	1.4		0.92	J	0.4	J	0.56	J	0.16	J	0.5	J	0.48	J	0.15	U
Trichloroethene	1.3		0.23	J	0.09	U	0.09	U	0.16	J	0.09	U	0.11	J	0.09	U	0.13	J	0.09	U	2.9	
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.9	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
R - Rejected
U - Not
detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,5-T, 2,4,5-TP, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-D, 2,4-DB, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, acenaphthene, acenaphthylene, acrolein, acrylonitrile, aldrin, alpha-BHC, alpha-chlordane, anthracene, antimony, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, arsenic, benzo[a]anthracene, benzo(a)pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, beryllium, beta-BHC, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate, bromodichloromethane, bromoform, bromomethane, butyl benzyl phthalate, calcium, carbazole, carbon tetrachloride, chlordane, chloroethane, chrysene, cis-1,3-dichloropropene, cobalt, delta-BHC, dibenz(a,h)anthracene, dibenzofuran, dibromochloromethane, dicamba, dichlorodifluoromethane, dichloroprop, dieldrin, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate,endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, fluoranthene, fluorene, gamma-BHC, gamma-chlordane, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, indeno(1,2,3-cd)pyrene, isophorone, isopropylbenzene, MCPA, mecoprop, methoxychlor, methylene chloride, naphthalene, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, pentachlorophenol, phenanthrene, phenol, p-isoproyltoluene, selenium, silver, styrene, thallium, toxaphene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, and vanadium.

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	CH-7		CH-7		CH-7		CH-8		CH-8		CH-9		EB-01		EB-01		EB-03		EB-03		MD-01	
Sample Name:	CH-7-051613-35		CH-7-091313-34.5_D		CH-7-091313-34.5		CH-8-051613-35		CH-8-091313-33.5		CH-9-051613-39		EB-01-052213-110		EB-01-09182013-172.5		EB-03-051713-128		EB-03-091813-128		MD-01-051613-52.5	
Laboratory I.D.:	460-56273-2		460-63068-5		460-63068-5		460-56273-3		460-63068-8		460-56273-7		460-56586-1		460-63354-16		460-56359-1		460-63354-23		460-56273-1	
Sample Date:	5/16/2013		9/13/2013		9/13/2013		5/16/2013		9/13/2013		5/16/2013		5/22/2013		9/18/2013		5/17/2013		9/18/2013		5/16/2013	
Sample Depth (feet):	35-35		34.5-34.5		34.5-34.5		35-35		33.5-33.5		39-39		110-110		172.5-172.5		128-128		128-128		52.5-52.5	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde	5	U					5	U			5	U	5.26	B			9.32	J			5	U
Cyanide													4	U								
Aluminum	2300						1930	B					1230				501	L			72.1	U
Barium	48.9	J					108	J					389				627	L			107	J
Cadmium	0.82	U					0.82	U					0.82	U			0.82	U			0.82	U
Calcium	12300						26200						728000				606000				13800	
Chromium	4.5	U					4.5	U					19.9				8	L			4.5	U
Cobalt	4.3	J					11.7	J					4.3	U			4.3	U			4.3	U
Copper	7.8	U					7.8	U					8.3	J			7.8	U			7.8	U
Iron	7570	L					2260	L					922				303	L			117	L
Lead	4	U					4	U					4	U			68.2	L			4	U
Magnesium	3000	J					6610						336	J			321	U			3890	J
Manganese	2980						2660						21				9	L			189	
Mercury	0.16	U					0.16	U					0.16	U			0.16	U			0.23	
Nickel	5	U					5	U					7.6	J			7.8	L			6.4	J
Potassium	2190	J					2680	J					293000				159000				769	J
Sodium	5360						12900						115000				117000	L			12600	
Zinc	19	J					10.7	J					93.7				20	L			8.7	J
1,2,4-Trichlorobenzene	0.21	U					0.19	U			0.19	U	0.19	U			0.19	U			0.54	J
Hexachloroethane	0.16	U					0.15	U					0.15	U			0.15	U			0.16	U
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.3	U
1,1,2-Trichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.95	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.65	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.45	U
1,2-Dichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.95	U
1,4-Dioxane			0.31	U	0.31	U			0.31	U	0.31	U	0.31	U			0.31	U				
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.4	J	2.3	U	6.9		12	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	35		26		31	J	32		13	U
Benzene	0.08	U	0.17	J	0.21	J	0.08	U	0.29	J	0.08	U	0.08	U	0.22	J	0.23	J	0.43	J	0.4	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.2	J	0.13	U	0.62	J	0.65	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.81	J
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.4	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.3	J	0.1	U	0.1	U	0.5	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	2.4	J
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	1.1	U
Ethylbenzene	0.1	U	0.26	J	0.23	J	0.1	U	0.34	J	0.1	U	0.1	U	0.15	J	0.12	J	0.25	J	0.5	U
m/p-Xylene	0.25	U	0.7	J	0.78	J	0.25	U	1.2	J	0.25	U	0.25	U	0.6	J	0.36	J	1.2	J	1.3	U
o-Xylene	0.13	U	0.33	J	0.45	J	0.13	U	0.66	J	0.13	U	0.13	U	0.27	J	0.18	J	0.61	J	0.65	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	1.7	J
Toluene	0.55	J	0.66	J	0.8	J	0.56	J	1.2		0.26	J	4		2.5		4.4		3.4		0.75	U
Trichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.43	J	0.36	J	0.37	J	1.8		1.7		1300	
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.17	J	0.15	U	0.15	U	0.75	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.7	U
Xylenes, Total	0.13	U	1	J	1.2	J	0.13	U	1.9	J	0.13	U	0.13	U	0.87	J	0.55	J	1.8	J	0.65	U

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MD-01		MW-01		MW-10		MW-10		MW-01		MW-10D		MW-10D		MW-11R		MW-11R		MW-12D	
Sample Name:	MD-01-091713-52.5		MW-01-051613-50		MW-10-051513-65.5		MW-10-091813-65.5		MW-1-091613-50		MW-10D-051513-146		MW-10D-091813-146.5		MW-11R-051413-85		MW-11R-091813-85		MW-12D-051413-90	
Laboratory I.D.:	460-63354-8		460-56273-9		460-56233-9		460-63354-14		460-63088-7		460-56233-10		460-63354-18		460-56074-1		460-63354-22		460-56074-2	
Sample Date:	9/17/2013		5/16/2013		5/15/2013		9/18/2013		9/16/2013		5/15/2013		9/18/2013		5/14/2013		9/18/2013		5/14/2013	
Sample Depth (feet):	52.5-52.5		50-50		65.5-65.5		65.5-65.5		50-50		146-146		146.5-146.5		85-85		85-85		90-90	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde			5	U	5	U					5	U			5	U			5	U
Cyanide					6.3	B					6.8	B								
Aluminum					72.1	U					135	J								
Barium					54.9	J					91.1	J								
Cadmium					0.82	U					0.82	U								
Calcium					20900						36100									
Chromium					4.5	U					4.5	U								
Cobalt					4.3	U					4.3	U								
Copper					7.8	U					7.8	U								
Iron					73.6	U					76.6	J								
Lead					4	U					4	U								
Magnesium					2860	J					2960	J								
Manganese					4.3	U					59.6									
Mercury					0.16	U					0.16	U								
Nickel					5	U					5	U								
Potassium					528	J					728	J								
Sodium					7160						3970	J								
Zinc					5.8	U					5.8	U								
1,2,4-Trichlorobenzene			0.19	U	0.19	U					0.19	U			0.19	U			0.19	U
Hexachloroethane					0.15	U					0.2	J								
1,1,1-Trichloroethane	3.8	J	0.06	U	0.06	U	0.11	J	0.06	U	0.06	U	0.06	U	1.4		0.9	J	0.06	U
1,1,2-Trichloroethane	4.8	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,1-Dichloroethane	3.3	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	2.3	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.41	J	0.09	U	0.09	U
1,2-Dichloroethane	4.8	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,4-Dioxane	0.31	U	0.31	U	0.31	U			0.31	U	0.31	U			0.31	U			0.31	U
2-Butanone	58	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Acetone	67	U	2.7	U	2.7	R	2.7	U	2.7	U	2.7	R	2.7	U	2.7	R	2.7	U	2.7	R
Benzene	2	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.21	J	0.08	U	0.08	U	0.08	U
Carbon disulfide	3.3	U	0.13	U	0.13	U	0.13	U	0.15	B	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Chlorobenzene	2.8	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	2	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Chloromethane	2.5	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	5.7	J	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	5.5	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.5	J	0.22	U	0.22	U	0.22	U
Ethylbenzene	2.5	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.14	J	0.1	U	0.1	U	0.1	U
m/p-Xylene	6.3	U	0.25	U	0.25	U	0.5	J	0.25	U	0.25	U	1.2	J	0.25	U	0.25	U	0.25	U
o-Xylene	3.3	U	0.13	U	0.13	U	0.2	J	0.13	U	0.13	U	0.52	J	0.13	U	0.13	U	0.13	U
Tetrachloroethene	7.4	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	3.8	U	0.52	J	0.62	J	0.45	J	0.18	J	3.7		1.1		0.8	J	0.26	J	0.62	J
Trichloroethene	4900		0.75	J	0.62	J	2.9		0.26	J	0.29	J	0.25	J	28		18		0.09	U
Trichlorofluoromethane	3.8	U	0.15	U	0.31	J	0.26	J	0.15	U	0.87	J	0.89	J	0.15	U	0.15	U	0.15	U
Vinyl chloride	3.5	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	3.3	U	0.13	U	0.13	U	0.7	J	0.13	U	0.13	U	1.8	J	0.13	U	0.13	U	0.13	U

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MW-12D		MW-12R		MW-12R		MW-12R		MW-13		MW-13		MW-14D		MW-14D		MW-14D	
Sample Name:	MW-12D-091813-84		MW-12R-051413-50_D		MW-12R-051413-50		MW-12R-091813-50		MW-13-052013-345		MW-13-09172013-340		MW-14D-051613-189		MW-14D-09182013-189_D		MW-14D-09182013-189	
Laboratory I.D.:	460-63354-15		460-56074-5		460-56074-5		460-63354-17		460-56436-3		460-63354-6		460-56273-18		460-63354-21		460-63354-21	
Sample Date:	9/18/2013		5/14/2013		5/14/2013		9/18/2013		5/20/2013		9/17/2013		5/16/2013		9/18/2013		9/18/2013	
Sample Depth (feet):	84-84		50-50		50-50		50-50		345-345		340-340		189-189		189-189		189-189	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde			5	U	5	U			5	U			5	U				
Cyanide													4	U				
Aluminum													79.5	J				
Barium													50.9	J				
Cadmium													0.82	U				
Calcium													69200					
Chromium													4.5	U				
Cobalt													4.3	U				
Copper													7.8	U				
Iron													73.6	U				
Lead													54.3					
Magnesium													6620					
Manganese													4.3	U				
Mercury													0.16	U				
Nickel													5	U				
Potassium													1250	J				
Sodium													12600					
Zinc													5.8	U				
1,2,4-Trichlorobenzene			0.19	U	0.19	U			0.19	U			0.19	U				
Hexachloroethane													0.15	U				
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1,2-Trichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,4-Dioxane			0.31	U	0.31	U			0.31	U			0.31	U				
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Acetone	2.7	U	2.7	R	2.7	R	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.24	J	0.08	U	0.16	J	0.08	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.22	J	0.1	U	0.14	J	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.3	J	0.25	U	0.89	J	0.25	U	0.66	J	0.6	J
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	J	0.13	U	0.43	J	0.13	U	0.28	J	0.31	J
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.24	J	1		0.4	J	0.29	J	2.8		1.1		1.4		0.75	J	0.79	J
Trichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	2.1		0.6	J	3.5		2.3		2.3	
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.28	J	0.22	J	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.13	U	0.43	J	0.13	U	1.3	J	0.13	U	0.95	J	0.91	J

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MW-14M		MW-14M		MW-14S		MW-14S		MW-15S		MW-15S		MW-16S		MW-16S		MW-16S		MW-17	
Sample Name:	MW-14M-051513-128		MW-14M-091713-128		MW-14S-051513-73		MW-14S-091713-73		MW-15S-052013-55		MW-15S-091613-55.5		MW-16S		MW-16S-052013-43.5		MW-16S-091613-43.5		MW-17-051413-89	
Laboratory I.D.:	460-56233-8		460-63354-9		460-56233-15		460-63354-7		460-56436-8		460-63088-9		460-74286-16		460-56436-7		460-63088-5		460-56233-3	
Sample Date:	5/15/2013		9/17/2013		5/15/2013		9/17/2013		5/20/2013		9/16/2013		4/10/2014		5/20/2013		9/16/2013		5/14/2013	
Sample Depth (feet):	128-128		128-128		73-73		73-73		55-55		55.5-55.5		47-47		43.5-43.5		43.5-43.5		89-89	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde	5	U			5	U			5	U					18.8	B			5	U
Cyanide	6.7	B			6	B			4	U					4	U				
Aluminum	125	J			72.1	U			673						778					
Barium	39.3	J			19.6	J			27.1	J					52.8	J				
Cadmium	0.82	U			0.82	U			0.82	U					2.9	J				
Calcium	70200				14100				5660						26400					
Chromium	4.5	U			4.5	U			4.5	U					4.5	U				
Cobalt	4.3	U			4.3	U			4.3	U					4.3	U				
Copper	7.8	U			7.8	U			7.8	U					7.8	U				
Iron	114	J			73.6	U			1080						32100					
Lead	20.6				4	U			4	U					5.8					
Magnesium	5630				2390	J			1040	J					8030					
Manganese	5.1	J			4.3	U			116						7610					
Mercury	0.16	U			0.16	U			0.16	U					0.16	U				
Nickel	5	U			5	U			5	U					5	U				
Potassium	732	J			525	U			586	J					1970	J				
Sodium	10000				3340	J			4030	J					52000					
Zinc	5.8	U			5.8	U			5.8	U					8.8	J				
1,2,4-Trichlorobenzene	0.19	U			0.19	U			0.2	U					0.2	U			0.19	U
Hexachloroethane	0.15	U			0.15	U			0.16	U					0.16	U				
1,1,1-Trichloroethane	0.06	U	0.06	U	0.16	J	0.18	J	0.06	U	0.06	U	1.2		1.6		2.7		1.6	
1,1,2-Trichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	3.9		4.3		6.3		0.13	J
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	5.2		0.09	U	6.6		0.41	J
1,2-Dichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,4-Dioxane	0.31	U			0.31	U			0.31	U			7.2		14		6.7		0.31	U
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Acetone	2.7	R	2.7	U	2.7	R	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	R
Benzene	0.08	U	0.12	J	0.08	U	0.14	J	0.08	U	0.08	U	0.16	J	0.08	U	0.19	J	0.08	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.21	J	0.36	J	0.18	U	0.18	U	1.7		1.1		2		0.26	J
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.63	J	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.18	J	0.1	U	0.1	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.7	J	0.25	U	0.51	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
o-Xylene	0.13	U	0.32	J	0.13	U	0.24	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.14	J	0.12	J	0.1	U	0.1	U	0.67	J	0.28	J	0.78	J	0.19	J
Toluene	2		0.57	J	0.73	J	0.63	J	0.64	J	0.24	J	0.15	U	1.8		0.15	U	0.7	J
Trichloroethene	3.5		4		67		65		0.09	U	0.09	U	1.7		1.2		2.3		52	
Trichlorofluoromethane	0.15	U	0.21	J	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	1	J	0.13	U	0.75	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MW-17		MW-18		MW-18		MW-18		MW-18		MW-18		MW-18		MW-19		MW-2		MW-2		MW-3	
Sample Name:	MW-17-091813-87		MW-18_D		MW-18_D_2		MW-18		MW-18-051413-45_D		MW-18-051413-45		MW-18-091813-47		MW-19-051413-57		MW-2-051513-50		MW-2-091613-50		MW-3-051513-50	
Laboratory I.D.:	460-63354-19		460-74190-12		460-39047-10		460-74190-12		460-56074-10		460-56074-10		460-63354-20		460-56074-3		460-56233-13		460-63088-6		460-56233-14	
Sample Date:	9/18/2013		4/8/2014		4/12/2012		4/8/2014		5/14/2013		5/14/2013		9/18/2013		5/14/2013		5/15/2013		9/16/2013		5/15/2013	
Sample Depth (feet):	87-87		47-47		45.5-47.4		47-47		45-45		45-45		47-47		57-57		50-50		50-50		50-50	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde									5	U	5	U			5	U	5	U			5	U
Cyanide									4	U	4	U					6.1	B			6.3	B
Aluminum									72.1	U	72.1	U					99.2	J			99.8	J
Barium									41.3	J	41.6	J					46.6	J			42.9	J
Cadmium									0.82	U	0.82	U					0.82	U			0.82	U
Calcium									9700		9700						12500				9370	
Chromium									4.5	U	4.5	U					4.5	U			4.5	U
Cobalt									4.3	U	4.3	U					4.3	U			4.3	U
Copper									7.8	U	7.8	U					7.8	U			7.8	U
Iron									73.6	U	73.6	U					98.7	J			182	
Lead									4	U	4	U					4	U			4	U
Magnesium									2510	J	2500	J					2620	J			1910	J
Manganese									5.2	J	6.2	J					4.3	U			9	J
Mercury									0.16	U	0.16	U					0.16	U			0.16	U
Nickel									5	U	5	U					5	U			5	U
Potassium									702	J	728	J					721	J			1190	J
Sodium									8030		8080						7590				8800	
Zinc									8.1	J	11.1	J					5.8	U			8	J
1,2,4-Trichlorobenzene									0.2	U	0.2	U			0.19	U	0.19	U			0.19	U
Hexachloroethane									0.16	U	0.16	U					0.15	U			0.15	U
1,1,1-Trichloroethane	5.4		7.4		8.4		6.9		10		9.7		7.6		0.06	U	3.1	J	4.5	J	0.99	J
1,1,2-Trichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.95	U	0.95	U	0.95	U
1,1-Dichloroethane	0.46	J	0.49	J	0.59	J	0.56	J	0.75	J	0.69	J	0.56	J	0.13	U	0.83	J	1.1	J	0.65	U
1,1-Dichloroethene	1.1		1.5		2.1		1.6		2.4		2.2		1.6		0.09	U	1.2	J	1.4	J	0.45	U
1,2-Dichloroethane	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.95	U	0.95	U	0.95	U
1,4-Dioxane			1.3				1.5						1.5	J	0.31	U	0.31	U			0.31	U
2-Butanone	2.3	U	2.3	U	2.3	R	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	12	U	12	U	12	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	R	2.7	R	2.7	U	2.7	R	13	R	13	U	13	R
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.4	U	0.4	U	0.4	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.65	U	0.65	U	0.65	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.55	U	0.55	U	0.55	U
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.4	U	0.4	U	0.4	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	0.39	J	0.69	J	0.62	J	0.69	J	0.89	J	0.81	J	0.43	J	0.18	U	9.5		6		3.5	J
Dichlorodifluoromethane	0.33	J	0.27	J	0.22	U	0.23	J	0.22	U	0.22	U	0.22	U	0.22	U	1.1	U	1.1	U	1.1	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.5	U	0.5	U	0.5	U
m/p-Xylene	0.75	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	1.3	U	1.3	U	1.3	U
o-Xylene	0.36	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.65	U	0.65	U	0.65	U
Tetrachloroethene	0.1	U	0.89	J	0.56	J	1		0.74	J	0.66	J	0.45	J	0.1	U	3.8	J	3.2	J	2.9	J
Toluene	0.89	J	0.15	U	0.15	U	0.15	U	0.19	J	0.18	J	0.26	J	1.1		0.75	U	0.75	U	0.75	U
Trichloroethene	77		120		110		120		140		140		84		1.1		2400		1600		650	
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.75	U	0.75	U	0.75	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.7	U	0.7	U	0.7	U
Xylenes, Total	1.1	J	0.13	U	0.36	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.65	U	0.65	U	0.65	U

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MW-3		MW-4		MW-4		MW-5		MW-5		MW-6		MW-6		MW-7		MW-7		MW-7		MW-7S	
Sample Name:	MW-3-091713-50		MW-4-051613-52		MW-4-091713-55.5		MW-5-052013-285		MW-5-09172013-287.5		MW-6-052213-95		MW-6-091313-68		MW-7		MW-7-051713-80		MW-7-091713-63		MW-7S	
Laboratory I.D.:	460-63354-5		460-56273-4		460-63354-10		460-56436-4		460-63354-4		460-56586-2		460-63068-11		460-74286-15		460-56359-3		460-63354-2		460-74286-14	
Sample Date:	9/17/2013		5/16/2013		9/17/2013		5/20/2013		9/17/2013		5/22/2013		9/13/2013		4/10/2014		5/17/2013		9/17/2013		4/10/2014	
Sample Depth (feet):	50-50		52-52		55.5-55.5		285-285		287.5-287.5		95-95		68-68		63-63		80-80		63-63		47.5-47.5	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde			5	U			5	U			5	U					9.1	J				
Cyanide											4	U										
Aluminum			72.1	U							179	J					77.4	J				
Barium			107	J							71	J					78.5	J				
Cadmium			0.82	U							0.82	U					0.82	U				
Calcium			11200								11300						9600					
Chromium			4.5	U							8.5	J					4.5	U				
Cobalt			4.3	U							4.3	U					4.3	U				
Copper			7.8	U							7.8	U					7.8	U				
Iron			73.6	U							53400						130	J				
Lead			4	U							4	U					4	U				
Magnesium			3420	J							2120	J					2390	J				
Manganese			275								837						78.6					
Mercury			0.16	U							0.16	U					0.16	U				
Nickel			6.2	J							5	U					5	U				
Potassium			900	J							1030	J					1060	J				
Sodium			12900								23900						24000					
Zinc			10	J							5.8	U					9.6	J				
1,2,4-Trichlorobenzene			0.36	J			0.19	U			0.19	U					0.19	U				
Hexachloroethane			0.15	U							0.15	U					0.15	U				
1,1,1-Trichloroethane	0.92	J	0.6	U	1.1	J	0.06	U	0.19	J	0.06	U	0.06	U	0.06	U	30		49		260	
1,1,2-Trichloroethane	0.19	U	1.9	U	1.9	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,1-Dichloroethane	0.28	J	1.3	U	1.3	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	2.1		4.5		20	
1,1-Dichloroethene	0.13	J	0.9	U	0.9	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	7.4		9.5		49	
1,2-Dichloroethane	0.19	U	1.9	U	1.9	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,4-Dioxane					0.31	U	0.31	U			0.31	U	0.31	U	0.74	J	0.31	U	5.6		34	
2-Butanone	2.3	U	23	U	23	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Acetone	2.7	U	27	U	27	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Benzene	0.08	U	0.8	U	0.8	U	0.08	U	0.22	J	0.08	U	0.31	J	0.08	U	0.08	U	0.08	U	0.08	U
Carbon disulfide	0.13	U	1.3	U	1.3	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Chlorobenzene	0.11	U	1.1	U	1.1	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.8	U	0.8	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.16	J	0.27	J
Chloromethane	0.1	U	1	U	1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.47	J	7.6	J	3.8	J	0.18	U	0.18	U	0.18	U	0.18	U	0.49	J	1.4		3.1		6.6	
Dichlorodifluoromethane	0.22	U	2.2	U	2.2	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	2.7		3.2	
Ethylbenzene	0.1	U	1	U	1	U	0.1	U	0.21	J	0.1	U	0.28	J	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.34	J	2.5	U	2.5	U	0.25	U	0.77	J	0.25	U	1.2	J	0.25	U	0.25	U	0.34	J	0.25	U
o-Xylene	0.14	J	1.3	U	1.3	U	0.13	U	0.42	J	0.13	U	0.73	J	0.13	U	0.13	U	0.16	J	0.13	U
Tetrachloroethene	0.75	J	3.7	J	2.8	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	2.6		6.7		16	
Toluene	0.33	J	1.6	J	1.5	U	1.4		1.1		0.15	U	1.2		0.15	U	1.9		0.35	J	0.15	U
Trichloroethene	88		3600		1600		3.3		39		0.68	J	0.97	J	36		62		110		92	
Trichlorofluoromethane	0.15	U	1.5	U	1.5	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U
Vinyl chloride	0.33	J	1.4	U	1.4	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.48	J	1.3	U	1.3	U	0.13	U	1.2	J	0.13	U	2		0.13	U	0.13	U	0.5	J	0.13	U

Attachment E-6. Sample Results for the Former FWEC Facility Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MW-7S		MW-7S		MW-8		MW-8		MW-9		MW-9		MW-9D		MW-9D	
Sample Name:	MW-7S-051713-50		MW-7S-091613-47.5		MW-8-052013-70		MW-8-091913-70		MW-9-051513-55.5		MW-9-091713-55		MW-9D-052013-151		MW-9D-091713-151.5	
Laboratory I.D.:	460-56359-2		460-63088-10		460-56436-2		460-63420-4		460-56233-11		460-63354-11		460-56436-6		460-63354-3	
Sample Date:	5/17/2013		9/16/2013		5/20/2013		9/19/2013		5/15/2013		9/17/2013		5/20/2013		9/17/2013	
Sample Depth (feet):	50-50		47.5-47.5		70-70		70-70		55.5-55.5		55-55		151-151		151.5-151.5	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Formaldehyde	5	U			5	U			5	U			5	U		
Cyanide									6.6	B			4	U		
Aluminum	350								72.1	U			72.1	U		
Barium	110	J							10	J			45.7	J		
Cadmium	0.82	U							0.82	U			0.82	U		
Calcium	5660								1490	J			59000			
Chromium	4.5	U							4.5	U			4.5	U		
Cobalt	4.3	U							4.3	U			4.3	U		
Copper	7.8	U							7.8	U			7.8	U		
Iron	190								73.6	U			73.6	U		
Lead	4	U							4	U			4	U		
Magnesium	3200	J							487	J			4840	J		
Manganese	185								6.4	J			4.3	U		
Mercury	0.16	U							0.16	U			0.16	U		
Nickel	6.3	J							5	U			5	U		
Potassium	2010	J							525	U			1030	J		
Sodium	22800								1450	J			4980	J		
Zinc	20.9	J							5.8	U			5.8	U		
1,2,4-Trichlorobenzene	0.19	U			0.19	U			0.19	U			0.2	U		
Hexachloroethane	0.15	U							0.15	U			0.16	U		
1,1,1-Trichloroethane	60		380		0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1,2-Trichloroethane	0.19	U	0.34	J	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,1-Dichloroethane	9.2		29		0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	11		56		0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichloroethane	0.19	U	0.21	J	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
1,4-Dioxane	38		45	J	0.31	U			0.31	U			0.31	U		
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	R	2.7	U	2.7	U	2.7	U
Benzene	0.08	U	0.13	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.45	J
Carbon disulfide	0.13	U	0.26	B	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.25	J	0.08	U	0.08	U	0.08	U	0.08	U	0.2	J	0.17	J
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	4.7		10		0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	1.3		0.22	U	0.22	U	0.22	U	0.22	U	7.7		4.3	
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	J
m/p-Xylene	0.25	U	0.57	J	0.25	U	0.25	U	0.25	U	0.3	J	0.25	U	1	J
o-Xylene	0.13	U	0.24	J	0.13	U	0.13	U	0.13	U	0.15	J	0.13	U	0.54	J
Tetrachloroethene	3.6		15		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.46	B	0.55	J	1.6		0.15	U	0.71	J	0.35	J	2.3		1.8	
Trichloroethene	16		62		0.09	U	0.33	J	0.09	U	0.09	U	0.45	J	0.37	J
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	6.1	J	4.8	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.81	J	0.13	U	0.13	U	0.13	U	0.44	J	0.13	U	1.6	J

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	EPA-1D		EPA-1D		EPA-2DR		EPA-2DR		EPA-2DR		EPA-2DR		EPA-3D		EPA-3D		EPA-3D		FWEC-4R	
Sample Name:	EPA-1D-052213-169		EPA-1D-091913-169		EPA-2DR		EPA-2DR-052113-114		EPA-2DR-09112013-114		EPA-2DR-09112013-114		EPA-3D-051013-161		EPA-3D-051013-161		EPA-3D-091913-161		FWEC-4R-051413-160	
Laboratory I.D.:	460-56586-8		460-63420-18		460-74190-5		460-56505-1		460-63058-3		460-63058-3		460-55866-6		460-55866-6		460-63420-20		460-56074-8	
Sample Date:	5/22/2013		9/19/2013		4/8/2014		5/21/2013		9/11/2013		9/11/2013		5/10/2013		5/10/2013		9/19/2013		5/14/2013	
Sample Depth (feet):	169-169		169-169		114-114		114-114		114-114		114-114		161-161		161-161		161-161		160-160	
Source:	TAIE		TAIE		TAIE		TAIE		0		TAIE		0		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	5	U					5	U					5	U	5	U			5	U
Aluminum																				
Barium																				
Calcium																				
Iron																				
Magnesium																				
Manganese																				
Potassium																				
Sodium																				
Zinc																				
Bis(2-ethylhexyl)phthalate																				
1,1,1-Trichloroethane	0.06	U	0.06	U	0.67	J	2.6		0.7	J	0.66	J	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.32	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.33	J	0.59	J	0.32	J	0.32	J	0.09	U	0.09	U	0.09	U	0.09	U
1,4-Dioxane	0.31	U			0.72	J	0.74	J	1.2	J	1.2	J	0.31	U	0.31	U			0.31	U
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	20	U	0.34	U	0.34	U	20	U	0.34	U	0.34	U	20	U	20	U	0.34	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	26		2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	R
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	R
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.08	U	0.27	J	0.08	U	0.08	U	0.19	J	0.18	J	0.08	U	0.08	U	0.16	J	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.12	B	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.26	J	0.35	J	0.21	J	0.19	J	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.43	J	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.28	J	0.1	U	0.1	U	0.14	J	0.18	J	0.1	U	0.1	U	0.14	J	0.1	U
m/p-Xylene	0.25	U	1.2	J	0.25	U	0.25	U	0.66	J	0.64	J	0.25	U	0.25	U	0.74	J	0.25	U
Methylene chloride	0.18	U	0.28	J	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.7	J	0.13	U	0.13	U	0.34	J	0.34	J	0.13	U	0.13	U	0.42	J	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.32	J	0.13	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.72	B	1.2		0.27	J	1	B	0.79	J	0.77	J	2.2		1.6		0.73	J	2.2	
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	0.13	J	0.09	U	81		160		72		72		0.71	J	0.9	J	0.92	J	0.49	J
Trichlorofluoromethane	0.15	U	0.15	U	0.22	J	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	2.3	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	1.9	J	0.13	U	0.13	U	1	J	0.98	J	0.13	U	0.13	U	1.2	J	0.13	U

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dintrotoluene, 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, acenaphthene, acenaphthylene, anthracene, antimony, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, arsenic, benzo[a]anthracene, benzo(a)pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, beryllium, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bromoform, bromomethane, butyl benzyl phthalate, cadmium, carbazole, chloroethane, chloromethane, chromium, chrysene, cis-1,3-dichloropropene, cobalt, copper, cyanide, dibenz(a,h)anthracene, dibenzofuran, dibromochloromethane, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, fluoranthene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, indeno(1,2,3-cd)pyrene, isophorone, isopropylbenzene, lead, mercury, naphthalene, nickel, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, pentachlorophenol, phenanthrene, phenol, p-isoproyltoluene, pyrene, selenium, silver, styrene, thallium, trans-1,3-dichloropropene, and vanadium.

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	FWEC-4R		FWEC-5R		FWEC-5R		FWEC-5S		FWEC-5S		HP07		HP07		HP07		HP08		HP08		HP09
Sample Name:	FWEC-4R-091313-160		FWEC-5R-050813-120.3		FWEC-5R-09132013-120.3		FWEC-5S-050813-38		FWEC-5S-09132013-38		GWE-HP07-32-35		GWE-HP07-60-63		GWE-HP07-74-77		GWE-HP08-55-58		GWE-HP08-60-63		GWE-HP09-30-33
Laboratory I.D.:	460-63068-6		460-55697-6		460-63068-7		460-55697-9		460-63068-10		460-28269-3		460-28269-2		460-28269-1		460-28002-2		460-28002-1		460-27896-4
Sample Date:	9/13/2013		5/8/2013		9/13/2013		5/8/2013		9/13/2013		6/29/2011		6/29/2011		6/29/2011		6/22/2011		6/22/2011		6/20/2011
Sample Depth (feet):	160-160		120.3-120.3		120.3-120.3		38-38		38-38		32-35		60-63		74-77		55-58		60-63		30-33
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l
Formaldehyde			5	U			5	U			22.3	J	29.1	J	27.4	J	5	U	5	U	5
Aluminum																					
Barium																					
Calcium																					
Iron																					
Magnesium																					
Manganese																					
Potassium																					
Sodium																					
Zinc																					
Bis(2-ethylhexyl)phthalate																					
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14
1,4-Dioxane			0.31	U			0.31	U			1.7	U	1.7	U	1.7	U	8.4	R	8.4	R	8.4
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	0.82	R	0.82	R	0.82	R	0.82	U	0.82	U	0.82
2-Chloroethyl vinyl ether	0.34	U	20	U	0.34	U	20	U	0.34	U	20	U	20	U	20	U	20	U	20	U	0.19
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.55	U	0.55	U	0.55	U	0.55	R	0.55	R	0.55
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	11		11		11		2.5	R	2.5	R	2.5
Acrolein	1.3	U	1.3	R	1.3	U	1.3	R	1.3	U	1.9	U	1.9	U	1.9	U	1.9	R	1.9	R	1.9
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3
Benzene	0.19	J	0.08	U	0.3	J	0.08	U	0.08	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.67	J	0.98	J	1		0.44	J	1.3		0.093
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.15	U	0.15	U	0.15	U	0.15	U	0.17	J	0.15
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	10		9.4		10		6		14		3.7
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.21	U	0.67	J	0.66	J	0.21	U	0.21	U	0.21
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2
Dichlorodifluoromethane	1.6		6.5		2.6		0.89	J	0.87	J	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29
Ethylbenzene	0.29	J	0.1	U	0.38	J	0.1	U	0.1	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25
m/p-Xylene	1.1	J	0.25	U	1.5	J	0.25	U	0.54	J	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19
o-Xylene	0.48	J	0.13	U	0.71	J	0.13	U	0.22	J	0.17	J	0.15	U	0.15	U	0.15	U	0.15	U	0.15
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2
Toluene	0.8	J	1.5		1.3		0.28	J	0.33	J	0.2	J	0.14	J	0.15	J	140		170		0.09
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14
Trichloroethene	0.6	J	0.09	U	0.09	U	0.09	U	0.09	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18
Trichlorofluoromethane	2.8		3		2.1		0.59	J	0.74	J	0.16	U	0.16	U	0.16	U	1.3	J	0.21	J	0.28
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Xylenes, Total	1.6	J	0.36	U	2.2	J	0.36	U	0.76	J	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

dichloroethane, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dintrotoluene, 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, acenaphthene, acenaphthylene, anthracene, antimony, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, arsenic, benzo[a]anthracene, benzo(a)pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, beryllium, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bromoform, bromomethane, butyl benzyl phthalate, cadmium, carbazole, chloroethane, chloromethane, chromium, chrysene, cis-1,3-dichloropropene, cobalt, copper, cyanide, dibenz(a,h)anthracene, dibenzofuran, dibromochloromethane, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, fluoranthene, fluorene, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, indeno(1,2,3-cd)pyrene, isophorone, isopropylbenzene, lead, mercury, naphthalene, nickel, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, pentachlorophenol, phenanthrene, phenol, p-isoproyltoluene, pyrene, selenium, silver, styrene, thallium, trans-1,3-dichloropropene, and vanadium.

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:		HP09		HP09		HP09		HP13		HP13		HP17		HP12		HP12		HP01		HP01	
Sample Name:		GWE-HP09-47-50		GWE-HP09-75-78		GWE-HP09-75-78		GWE-HP13-40-43		GWE-HP13-60-63		GWE-HP17-105		GW-GW-HP12-18		GW-GW-HP12-18		GW-HP01-24_11162010		GW-HP01-36_11182010	
Laboratory I.D.:		460-27896-3		460-27896-1		460-27896-1		460-27739-2		460-27739-1		460-43859-3		460-21317-5		460-21317-5		460-20090-1		460-20142-2	
Sample Date:		6/20/2011		6/20/2011		6/20/2011		6/15/2011		6/15/2011		8/23/2012		12/17/2010		12/17/2010		11/16/2010		11/18/2010	
Sample Depth (feet):		47-50		75-78		75-78		40-43		60-63		105-105		18-18		18-18		24-24		36-36	
Source:		TAIE		0		TAIE		TAIE		TAIE		TAIE		0		TAIE		TAIE		TAIE	
Analytes:	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	U	5	U	5	U	5	U	75.7		28.2	J	5	U	5.62	B	5.31	J	14.8	J	5.1	J
Aluminum																					
Barium																					
Calcium																					
Iron																					
Magnesium																					
Manganese																					
Potassium																					
Sodium																					
Zinc																					
Bis(2-ethylhexyl)phthalate																					
1,1,1-Trichloroethane	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.06	U	0.25	U	0.25	U	0.73	J	0.25	U
1,1-Dichloroethane	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.13	U	0.1	U	0.1	U	1.3		0.22	J
1,1-Dichloroethene	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.09	U	0.14	U	0.14	U	0.77	J	0.4	J
1,4-Dioxane	U	8.4	R	8.4	R	8.4	R	8.4	R	8.4	R	0.31	R	0.88	R	0.88	R	8.4	R	8.4	R
2-Butanone	U	0.82	U	0.82	U	1.6	J	0.82	U	0.82	U	2.3	R	0.82	U	0.82	U	0.82	R	1.9	J
2-Chloroethyl vinyl ether	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-Hexanone	U	0.55	R	0.55	R	0.55	R	0.55	R	0.55	R	0.5	U	0.55	U	0.55	U	0.55	U	0.55	U
4-Methyl-2-pentanone	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.99	U	0.68	U	0.68	U	0.68	U	0.68	U
Acetone	U	2.5	R	7.9	J	8.3	J	2.5	R	2.5	R	1400	D	2.5	U	2.5	U	2.5	U	6.3	J
Acrolein	U	1.9	R	1.9	R	1.9	R	1.9	R	1.9	R	1.3	R	1.9	R	1.9	R	1.9	R	1.9	R
Acrylonitrile	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.68	U	0.3	U	0.3	U	0.3	U	0.3	U
Benzene	U	0.13	U	0.13	U	0.13	U	0.13	U	0.23	J	0.23	J	0.13	U	0.13	U	0.13	U	0.49	J
Bromodichloromethane	U	0.39	J	0.43	J	0.45	J	0.093	U	0.093	U	0.12	U	0.093	U	0.093	U	0.093	U	0.093	U
Carbon disulfide	U	0.15	U	0.15	U	0.15	U	0.15	U	0.18	J	0.13	U	0.15	U	0.15	U	0.15	U	0.15	U
Carbon tetrachloride	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.06	U	0.19	U	0.19	U	0.19	U	0.19	U
Chlorobenzene	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.11	U	0.16	U	0.16	U	0.16	U	0.16	U
Chloroform		8.5		19		19		6.2		14		2.8		0.15	U	0.15	U	0.15	U	0.15	U
Chloromethane	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.1	U	0.21	U	0.21	U	0.21	U	0.21	U
cis-1,2-Dichloroethene	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.18	U	0.2	U	0.2	U	7.4		0.78	J
Dichlorodifluoromethane	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.22	U	0.29	U	0.29	U	0.29	U	0.29	U
Ethylbenzene	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.1	U	0.25	U	0.25	U	0.25	U	0.25	U
m/p-Xylene	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.25	U								
Methylene chloride	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.18	U	0.19	U	0.19	U	0.19	U	0.19	U
o-Xylene	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.13	U								
Tetrachloroethene	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.11	J	0.2	U	0.2	U	0.2	U	0.2	U
Toluene	U	0.09	U	0.16	J	0.18	J	1.4		1.3		5.9		0.09	U	0.09	U	0.25	J	2	
trans-1,2-Dichloroethene	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.14	U	0.14	U	0.19	J	0.14	U
Trichloroethene	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.58	J	0.18	U	0.18	U	210		21	
Trichlorofluoromethane	J	0.2	J	0.16	U	0.16	U	0.16	U	0.16	U	0.15	U	0.16	U	0.16	U	0.16	U	0.16	U
Vinyl chloride	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.14	U	0.13	U	0.13	U	0.91	J	0.13	U
Xylenes, Total	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.36	U	0.43	U	0.43	U	0.43	U	0.43	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	HP01		HP02		HP03		HP04		HP04		HP04		HP04		HP05		HP11		HP14A		HP15		RMW-04S-2		RMW-01D	
Sample Name:	GW-HP01-48_11182010		GW-HP02-36		GW-HP03-24		GW-HP04-28		GW-HP04-40		GW-HP04-58		GW-HP04-58		GW-HP05-42		GW-HP11-32		GW-HP14A-36		GW-HP15-20		GW-RMW-04S-60_05102011		RMW-01D-1	
Laboratory I.D.:	460-20142-1		460-20628-2		460-20598-3		460-20598-4		460-20598-5		460-20628-1		460-20628-1		460-20685-3		460-21317-3		460-21487-4		460-21487-3		460-26340-1		460-74190-7	
Sample Date:	11/18/2010		12/2/2010		11/30/2010		12/1/2010		12/1/2010		12/2/2010		12/2/2010		12/3/2010		12/16/2010		12/21/2010		12/21/2010		5/10/2011		4/8/2014	
Sample Depth (feet):	48-48		36-36		24-24		28-28		40-40		58-58		58-58		42-42		32-32		36-36		20-20		60-60		138-153	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		0		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	5	U			49.4	J	49.2	J	125	J	9.72	J	31.7	J	15.2	J	98.5	B	54.4		7.61	B	5	U		
Aluminum																										
Barium																										
Calcium																										
Iron																										
Magnesium																										
Manganese																										
Potassium																										
Sodium																										
Zinc																										
Bis(2-ethylhexyl)phthalate																							2.3	U		
1,1,1-Trichloroethane	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.58	J	2.4	
1,1-Dichloroethane	0.39	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.56	J	0.1	U	0.1	U	0.1	U	0.31	J
1,1-Dichloroethene	0.56	J	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	1.2	
1,4-Dioxane	8.4	R	8.4	R	0.88	R	0.88	R	0.88	R	8.4	R	8.4	R	8.4	R	0.88	R	0.88	R	0.88	R	8.4	R	2	
2-Butanone	5.5	J	2.6	L	16		0.82	U	6.4	J	0.82	R	0.82	R	0.82	R	1.2	J	0.82	R	0.82	R	0.82	R	2.3	U
2-Chloroethyl vinyl ether	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	0.34	U
2-Hexanone	0.55	U	0.55	U	1.8	J	0.55	U	0.55	U	0.55	U	0.55	U	0.55	U	0.55	U	0.55	U	0.55	U	0.55	U	0.5	U
4-Methyl-2-pentanone	0.68	U	0.68	U	0.81	J	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.99	U
Acetone	16		18		90		2.5	U	30		2.5	U	2.5	U	2.5	U	21		2.5	R	2.5	R	2.5	U	2.7	U
Acrolein	1.9	R	1.9	U	1.9	R	1.9	R	1.9	R	1.9	U	1.9	U	1.9	U	1.9	R	1.9	R	1.9	R	1.9	R	1.3	U
Acrylonitrile	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.68	U
Benzene	0.85	J	0.13	U	0.84	L	0.13	U	0.28	J	0.13	U	0.13	U	0.13	U	0.49	J	0.13	U	0.13	U	0.13	U	0.13	J
Bromodichloromethane	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.12	U
Carbon disulfide	0.15	U	0.37	J	0.38	J	0.15	J	0.19	J	0.15	U	0.15	U	0.15	U	0.81	J	0.15	U	0.15	U	0.15	U	0.13	U
Carbon tetrachloride	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.37	J	0.35	J	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.06	U
Chlorobenzene	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.11	U
Chloroform	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.42	J
Chloromethane	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.1	U
cis-1,2-Dichloroethene	1.3		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	2.9		0.2	U	0.2	U	0.2	U	0.97	J
Dichlorodifluoromethane	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.39	J
Ethylbenzene	0.25	U	0.25	U	0.29	L	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.1	U
m/p-Xylene																							0.29	U	0.25	U
Methylene chloride	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.18	U
o-Xylene																							0.15	U	0.13	U
Tetrachloroethene	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.39	J
Toluene	10		0.09	U	6.7	L	0.91	J	0.37	J	0.09	U	0.09	U	0.09	U	0.57	J	0.09	U	0.09	U	0.09	U	1.9	
trans-1,2-Dichloroethene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U
Trichloroethene	37		0.18	U	0.18	U	0.32	J	0.94	J	0.2	J	0.2	J	0.18	U	15		0.18	U	0.18	U	31		310	
Trichlorofluoromethane	0.16	U	0.16	U	0.16	U	0.16	U	0.4	J	1.6		1.2		0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.52	J
Vinyl chloride	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.62	J	0.13	U	0.13	U	0.13	U	0.14	U
Xylenes, Total	0.43	U	0.43	U	0.48	L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.13	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-01D		RMW-01D		RMW-01D		RMW-01D		RMW-01D		RMW-01D		RMW-01D		RMW-01D		RMW-01D		RMW-01D	
Sample Name:	RMW-01D-1-052113		RMW-01D-1-09112013		RMW-01D-138-153		RMW-01D-2		RMW-01D-200-215		RMW-01D-2-052113		RMW-01D-2-09112013		RMW-01D-298-318		RMW-01D-3		RMW-01D-3-052113	
Laboratory I.D.:	460-56505-6		460-63058-5		460-54501-1		460-74190-8		460-54501-2		460-56505-7		460-63058-4		460-54501-3		460-74190-9		460-56505-8	
Sample Date:	5/21/2013		9/11/2013		4/18/2013		4/8/2014		4/18/2013		5/21/2013		9/11/2013		4/18/2013		4/8/2014		5/21/2013	
Sample Depth (feet):	138-153		138-153		138-153		200-215		200-215		200-215		200-215		298-318		298-318		298-318	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	5	U			5	U			5	U	5	U			5	U			5	U
Aluminum																				
Barium																				
Calcium																				
Iron	73.6	U																		
Magnesium																				
Manganese																				
Potassium																				
Sodium																				
Zinc																				
Bis(2-ethylhexyl)phthalate																				
1,1,1-Trichloroethane	0.74	J	0.8	J	0.095	J	0.16	J	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.31	J	0.3	J	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,4-Dioxane							0.5	U									0.5	U		
2-Butanone	2.3	U	2.3	U	3.7	J	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	20	U	0.34	U	20	U	0.34	U	20	U	20	U	0.34	U	20	U	0.34	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	13		12	D	2.7	U	2.7	R	2.7	U	2.7	U	2.7	R	2.7	U	2.7	U
Acrolein	1.3	U	1.3	U	1.3	R	1.3	U	1.3	R	1.3	U	1.3	U	1.3	R	1.3	U	1.3	U
Acrylonitrile	0.68	U	0.68	U	0.68	R	0.68	U	0.68	R	0.68	U	0.68	U	0.68	R	0.68	U	0.68	U
Benzene	0.08	U	0.16	J	0.95	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	1.5		2		0.73	J	0.08	U	0.08	U	0.08	U	0.08	U	0.26	J	0.11	J	0.19	B
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.31	J	0.29	J	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.62	J	0.52	J	0.42	J	0.34	J	0.62	J	0.49	J	2.3		2.6		0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U	0.43	J	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	20		17		19		0.15	U	1.1		0.38	B	0.22	J	0.69	J	0.15	U	0.32	B
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	99		100		13		13		11		12		11		2		1.9		2	
Trichlorofluoromethane	0.79	L	0.96	J	0.84	J	0.75	J	0.61	J	0.15	U	0.87	J	4.2		4.6		4.6	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.36	U	0.13	U	0.36	U	0.13	U	0.13	U	0.36	U	0.13	U	0.13	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-01D		RMW-01S-1		RMW-01S-1		RMW-01S-1		RMW-01S-2		RMW-01S-2		RMW-01S-2		RMW-02D		RMW-02D		RMW-02D		RMW-02S-1	
Sample Name:	RMW-01D-3-09112013		RMW-01S-1		RMW-01S-1-052113-42		RMW-01S-1-09112013-42		RMW-01S-2		RMW-01S-2-052113-110		RMW-01S-2-09112013-110		RMW-02D		RMW-02D-051413-173		RMW-02D-091913-173		RMW-02S-1	
Laboratory I.D.:	460-63058-6		460-74190-6		460-56505-4		460-63058-7		460-74197-5		460-56505-5		460-63058-9		460-74286-5		460-56074-16		460-63420-17		460-35111-1	
Sample Date:	9/11/2013		4/8/2014		5/21/2013		9/11/2013		4/9/2014		5/21/2013		9/11/2013		4/10/2014		5/14/2013		9/19/2013		12/21/2011	
Sample Depth (feet):	298-318		42-42		42-42		42-42		110-110		110-110		110-110		173-173		173-173		173-173		45.5-45.5	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde					5	U					5	U					5	U			5	U
Aluminum																					179	J
Barium																					29.7	J
Calcium																					10800	
Iron					15400	L					2940	L					73.6	U			281	
Magnesium																					2540	J
Manganese																					15.3	
Potassium																					823	J
Sodium																					6250	
Zinc																					53.4	
Bis(2-ethylhexyl)phthalate																					2	U
1,1,1-Trichloroethane	0.06	U	21		13		21		0.06	U	1.8		2.4		0.06	U	0.06	U	0.06	U	1	
1,1-Dichloroethane	0.13	U	36		33		41		0.13	U	0.91	J	0.84	J	0.13	U	0.13	U	0.13	U	0.1	U
1,1-Dichloroethene	0.09	U	4.6		2.5		4		0.54	J	0.09	U	0.17	J	0.09	U	0.09	U	0.09	U	0.14	U
1,4-Dioxane			0.5		70		74		1.8		3.3	L	3.1		0.5	U	0.31	U	0.31	U	0.89	R
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	0.82	R
2-Chloroethyl vinyl ether	0.34	U	0.34	U	2.3	J	0.34	U	0.34	U	20	U	0.34	U	0.34	U	20	U	0.34	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.55	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.68	U
Acetone	9.6		2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	R	2.7	U	2.5	U
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	R	1.3	U	1.9	U
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.3	U
Benzene	0.08	U	0.08	U	0.08	U	0.12	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.12	J	0.13	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.093	U
Carbon disulfide	0.13	U	0.13	U	0.18	J	0.13	U	0.13	U	0.4	J	0.13	U	0.13	U	0.13	U	0.13	U	0.15	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.34	J	0.31	J	0.27	J	0.19	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.16	U
Chloroform	0.14	J	0.08	U	0.08	U	0.08	U	0.19	J	0.79	B	0.7	J	0.08	U	0.08	U	0.08	U	0.15	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.21	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.45	J	0.95	J	0.7	J	0.18	U	0.18	U	0.18	U	0.2	U
Dichlorodifluoromethane	3.3		0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	2.8		0.22	U	0.46	J	0.29	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.14	J	0.25	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.45	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	1	J	0.29	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.24	J	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.19	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.2	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.58	J	0.15	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.13	J	0.1	U	0.24	J	0.1	U	0.1	U	0.1	U	0.2	U
Toluene	1.5		0.15	U	1.1	B	0.46	J	0.17	J	2.3	B	0.15	U	0.25	J	1.4		0.52	J	0.09	U
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.14	U
Trichloroethene	1		0.29	J	0.09	U	0.09	U	110		58		110		7.7		8.4		6.7		39	
Trichlorofluoromethane	5.8	J	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.87	J	0.76	J	0.99	J	0.16	U
Vinyl chloride	0.14	U	3.8		0.14	U	4.2		0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U
Xylenes, Total	0.13	U	0.13	U	0.13	U	0.65	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	1.6	J	0.43	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-02S-1		RMW-02S-1		RMW-02S-1		RMW-02S-1		RMW-02S-2		RMW-02S-2		RMW-02S-2		RMW-02S-2		RMW-02S-2		RMW-03D	
Sample Name:	RMW-02S-1		RMW-02S-1		RMW-02S-1-051313-45.5		RMW-02S-1-091913-45.5		RMW-02S-2		RMW-02S-2		RMW-02S-2		RMW-02S-2-051313-65		RMW-02S-2-091913-65		RMW-03D-052113-206	
Laboratory I.D.:	460-39047-8		460-74286-6		460-56003-4		460-63420-11		460-35111-2		460-39047-9		460-74286-7		460-56003-5		460-63420-15		460-56505-10	
Sample Date:	4/12/2012		4/10/2014		5/13/2013		9/19/2013		12/21/2011		4/12/2012		4/10/2014		5/13/2013		9/19/2013		5/21/2013	
Sample Depth (feet):	44-46		45.5-45.5		45.5-45.5		45.5-45.5		65-65		63-65		65-65		65-65		65-65		206-206	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde					5	U			5	U					5	U			5	U
Aluminum									569											
Barium									29.6	J										
Calcium									8600											
Iron					209	L			1110						923	L				
Magnesium									2210	J										
Manganese									298											
Potassium									1130	J										
Sodium									7620											
Zinc									8.9	J										
Bis(2-ethylhexyl)phthalate									2	U										
1,1,1-Trichloroethane	1		0.06	U	0.06	U	0.06	U	1.6		1.6		2		1.1		1.5		0.06	U
1,1-Dichloroethane	1.5		0.13	U	0.35	J	0.73	J	0.1	U	0.29	J	0.13	U	0.2	J	0.25	J	0.13	U
1,1-Dichloroethene	0.85	J	0.09	U	0.16	J	0.4	J	0.45	J	0.54	J	0.81	J	0.42	J	0.56	J	0.09	U
1,4-Dioxane			3.4		2.5		5.2		3.6	J			2.3		1.8	J	1.9	J	0.31	U
2-Butanone	2.3	R	2.3	U	2.3	U	2.3	U	0.82	R	2.3	R	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	20	U	0.34	U	20	U	0.34	U	20	U	20	U	0.34	U	20	U	0.34	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.55	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.68	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.5	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.9	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.3	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.08	U	0.08	U	0.08	U	0.14	J	0.13	U	0.08	U	0.08	U	0.08	U	0.12	J	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.093	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.15	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.19	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.16	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.13	J	0.08	U	0.15	U	0.16	J	0.08	U	0.08	U	0.08	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.21	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.78	J	0.61	J	0.4	J	0.81	J	0.2	U	0.18	U	0.18	U	0.23	J	0.27	J	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.29	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.13	J	0.25	U	0.1	U	0.1	U	0.1	U	0.18	J	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.72	J	0.29	U	0.25	U	0.25	U	0.25	U	0.74	J	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.19	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.39	J	0.15	U	0.13	U	0.13	U	0.13	U	0.42	J	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.21	J	0.1	U	0.22	J	0.22	J	0.1	U
Toluene	0.15	U	0.15	U	0.24	J	0.63	J	0.09	U	0.15	U	0.15	U	0.77	J	0.56	J	2.7	B
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	32		16		11		17		100		83		130		70		94		0.09	U
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.16	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.29	J	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.36	U	0.13	U	0.13	U	1.1	J	0.43	U	0.36	U	0.13	U	0.13	U	1.2	J	0.13	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-03D		RMW-03S		RMW-03S		RMW-04S-1		RMW-04S-1		RMW-04S-1		RMW-04S-1		RMW-04S-1		RMW-04S-2		RMW-04S-2	
Sample Name:	RMW-03D-09112013-206.5		RMW-03S-052113-92.6		RMW-03S-09112013-92.5		RMW-04S-1		RMW-04S-1		RMW-04S-1		RMW-04S-1-051013-40		RMW-04S-1-091913-40		RMW-04S-2		RMW-04S-2	
Laboratory I.D.:	460-63058-13		460-56505-9		460-63058-8		460-35111-3		460-39047-6		460-74186-14		460-55866-9		460-63420-16		460-35111-4		460-39047-7	
Sample Date:	9/11/2013		5/21/2013		9/11/2013		12/21/2011		4/11/2012		4/7/2014		5/10/2013		9/19/2013		12/21/2011		4/11/2012	
Sample Depth (feet):	206.5-206.5		92.6-92.6		92.5-92.5		40-40		38-40		40-40		40-40		40-40		65-65		64-66	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde			7.65	B			5	U					5	U			5	U		
Aluminum							345										521			
Barium							33.4	J									62	J		
Calcium							12300										15900			
Iron							551						200	L			866			
Magnesium							3060	J									4770	J		
Manganese							29.4										7820			
Potassium							876	J									1490	J		
Sodium							7220										102000			
Zinc							5.9	J									6.6	J		
Bis(2-ethylhexyl)phthalate							2.1	U									6.2	J		
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.39	J	0.68	J	0.5	J	0.06	U	0.06	U	3.6		0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.1	U	0.13	U	0.15	J	0.13	U	0.13	U	2		0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.14	U	0.09	U	0.09	U	0.09	U	0.09	U	1.2		0.09	U
1,4-Dioxane			0.31	U	3.1		22	J			1.6		0.31	U			23	J		
2-Butanone	2.3	J	2.3	U	2.3	U	0.82	R	2.3	R	2.3	U	2.3	U	2.3	U	0.82	R	2.3	R
2-Chloroethyl vinyl ether	0.34	U	20	U	0.34	U	20	U	20	U	0.34	U	20	U	0.34	U	20	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.55	U	0.5	U	0.5	U	0.5	U	0.5	U	0.55	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.68	U	0.99	U	0.99	U	0.99	U	0.99	U	0.68	U	0.99	U
Acetone	23		6.1		2.7	U	2.5	U	2.7	U	2.7	U	2.7	U	2.7	U	2.5	U	2.7	U
Acrolein	1.3	U	1.3	U	1.3	U	1.9	U	1.3	U	1.3	U	1.3	U	1.3	U	1.9	U	1.3	U
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.3	U	0.68	U	0.68	U	0.68	U	0.68	U	0.3	U	0.68	U
Benzene	0.08	U	0.08	U	0.092	J	0.13	U	0.08	U	0.08	U	0.08	U	0.08	U	0.13	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.093	U	0.12	U	0.12	U	0.12	U	0.12	U	0.093	U	0.12	U
Carbon disulfide	0.13	U	0.24	J	0.13	U	0.15	U	0.13	U	0.13	U	0.13	U	0.13	U	0.15	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.19	U	0.06	U	0.06	U	0.06	U	0.06	U	0.19	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.16	U	0.11	U	0.11	U	0.11	U	0.11	U	0.16	U	0.11	U
Chloroform	0.08	U	1	B	0.26	J	0.15	U	0.08	U	0.08	U	0.08	U	0.08	U	0.15	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.21	U	0.1	U	0.1	U	0.1	U	0.1	U	0.21	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.2	U	0.18	U	0.19	J	0.18	U	0.18	U	0.52	J	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.29	U	0.22	U	0.22	U	0.22	U	0.22	U	0.29	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.25	U	0.1	U	0.1	U	0.1	U	0.1	U	0.25	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.29	U	0.25	U	0.25	U	0.25	U	0.25	U	0.29	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.19	U	0.18	U	0.18	U	0.18	U	0.18	U	0.19	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.15	U	0.13	U	0.13	U	0.13	U	0.14	J	0.15	U	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.14	J	0.1	U	0.1	U	0.2	U	0.1	U
Toluene	0.15	U	1.4	B	0.16	J	0.09	U	0.15	U	0.15	U	0.29	J	0.19	J	0.09	U	0.15	U
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13	U	0.14	U	0.13	U
Trichloroethene	0.09	U	0.09	U	0.09	U	27		31		30		28		29		58		21	
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.16	U	0.15	U	0.15	U	0.15	U	0.15	U	0.16	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.13	U	0.43	U	0.36	U	0.13	U	0.13	U	0.14	J	0.43	U	0.36	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-04S-2		RMW-04S-2		RMW-04S-2		RMW-04S-3		RMW-04S-3		RMW-04S-3		RMW-04S-3		RMW-05S		RMW-05S		RMW-05S	
Sample Name:	RMW-04S-2		RMW-04S-2-051013-65		RMW-04S-2-091913-65		RMW-04S-3		RMW-04S-3-050913-130		RMW-04S-3-050913-130		RMW-04S-3-091913-130		RMW-05S		RMW-05S-051013-119		RMW-05S-091313-114	
Laboratory I.D.:	460-74186-15		460-55866-10		460-63420-10		460-74186-16		460-55767-1		460-55767-1		460-63420-5		460-39047-2		460-55866-7		460-63068-9	
Sample Date:	4/7/2014		5/10/2013		9/19/2013		4/7/2014		5/9/2013		5/9/2013		9/19/2013		4/11/2012		5/10/2013		9/13/2013	
Sample Depth (feet):	65-65		65-65		65-65		130-130		130-130		130-130		130-130		115-117		119-119		114-114	
Source:	TAIE		TAIE		TAIE		TAIE		0		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde			5	U					5	U	5	U					5	U		
Aluminum																				
Barium																				
Calcium																				
Iron			1530	L					163	L	200	L								
Magnesium																				
Manganese																				
Potassium																				
Sodium																				
Zinc																				
Bis(2-ethylhexyl)phthalate																				
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,4-Dioxane	0.52	J	0.31	U			0.5	U	0.31	U	0.31	U					0.31	U		
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	R	2.3	U	2.3	U
2-Chloroethyl vinyl ether	0.34	U	20	U	0.34	U	0.34	U	20	U	20	U	0.34	U	0.34	U	20	U	0.34	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.16	J	0.08	U	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.15	J	0.21	J	0.88	J	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.66	J	0.67	J	0.53	J	0.21	J	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.19	B	1.4		2.2		2		0.25	J	0.08	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.66	J	0.74	J	0.62	J	0.56	J	0.22	U	1.6		1.1	
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.27	J	0.12	J	0.1	U	0.31	J
m/p-Xylene	0.25	U	0.25	U	0.46	J	0.25	U	0.25	U	0.25	U	1.1	J	0.36	J	0.25	U	1	J
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.24	J	0.13	U	0.13	U	0.13	U	0.7	J	0.13	J	0.13	U	0.66	J
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.15	U	0.46	J	0.32	J	0.21	J	0.87	J	0.84	J	0.87	J	0.42	J	1.5		0.86	J
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	14		13		12		5.4		5.8		4.1		2.7		0.18	J	0.38	J	0.28	J
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	2.1		2.1		1.7		1.7		0.15	U	1.8		2	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.13	J	0.13	U	0.13	U	0.13	U	1.8	J	0.5	J	0.13	U	1.7	J

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D	
Sample Name:	RMW-06D-1		RMW-06D-1		RMW-06D-1		RMW-06D-1-051513		RMW-06D-1-091913		RMW-06D-2		RMW-06D-2		RMW-06D-2		RMW-06D-2-051513		RMW-06D-2-091913		RMW-06D-3		RMW-06D-3	
Laboratory I.D.:	460-48795-1		460-50120-1		460-74186-6		460-56233-4		460-63420-6		460-48795-2		460-50120-2		460-74186-7		460-56233-5		460-63420-7		460-48795-3		460-50120-3	
Sample Date:	12/20/2012		1/30/2013		4/7/2014		5/15/2013		9/19/2013		12/20/2012		1/30/2013		4/7/2014		5/15/2013		9/19/2013		12/20/2012		1/30/2013	
Sample Depth (feet):	155-165		155-165		155-165		155-165		155-165		177-187		177-187		177-187		177-187		177-187		190-200		190-200	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	5	U	5	U			5	U			5	U	5	U			5	U			9.02	J	5	U
Aluminum																								
Barium																								
Calcium																								
Iron																								
Magnesium																								
Manganese																								
Potassium																								
Sodium																								
Zinc																								
Bis(2-ethylhexyl)phthalate																								
1,1,1-Trichloroethane	0.06	U	0.39	J	0.27	J	0.41	J	0.06	U	0.06	U	0.25	J	0.17	J	0.19	J	0.06	U	0.06	U	0.8	J
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.2	J	0.15	J	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.62	J
1,4-Dioxane					0.5	U									0.5	U								
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	20	U	20	U	0.34	U	20	U	0.34	U	20	U	20	U	0.34	U	20	U	0.34	U	20	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	38		2.7	U	2.7	U	11	L	2.7	U	34		2.7	U	2.7	U	2.7	R	2.7	U	62		2.7	U
Acrolein	1.3	R	1.3	R	1.3	U	1.3	R	1.3	U	1.3	R	1.3	R	1.3	U	1.3	R	1.3	U	1.3	R	1.3	R
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.35	J
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	J	0.1	U	0.1	U	0.26	J
Toluene	0.5	J	0.45	J	0.15	U	0.23	J	0.15	U	1.1		0.15	J	0.15	U	0.15	U	0.15	U	0.89	J	0.31	J
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	8.2		60		33		57		54		5.6		35		21		26		21		5.3		150	
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.36	U	0.36	U	0.13	U	0.13	U	0.13	U	0.36	U	0.36	U	0.13	U	0.13	U	0.13	U	0.36	U	0.36	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D	
Sample Name:	RMW-06D-3		RMW-06D-3		RMW-06D-3-051613		RMW-06D-3-091913		RMW-06D-3-091913		RMW-06D-4		RMW-06D-4		RMW-06D-4		RMW-06D-4-051513		RMW-06D-4-091913		RMW-06D-5	
Laboratory I.D.:	460-74186-8		460-74186-8		460-56273-5		460-63420-8		460-63420-8		460-48795-4		460-50120-4		460-74186-9		460-56233-18		460-63420-9		460-48795-5	
Sample Date:	4/7/2014		4/7/2014		5/16/2013		9/19/2013		9/19/2013		12/20/2012		1/30/2013		4/7/2014		5/15/2013		9/19/2013		12/20/2012	
Sample Depth (feet):	190-200		190-200		190-200		190-200		190-200		242-252		242-252		242-252		242-252		242-252		259-269	
Source:	0		TAIE		TAIE		0		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde					5	U					11.3	J	5	U			5.2	B			5	U
Aluminum																						
Barium																						
Calcium																						
Iron					92.1	J																
Magnesium																						
Manganese																						
Potassium																						
Sodium																						
Zinc																						
Bis(2-ethylhexyl)phthalate																						
1,1,1-Trichloroethane	0.4	J	0.41	J	0.95	J	0.06	U	0.06	U	0.06	U	0.51	J	0.47	J	0.34	J	0.06	U	0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.25	J	0.18	J	0.38	J	0.41	J	0.09	U	0.09	U	0.28	J	0.12	J	0.16	J	0.09	U
1,4-Dioxane	0.5	U	0.5	U											0.55	J						
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	0.34	U	0.34	U	20	U	0.34	U	0.34	U	20	U	20	U	0.34	U	20	U	0.34	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	62		2.7	U	2.7	U	380	L	2.7	U	46	
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	R	1.3	R	1.3	U	1.3	R	1.3	U	1.3	R
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.12	J	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.67	J	0.7	J	0.39	J	0.57	J	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.3	J	0.21	B	0.28	J	0.29	J	0.08	U
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.34	J	0.33	J	0.29	J	0.18	U	0.32	J	0.36	J	0.3	J	0.3	J	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	1.2		0.22	U	1.1		0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Tetrachloroethene	0.1	U	0.18	J	0.21	J	0.18	J	0.27	J	0.1	U	0.17	J	0.22	J	0.11	J	0.1	U	0.1	U
Toluene	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	2.8		0.36	J	0.15	U	2.6		0.17	J	2.9	
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	64		63		140		130		130		13		95		85		62		86		5.6	
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	7.8	J	5.4		3.4		5.9		0.24	J
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.36	U	0.36	U	0.13	U	0.13	U	0.13	U	0.36	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D	
Sample Name:	RMW-06D-5		RMW-06D-5		RMW-06D-5		RMW-06D-5-051613		RMW-06D-5-091913		RMW-06D-6		RMW-06D-6		RMW-06D-6		RMW-06D-6-051613		RMW-06D-6-051613		RMW-06D-6-091913		RMW-06D-7	
Laboratory I.D.:	460-50120-5		460-50120-5		460-74186-10		460-56273-15		460-63420-12		460-48795-6		460-50120-6		460-74186-11		460-56273-16		460-56273-16		460-63420-13		460-48795-7	
Sample Date:	1/30/2013		1/30/2013		4/7/2014		5/16/2013		9/19/2013		12/20/2012		1/30/2013		4/7/2014		5/16/2013		5/16/2013		9/19/2013		12/20/2012	
Sample Depth (feet):	259-269		259-269		259-269		259-269		259-269		275-285		275-285		275-285		275-285		275-285		275-285		309-319	
Source:	0		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		0		TAIE		TAIE		0	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	5	U	5	U			5	U			5	U	5	U			5	U	5	U			5	U
Aluminum																								
Barium																								
Calcium																								
Iron																								
Magnesium																								
Manganese																								
Potassium																								
Sodium																								
Zinc																								
Bis(2-ethylhexyl)phthalate																								
1,1,1-Trichloroethane	0.28	J	0.06	U	0.46	J	0.65	J	0.4	J	0.06	U	0.42	J	0.52	J	0.54	J	0.52	J	0.06	U	0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.31	J	0.33	J	0.2	J	0.09	U	0.09	U	0.29	J	0.27	J	0.25	J	0.16	J	0.09	U
1,4-Dioxane					0.52	J									0.5	U								
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	20	U	20	U	0.34	U	20	U	0.34	U	20	U	20	U	0.34	U	20	U	20	U	0.34	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	28		290		2.7	U	2.7	U	2.7	U	57		14		2.7	U	2.7	U	2.7	U	2.7	U	20	
Acrolein	1.3	R	1.3	R	1.3	U	1.3	U	1.3	U	1.3	R	1.3	R	1.3	U	1.3	U	1.3	U	1.3	U	1.3	R
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.08	U	0.35	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.34	J
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.3	J	0.26	J	0.75	J	1		0.68	J	0.06	U	0.73	J	0.98	J	1		1		0.82	J	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.22	J	0.26	J	0.19	B	0.28	J	0.08	U	0.08	U	0.25	J	0.18	B	0.2	J	0.21	J	0.08	U	0.45	J
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.28	J	0.22	J	0.39	J	0.44	J	0.33	J	0.18	U	0.33	J	0.42	J	0.41	J	0.43	J	0.26	J	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	1.1		0.22	U	1.2		0.22	U	0.22	U	1.4		0.22	U	0.22	U	1.4		0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.37	J
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.3	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	1.1	J
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.52	J
Tetrachloroethene	0.11	J	0.1	U	0.1	U	0.14	J	0.21	J	0.1	U	0.17	J	0.29	J	0.21	J	0.17	J	0.17	J	0.1	U
Toluene	1.1		5.4		0.26	J	0.36	J	0.15	J	12		2.4		0.15	U	0.41	J	0.28	J	0.2	J	63	
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	66		51		90		110		87		20		96		110		99		100		71		21	
Trichlorofluoromethane	2.1		1.7	J	5.5		7.6	J	7		0.15	U	8.2	J	5.9		6.7	J	6.6	J	7.1		1.6	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.36	U	0.36	U	0.13	U	0.13	U	0.13	U	0.36	U	0.36	U	0.13	U	0.13	U	0.13	U	0.13	U	1.6	J

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06D		RMW-06S		RMW-06S		RMW-06S		RMW-06S		RMW-07D	
Sample Name:	RMW-06D-7		RMW-06D-7		RMW-06D-7		RMW-06D-7-051613		RMW-06D-7-091913		RMW-06D-TAG		RMW-06S		RMW-06S		RMW-06S-051313-120		RMW-06S-091913-115		RMW-07D-050613-156	
Laboratory I.D.:	460-48795-7		460-50120-7		460-74186-12		460-56273-17		460-63420-14		460-74286-13		460-39047-4		460-74190-13		460-56003-6		460-63420-19		460-55539-3	
Sample Date:	12/20/2012		1/30/2013		4/7/2014		5/16/2013		9/19/2013		4/10/2014		4/11/2012		4/8/2014		5/13/2013		9/19/2013		5/6/2013	
Sample Depth (feet):	309-319		309-319		309-319		309-319		309-319		0-0		115-116		115-115		120-120		115-115		156-156	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		0	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	5	U	5	U			5	U									5	U			5	U
Aluminum																						
Barium																						
Calcium																						
Iron																	21400	L				
Magnesium																						
Manganese																						
Potassium																						
Sodium																						
Zinc																						
Bis(2-ethylhexyl)phthalate																						
1,1,1-Trichloroethane	0.06	U	0.2	J	0.32	J	0.45	J	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.14	J	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,4-Dioxane					0.5	U					5.4				0.5	U	0.31	U	0.31	U	0.31	U
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	R	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	20	U	20	U	0.34	U	20	U	0.34	U	0.34	U	20	U	0.34	U	20	U	0.34	U	20	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	25		36		2.7	U	2.7	U	2.7	U	50		2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	1.3	R	1.3	R	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.38	J	0.08	U	0.08	U	0.08	U	0.08	U	0.46	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	4.5	B	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.16	J	0.75	J	0.72	J	0.47	J	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.23	J	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.3	J	0.51	J	0.3	B	0.79	J	0.69	J	0.23	J	0.08	U	0.08	U	0.08	U	0.08	U	0.28	J
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.27	J	0.33	J	0.24	J	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	1.4		0.22	U	1		0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	1.1	
Ethylbenzene	0.38	J	0.1	U	0.1	U	0.1	U	0.1	U	0.19	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	1.1	J	0.25	U	0.25	U	0.25	U	0.25	U	0.46	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.78	J	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.4	J	0.13	U	0.13	U	0.13	U	0.13	U	0.22	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.17	J	0.12	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	56		1.4		0.47	J	1.4		0.66	J	98		0.25	J	0.31	J	0.82	J	0.15	U	2.4	
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	21		36		58		82		65		0.17	J	0.09	U	0.09	U	0.26	J	0.09	U	0.82	J
Trichlorofluoromethane	1.6		1.2	J	8		5.2	J	5.4		0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	2.3	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	1.5	J	0.36	U	0.13	U	0.13	U	0.13	U	0.67	J	0.36	U	0.13	U	0.13	U	0.13	U	0.13	U

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-7. Sample Results for the Surrounding Industrial Properties Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-07D		RMW-07D		RMW-07S		RMW-07S		RMW-07S	
Sample Name:	RMW-07D-050613-156		RMW-07D-09122013-148.5		RMW-07S		RMW-07S-050613-45		RMW-07S-09122013-45	
Laboratory I.D.:	460-55539-3		460-63058-25		460-38988-9		460-55539-6		460-63058-20	
Sample Date:	5/6/2013		9/12/2013		4/10/2012		5/6/2013		9/12/2013	
Sample Depth (feet):	156-156		148.5-148.5		43-45		45-45		45-45	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q	ug/l	Q
Formaldehyde	5	U					5	U		
Aluminum										
Barium										
Calcium										
Iron										
Magnesium										
Manganese										
Potassium										
Sodium										
Zinc										
Bis(2-ethylhexyl)phthalate										
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethane	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,4-Dioxane	0.31	U					0.31	U		
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
2-Chloroethyl vinyl ether	20	U	0.34	U	20	U	20	U	0.34	U
2-Hexanone	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Acrylonitrile	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U
Benzene	0.08	U	0.65	J	0.08	U	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.27	J	0.29	J	0.45	J	0.32	J	0.37	J
Chloromethane	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	1.2		0.64	J	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.29	J	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	1.4	J	0.25	U	0.25	U	0.31	J
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.75	J	0.13	U	0.13	U	0.13	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	1.9		2.3		0.15	U	0.59	J	0.29	J
trans-1,2-Dichloroethene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Trichloroethene	0.79	J	0.29	J	0.31	J	0.33	J	0.24	J
Trichlorofluoromethane	2.4		1		0.34	J	0.18	J	0.26	J
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	2.1	J	0.36	U	0.13	U	0.31	J

NOTES:
B - Reported value may be wholly
or partially due to contamination in
an associated blank sample.
D - Secondary dilution factor
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Q - qualifier
R - Rejected
U - Not detected

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	FWEC-6S		FWEC-6M		FWEC-6M		FWEC-6R		FWEC-6R		FWEC-6S	
Sample Name:	FWEC-06S-050713-40.9		FWEC-6M-051013-75.3		FWEC-6M-091313-75.3		FWEC-6R-051013-170		FWEC-6R-091213-165		FWEC-6S-091213-40.9	
Laboratory I.D.:	460-55697-2		460-55866-5		460-63068-4		460-55866-4		460-63058-27		460-63058-26	
Sample Date:	5/7/2013		5/10/2013		9/13/2013		5/10/2013		9/12/2013		9/12/2013	
Sample Depth (feet):	40.9-40.9		75.3-75.3		75.3-75.3		170-170		165-165		40.9-40.9	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron												
Diethyl phthalate												
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane	0.31	U	0.31	U			0.31	U				
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	1.3	R	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Benzene	0.08	U	0.08	U	0.11	J	0.08	U	0.18	J	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.17	J	0.1	U	0.18	J	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.51	J	0.25	U	0.92	J	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.33	J	0.13	U	0.42	J	0.13	U
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.43	J	1		0.15	U	1.1		0.95	J	0.32	J
Trichloroethene	0.09	U	0.09	U	0.09	U	0.56	J	0.49	J	0.09	U
Trichlorofluoromethane	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.36	U	0.13	U	0.84	J	0.13	U	1.3	J	0.13	U

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
R - Rejected
U - Not detected
* The sample results for RMW-09S-1 samples on 4/9/2014 for all analytes were excluded from the BHHRA. See text for discussion.

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethene, 1,2,4-trichlorobenzene, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichlorobenzene, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2-chloroethyl vinyl ether, 2-hexanone, 2-methylphenol, acrylonitrile, anthracene, bis(2-chloroethyl)ether, bromoform, bromomethane, carbazole, chloroethane, chloromethane, cis-1,3-dichloropropene, dibromochloromethane, formaldehyde, isopropylbenzene, methylene chloride, phenol, styrene, trans-1,2-dichloroethene, and trans-1,3-dichloropropene.

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	SW-SD-PW-14		SW-SD-PW-17		SW-SD-PW-23		SW-SD-PW-30		SW-SD-PW-30		RMW-08D		RMW-08D	
Sample Name:	PW 14 091511		PW 17 091511		PW 23 091511		PW 30 091511		PW 30 091511		RMW-08D-050613-135.5		RMW-08D-09132013-135.5	
Laboratory I.D.:	460-31243-14		460-31243-7		460-31243-9		460-31243-5		460-31243-5		460-55539-4		460-63068-3	
Sample Date:	9/15/2011		9/15/2011		9/15/2011		9/15/2011		9/15/2011		5/6/2013		9/13/2013	
Sample Depth (feet):	0.5-1		0.5-1		0.5-1		0.5-1		0.5-1		135.5-135.5		135.5-135.5	
Source:	TAIE		TAIE		TAIE		TAIE		0		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron														
Diethyl phthalate											1.4	U		
1,1,1-Trichloroethane	0.25	U	0.26	J	0.25	U	0.25	U	0.25	U	0.06	U	0.06	U
1,1-Dichloroethene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.23	U	0.23	U
1,4-Dioxane											0.31	U		
2-Butanone	0.82	U	0.82	U	0.82	U	0.82	U	0.82	U	2.3	U	2.3	U
4-Methyl-2-pentanone	0.68	U	0.68	U	0.68	U	0.68	U	0.68	U	0.99	U	0.99	U
Acetone	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.7	U	2.7	U
Acrolein	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.3	U	1.3	U
Benzene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.08	U	0.2	J
Bromodichloromethane	0.093	U	0.093	U	0.093	U	0.093	U	0.093	U	0.12	U	0.12	U
Carbon disulfide	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.13	U	0.13	U
Carbon tetrachloride	0.19	U	0.39	J	0.19	U	0.19	U	0.19	U	0.45	J	0.44	J
Chlorobenzene	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.11	U	0.11	U
Chloroform	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.42	J	0.39	J
cis-1,2-Dichloroethene	0.2	U	0.2	U	1.2		0.2	U	0.2	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	1		1.1	
Ethylbenzene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.1	U	0.3	J
m/p-Xylene	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U	0.25	U	1.3	J
Methylene chloride	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.18	U	0.18	U
o-Xylene	0.15	U	0.15	U	0.15	U	0.15	U	0.15	U	0.13	U	0.53	J
p-Isopropyltoluene	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.14	U	0.14	U
Tetrachloroethene	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.1	U	0.1	U
Toluene	0.09	U	0.09	U	0.09	U	0.87	J	0.24	J	1.4		0.88	J
Trichloroethene	0.18	U	35		40		0.18	U	0.18	U	6.6		7.3	
Trichlorofluoromethane	0.16	U	3		1.8		0.16	U	0.16	U	3.1		3.7	
Vinyl chloride	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.14	U	0.14	U
Xylenes, Total	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.13	U	1.8	J

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-08S		RMW-08S		RMW-08S		RMW-09D		RMW-09D		RMW-09D		RMW-09D	
Sample Name:	RMW-08S		RMW-08S-050613-75		RMW-08S-09122013-75		RMW-09D-1		RMW-09D-1-050813		RMW-09D-1-091213		RMW-09D-146-156	
Laboratory I.D.:	460-38988-10		460-55539-7		460-63058-28		460-74197-6		460-55697-7		460-63058-16		460-54413-6	
Sample Date:	4/10/2012		5/6/2013		9/12/2013		4/9/2014		5/8/2013		9/12/2013		4/17/2013	
Sample Depth (feet):	74-76		75-75		75-75		95-105		95-105		95-105		146-156	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron														
Diethyl phthalate			1.4	U										
1,1,1-Trichloroethane	0.25	J	0.06	U	0.2	J	0.55	J	0.75	J	0.43	J	0.25	J
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.13	J	0.09	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane			0.31	U			0.5	U						
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	R
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	R	1.3	U	1.3	R
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.43	J
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.63	J	0.71	J	1.9		0.42	J	0.06	U	1.6		0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.22	J	0.22	J	0.08	U	0.23	J	0.1	J	0.62	J
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.93	J	1.2		3.9	J	5.9		3.4		3.5	
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.19	J	0.1	U	0.1	U
Toluene	0.15	U	1		0.15	U	0.15	U	0.19	J	0.19	J	9.6	
Trichloroethene	41		41		31		68		86		60		28	
Trichlorofluoromethane	8.2	J	5.4		6.2		0.15	U	15		12	J	6.7	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.36	U	0.13	U	0.13	U	0.13	U	0.36	U	0.13	U	0.36	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09D	
Sample Name:	RMW-09D-176-186		RMW-09D-2		RMW-09D-2-050813		RMW-09D-205-215		RMW-09D-2-091213		RMW-09D-235-245		RMW-09D-3	
Laboratory I.D.:	460-54501-4		460-74197-7		460-55697-8		460-54501-5		460-63058-17		460-54501-6		460-74197-8	
Sample Date:	4/18/2013		4/9/2014		5/8/2013		4/18/2013		9/12/2013		4/18/2013		4/9/2014	
Sample Depth (feet):	176-186		115-125		115-125		205-215		115-125		235-245		146-156	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron														
Diethyl phthalate														
1,1,1-Trichloroethane	0.18	J	0.06	U	0.43	J	0.12	J	0.31	J	0.06	U	0.21	J
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane			0.5	J									0.5	U
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	33	L	6.2	B	2.7	U	8.5	L	2.7	U	150	L	2.7	U
Acrolein	1.3	R	1.3	U	1.3	R	1.3	R	1.3	U	1.3	R	1.3	U
Benzene	0.13	J	0.08	U	0.17	J	0.36	J	0.11	J	0.15	J	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.1	J	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.13	J
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.4	J	0.17	J	2.3		2.3		0.45	J	0.55	J	0.12	J
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	3.3		4.5	J	4.4		3.7		3.9		0.58	J	5.5	J
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	4.4		9.4		20		80		10		34		1.6	
Trichloroethene	17		41		47		9.5		35		4.7		18	
Trichlorofluoromethane	6.3		8.8		9.2		5.8		8.2	J	0.98	J	8.8	
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.36	U	0.36	U	0.13	U	0.36	U	0.13	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09D	
Sample Name:	RMW-09D-3-050813		RMW-09D-3-050913		RMW-09D-3-091213		RMW-09D-4		RMW-09D-4-050913		RMW-09D-4-091213		RMW-09D-5	
Laboratory I.D.:	460-55767-14		460-55767-15		460-63058-18		460-74197-12		460-55767-10		460-63058-19		460-74197-13	
Sample Date:	5/8/2013		5/9/2013		9/12/2013		4/9/2014		5/9/2013		9/12/2013		4/9/2014	
Sample Depth (feet):	146-156		146-156		146-156		176-186		176-186		176-186		205-215	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron			73.6	U										
Diethyl phthalate														
1,1,1-Trichloroethane	0.06	U			0.06	U	0.18	J	0.06	U	0.06	U	0.19	J
1,1-Dichloroethene	0.09	U			0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.21	U			0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U			0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane							0.5	U					0.85	J
2-Butanone	2.3	U			2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	0.99	U			0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U			2.7	U	30	B	2.7	U	2.7	U	8.3	B
Acrolein	1.3	U			1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Benzene	0.08	U			0.08	U	0.08	U	0.08	U	0.08	U	0.26	J
Bromodichloromethane	0.12	U			0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U			0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U			0.06	U	0.13	J	0.11	J	0.06	U	0.06	U
Chlorobenzene	0.11	U			0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.4	J			0.08	U	0.089	J	0.25	J	0.08	U	0.23	J
cis-1,2-Dichloroethene	0.18	U			0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	3.8				5.4		6.3	J	3.5		5.6		7	J
Ethylbenzene	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U			0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U			0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U			0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
p-Isopropyltoluene	0.14	U			0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.66	J			0.79	J	0.59	J	0.71	J	0.47	J	30	
Trichloroethene	31				21		13		20		15		15	
Trichlorofluoromethane	8.5				10	J	0.15	U	7.7		9.6	J	9.1	
Vinyl chloride	0.14	U			0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U			0.13	U	0.13	U	0.13	U	0.13	U	0.13	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09D		RMW-09S-1*		RMW-09S-1	
Sample Name:	RMW-09D-5-050913		RMW-09D-5-091213		RMW-09D-6		RMW-09D-6-050913		RMW-09D-6-091213		RMW-09S-1*		RMW-09S-1	
Laboratory I.D.:	460-55767-11		460-63058-23		460-74286-10		460-55767-12		460-63058-24		460-74197-9		460-39047-5	
Sample Date:	5/9/2013		9/12/2013		4/10/2014		5/9/2013		9/12/2013		4/9/2014		4/11/2012	
Sample Depth (feet):	205-215		205-215		235-245		235-245		235-245		47-47		40-42	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron														
Diethyl phthalate														
1,1,1-Trichloroethane	0.06	U	0.16	J	0.06	U	0.06	U	0.06	U	0.71	J	0.68	J
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane					0.68	J					0.51	J		
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	8.1		2.3	U	2.3	R
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	2.2	J	0.99	U	0.99	U
Acetone	11		22		2.7	U	36		550		2.7	U	2.7	U
Acrolein	1.3	U	3	J	1.3	U	1.3	U	130	J	1.3	U	1.3	U
Benzene	0.41	J	0.34	J	0.37	J	0.2	J	0.11	J	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.87	B	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	3.2		0.56	J	0.15	J	0.6	J	0.17	J	0.08	U	0.08	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.22	J	0.18	U
Dichlorodifluoromethane	0.87	J	4.9		15		0.54	J	0.33	J	0.73	J	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.17	J	0.1	U
Toluene	79		48		42		27		16		0.15	J	0.15	U
Trichloroethene	7.1		11		19		6.6		2.2		110		0.47	J
Trichlorofluoromethane	2.4		8.8		5.3		1.1		0.39	J	5.4		0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.36	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-09S-1		RMW-09S-1		RMW-09S-1		RMW-09S-2		RMW-09S-2		RMW-09S-2		RMW-09S-2
Sample Name:	RMW-09S-1-050813-50		RMW-09S-1-091213-47.5		RMW-09S1-10132014		RMW-09S-2		RMW-09S-2		RMW-09S-2		RMW-09S-2-050813-64.5
Laboratory I.D.:	460-55697-11		460-63058-15		460-84429-4		460-39047-3		460-74197-10		460-39047-3		460-55697-12
Sample Date:	5/8/2013		9/12/2013		10/13/2014		4/11/2012		4/9/2014		4/11/2012		5/8/2013
Sample Depth (feet):	50-50		47.5-47.5		50-50		64-66		64-64		64-66		64.5-64.5
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		0		TAIE
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l
Iron	6860	L											6430
Diethyl phthalate													
1,1,1-Trichloroethane	0.66	J	0.67	J	0.69	J	0.71	J	0.61	J	0.77	J	0.71
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23
1,4-Dioxane	0.31	U	0.31	U					0.61	J			0.31
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	R	2.3	U	2.3	R	2.3
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7
Acrolein	1.3	R	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11
Chloroform	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	J	0.18	U	0.18
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	1.1		0.9	J	1.1		1.1
Ethylbenzene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1
m/p-Xylene	0.25	U	0.26	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18
o-Xylene	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11
Toluene	0.32	J	0.21	J	0.15	U	0.15	U	0.16	J	0.15	U	2.1
Trichloroethene	0.26	J	0.09	U	0.27	J	61		83		62		86
Trichlorofluoromethane	0.15	U	0.2	J	0.15	U	5.4		4.7		5.5		5.6
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14
Xylenes, Total	0.13	U	0.26	J	0.13	U	0.36	U	0.13	U	0.36	U	0.36

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:		RMW-09S-2		RMW-09S-2		RMW-10D		RMW-10D		RMW-10D		RMW-10S	
Sample Name:		RMW-09S-2-091213-64.5		RMW-09S2-10132014		RMW-10D-051013-210		RMW-10D-09162013-210		RMW-10D-09162013-210		RMW-10S	
Laboratory I.D.:		460-63058-22		460-84429-3		460-55866-11		460-63088-11		460-63088-11		460-38988-8	
Sample Date:		9/12/2013		10/13/2014		5/10/2013		9/16/2013		9/16/2013		4/10/2012	
Sample Depth (feet):		64.5-64.5		64-64		210-210		210-210		210-210		114-116	
Source:		TAIE		TAIE		TAIE		TAIE		0		TAIE	
Analytes:	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron	L					17400	L						
Diethyl phthalate													
1,1,1-Trichloroethane	J	0.59	J	0.53	J	0.06	U	0.06	U	0.06	U	0.15	J
1,1-Dichloroethene	U	0.24	J	0.28	J	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane	U	0.31	U			0.31	U	0.31	U				
2-Butanone	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	R	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Benzene	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Bromodichloromethane	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	U	0.13	U	0.13	U	0.13	U	2.5		2.1		0.13	U
Carbon tetrachloride	U	0.06	U	0.14	J	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	U	0.08	U	0.1	J	0.08	U	0.08	U	0.13	J	0.16	J
cis-1,2-Dichloroethene	U	0.2	J	0.19	J	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane		0.83	J	0.22	U	0.22	U	3.2		1		0.22	U
Ethylbenzene	U	0.1	U	0.1	U	0.1	U	0.15	J	0.1	U	0.1	U
m/p-Xylene	U	0.27	J	0.25	U	0.25	U	0.7	J	0.46	J	0.25	U
Methylene chloride	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	U	0.16	J	0.13	U	0.13	U	0.28	J	0.24	J	0.13	U
p-Isopropyltoluene	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	J	0.1	U	0.16	J	0.1	U	0.1	U	0.1	U	0.1	U
Toluene		0.35	J	0.15	U	2.6		0.56	J	0.55	J	0.26	J
Trichloroethene		84		81		7.1		5		3.9		19	
Trichlorofluoromethane		5.3		5.2		3		3.9		2.3		6.2	J
Vinyl chloride	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	U	0.42	J	0.13	U	0.13	U	0.99	J	0.7	J	0.36	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-10S		RMW-10S		RMW-11D		RMW-11D		RMW-11D		RMW-11D		RMW-11D
Sample Name:	RMW-10S-050913-115		RMW-10S-09122013-115		RMW-11D-1		RMW-11D-1-051313		RMW-11D-1-09112013		RMW-11D-150-160		RMW-11D-2
Laboratory I.D.:	460-55767-13		460-63058-14		460-74286-8		460-56003-7		460-63058-10		460-54413-3		460-74286-9
Sample Date:	5/9/2013		9/12/2013		4/10/2014		5/13/2013		9/11/2013		4/17/2013		4/10/2014
Sample Depth (feet):	115-115		115-115		90-100		90-100		90-100		150-160		117-127
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l
Iron							46000	L					
Diethyl phthalate													
1,1,1-Trichloroethane	0.06	U	0.16	J	0.23	J	0.13	J	0.29	J	0.06	U	0.26
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23
1,4-Dioxane	0.31	U	0.31	U	0.5	U							0.5
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	24		2.7
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	R	1.3
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.34	J	0.08
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11
Chloroform	0.17	J	0.13	J	0.45	J	0.35	J	0.36	J	1.4		0.66
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18
Dichlorodifluoromethane	3.4		4		3.3		0.39	J	0.94	J	0.22	U	4.1
Ethylbenzene	0.1	U	0.11	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1
m/p-Xylene	0.25	U	0.5	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18
o-Xylene	0.13	U	0.23	J	0.13	U	0.13	U	0.13	U	0.13	U	0.13
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1
Toluene	1.9		0.5	J	0.15	U	0.77	J	0.15	U	15		0.16
Trichloroethene	21		19		33		19		37		1.3		34
Trichlorofluoromethane	4.8		5.5		0.15	U	1.3		5.5	J	0.29	J	4.3
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14
Xylenes, Total	0.13	U	0.73	J	0.13	U	0.13	U	0.13	U	0.36	U	0.13

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:		RMW-11D		RMW-11D		RMW-11D		RMW-11D		RMW-11D		RMW-11S		RMW-11S	
Sample Name:		RMW-11D-2-051313		RMW-11D-2-09112013		RMW-11D-3		RMW-11D-3-051313		RMW-11D-3-09112013		RMW-11S		RMW-11S	
Laboratory I.D.:		460-56003-8		460-63058-11		460-74286-12		460-56003-9		460-63058-12		460-38988-7		460-74197-11	
Sample Date:		5/13/2013		9/11/2013		4/10/2014		5/13/2013		9/11/2013		4/10/2012		4/9/2014	
Sample Depth (feet):		117-127		117-127		150-160		151-160		150-160		64-66		65-65	
Source:		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron															
Diethyl phthalate															
1,1,1-Trichloroethane	J	0.23	J	0.29	J	0.06	U	0.06	U	0.06	U	0.06	U	0.14	J
1,1-Dichloroethene	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane	U					0.57	J							0.5	U
2-Butanone	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	6.4	B
Acrolein	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Benzene	U	0.08	U	0.08	U	0.25	J	0.54	J	0.37	J	0.08	U	0.08	U
Bromodichloromethane	U	0.12	U	0.12	U	0.12	U	0.18	J	0.12	U	0.12	U	0.12	U
Carbon disulfide	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	U	0.11	U	0.11	U	0.11	U	0.11	U	0.16	J	0.11	U	0.11	U
Chloroform	J	0.82	J	0.84	J	1.5		4.6		3.3		0.08	U	0.39	J
cis-1,2-Dichloroethene	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane		0.72	J	1		0.22	U	0.47	J	0.44	J	0.22	U	0.22	U
Ethylbenzene	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.31	J	0.25	U
Methylene chloride	U	0.18	U	0.18	U	0.78	J	0.18	U	0.51	J	0.18	U	0.18	U
o-Xylene	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
p-Isopropyltoluene	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	J	2.1		0.36	J	1.4		30		19		0.34	J	0.15	U
Trichloroethene		26		31		14		4.1		7.6		1.6		17	
Trichlorofluoromethane		2.8		5.2		1.7		1.1		1.7		0.15	U	0.15	U
Vinyl chloride	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.36	U	0.13	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-11S		RMW-11S		RMW-12D		RMW-12D		RMW-12S		RMW-12S	
Sample Name:	RMW-11S-050913-65		RMW-11S-09102013-65		RMW-12D-050713-72		RMW-12D-09102013-72		RMW-12S		RMW-12S-050713-35	
Laboratory I.D.:	460-55767-16		460-62779-9		460-55539-10		460-62779-8		460-38988-5		460-55539-9	
Sample Date:	5/9/2013		9/10/2013		5/7/2013		9/10/2013		4/10/2012		5/7/2013	
Sample Depth (feet):	65-65		65-65		72-72		72-72		35-37		35-35	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron	1230	L			775	L					322	L
Diethyl phthalate												
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane	0.31	U	0.31	U	0.31	U					0.31	U
2-Butanone	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Benzene	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.2	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.2	J	0.1	U	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.8	J	0.25	U	0.59	J	0.25	U	0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.4	J	0.13	U	0.28	J	0.13	U	0.13	U
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.69	J	0.63	J	3		0.45	J	0.15	U	0.3	J
Trichloroethene	20		13		2.6		2		6.8		7.1	
Trichlorofluoromethane	1.2		0.15	U	0.49	J	0.15	U	0.6	J	0.39	J
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	1.2	J	0.13	U	0.87	J	0.36	U	0.13	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-12S		RMW-13D		RMW-13D		RMW-13S-1		RMW-13S-1		RMW-13S-1	
Sample Name:	RMW-12S-09102013-35		RMW-13D-050713-191		RMW-13D-09162013-190.5		RMW-13S-1-04102012		RMW-13S-1-050813-50		RMW-13S-1-09102013-50	
Laboratory I.D.:	460-62779-5		460-55539-13		460-63088-8		460-38988-6		460-55697-5		460-62779-2	
Sample Date:	9/10/2013		5/7/2013		9/16/2013		4/10/2012		5/8/2013		9/10/2013	
Sample Depth (feet):	35-35		191-191		190.5-190.5		49-51		50-50		50-50	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron												
Diethyl phthalate												
1,1,1-Trichloroethane	0.06	U	0.06	U	0.06	U	0.06	U	0.47	J	0.06	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
1,4-Dioxane			0.31	U					0.31	U		
2-Butanone	2.3	U	6.2		2.3	U	2.3	U	2.3	U	2.3	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acrolein	1.3	U	1.3	U	1.3	U	1.3	U	1.3	R	1.3	U
Benzene	0.08	U	0.18	J	0.2	J	0.08	U	0.08	U	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.18	B	0.13	U	0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Chloroform	0.08	U	0.08	U	0.2	J	0.08	U	0.08	U	0.08	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	0.61	J	0.36	J	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.11	J	0.1	U	0.1	U	0.1	U
m/p-Xylene	0.25	U	0.25	U	0.44	J	0.25	U	0.25	U	0.74	J
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.21	J	0.13	U	0.13	U	0.36	J
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.26	J	2.4		0.65	J	0.15	U	0.48	J	0.66	J
Trichloroethene	8.1		5.7		2.4		0.09	U	0.09	U	0.09	U
Trichlorofluoromethane	0.15	U	2.1		1		0.15	U	0.15	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Xylenes, Total	0.13	U	0.13	U	0.65	J	0.36	U	0.36	U	1.1	J

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-13S-2		RMW-13S-2		RMW-13S-2		RMW-14D		RMW-14D		RMW-14S	
Sample Name:	RMW-13S-2-04102012		RMW-13S-2-050813-125		RMW-13S-2-09102013-125		RMW-14D-050713-61		RMW-14D-09102013-61		RMW-14S-04102012	
Laboratory I.D.:	460-38988-3		460-55697-10		460-62779-7		460-55539-11		460-62779-3		460-38988-4	
Sample Date:	4/10/2012		5/8/2013		9/10/2013		5/7/2013		9/10/2013		4/10/2012	
Sample Depth (feet):	124-126		125-125		125-125		61-61		61-61		27-29	
Source:	TAIE		TAIE		TAIE		TAIE		TAIE		TAIE	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron			16700	L								
Diethyl phthalate												
1,1,1-Trichloroethane	0.31	J	0.39	J	0.06	U	0.06	U	0.06	U	0.06	U
1,1-Dichloroethene	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U	0.09	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.21	U	0.46	J	0.21	U	0.21	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.23	U	0.32	J	0.23	U	0.23	U
1,4-Dioxane			0.31	U			0.31	U				
2-Butanone	2.3	U	2.3	U	2.3	U	6.5		2.3	U	2.3	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U	0.99	U
Acetone	2.7	U	2.7	U	2.7	U	29		16		2.7	U
Acrolein	1.3	U	1.3	R	1.3	U	1.3	U	1.3	U	1.3	U
Benzene	0.08	U	0.08	U	0.27	J	0.21	J	0.94	J	0.08	U
Bromodichloromethane	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Carbon disulfide	0.13	U	0.13	U	0.13	U	1.1		0.13	U	0.13	U
Carbon tetrachloride	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Chlorobenzene	0.11	U	0.11	U	0.11	U	0.29	J	0.11	U	0.11	U
Chloroform	0.13	J	0.08	U	0.08	U	0.08	U	0.08	U	0.08	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
Dichlorodifluoromethane	0.22	U	6.5		0.22	U	0.22	U	0.22	U	0.22	U
Ethylbenzene	0.1	U	0.1	U	0.27	J	0.1	U	0.53	J	0.1	U
m/p-Xylene	0.26	J	0.25	U	1.4	J	0.54	J	2.3		0.25	U
Methylene chloride	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U	0.18	U
o-Xylene	0.13	U	0.13	U	0.74	J	0.28	J	1.5		0.13	U
p-Isopropyltoluene	0.14	U	0.14	U	0.14	U	0.14	U	0.15	J	0.14	U
Tetrachloroethene	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Toluene	0.28	J	1.3		1.3		29		15		0.15	U
Trichloroethene	36		44		34		0.09	U	0.09	U	0.09	U
Trichlorofluoromethane	20	J	20		12		0.15	U	0.15	U	0.15	U
Vinyl chloride	0.14	U	0.14	U	0.14	U	0.14	J	0.14	U	0.14	U
Xylenes, Total	0.36	U	0.36	U	2.1	J	0.83	J	3.8		0.36	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	RMW-14S		RMW-14S		RMW-14S		SW-SD-PW-14		SW-SD-PW-14		SW-SD-PW-17		SW-SD-PW-17	
Sample Name:	RMW-14S-050713-29		RMW-14S-09102013-29		RMW-14S-32_06152011		SW14-050511		SW14-082411		SW17-050511		SW17-050511	
Laboratory I.D.:	460-55539-12		460-62779-6		460-27739-5		460-26568-28		180-3419-5		460-26568-30		460-26568-30	
Sample Date:	5/7/2013		9/10/2013		6/15/2011		5/5/2011		8/25/2011		5/5/2011		5/5/2011	
Sample Depth (feet):	29-29		29-29		32-32		0-0		0-0		0-0		0-0	
Source:	TAIE		TAIE		TAIE		TAIE		TAI-P		TAIE		0	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron														
Diethyl phthalate									0.14	U				
1,1,1-Trichloroethane	0.06	U	0.06	U	0.25	U	0.25	U	0.29	U	0.25	U	0.27	J
1,1-Dichloroethene	0.09	U	0.09	U	0.14	U	0.14	U	0.3	U	0.14	U	0.14	U
1,2-Dichlorobenzene	0.21	U	0.21	U	0.16	U	0.16	U	0.15	U	0.16	U	0.16	U
1,4-Dichlorobenzene	0.23	U	0.23	U	0.15	U	0.15	U	0.21	U	0.15	U	0.15	U
1,4-Dioxane	0.31	U					8.4	U	0.14	U	8.4	U	8.4	U
2-Butanone	2.3	U	2.3	U	0.82	U	0.82	R	0.55	U	0.82	R	0.82	U
4-Methyl-2-pentanone	0.99	U	0.99	U	0.68	U	0.68	U	0.53	U	0.68	U	0.68	U
Acetone	2.7	U	2.7	U	2.5	R	2.5	U	5.8		2.5	U	2.5	U
Acrolein	1.3	U	1.3	U	1.9	R	1.9	R	2.6	R	1.9	R	1.9	U
Benzene	0.08	U	0.08	U	0.13	U	0.13	U	0.11	U	0.13	U	0.13	U
Bromodichloromethane	0.12	U	0.12	U	0.093	U	0.093	U	0.13	U	0.093	U	0.093	U
Carbon disulfide	0.13	U	0.13	U	0.15	U	0.15	U	0.21	U	0.15	U	0.15	U
Carbon tetrachloride	0.06	U	0.06	U	0.19	U	0.19	U	0.14	U	0.19	U	0.19	U
Chlorobenzene	0.11	U	0.11	U	0.16	U	0.16	U	0.14	U	0.16	U	0.16	U
Chloroform	0.08	U	0.08	U	0.15	U	0.15	U	0.17	U	0.15	U	0.15	U
cis-1,2-Dichloroethene	0.18	U	0.18	U	0.2	U	0.2	U	0.24	U	0.2	U	0.2	U
Dichlorodifluoromethane	0.22	U	0.22	U	0.29	U	0.29	U	0.19	U	0.43	J	0.38	J
Ethylbenzene	0.1	U	0.1	U	0.25	U	0.25	U	0.23	U	0.25	U	0.25	U
m/p-Xylene	0.25	U	0.25	U	0.29	U	0.29	U	0.41	U	0.29	U	0.29	U
Methylene chloride	0.18	U	0.18	U	0.19	U	0.19	U	0.15	U	0.19	U	0.19	U
o-Xylene	0.13	U	0.13	U	0.15	U	0.15	U	0.11	U	0.15	U	0.15	U
p-Isopropyltoluene	0.14	U	0.14	U	0.19	U	0.19	U	0.18	U	0.19	U	0.19	U
Tetrachloroethene	0.1	U	0.1	U	0.2	U	0.2	U	0.15	U	0.2	U	0.2	U
Toluene	0.42	J	0.18	J	0.14	J	0.09	U	0.15	U	0.09	U	0.09	U
Trichloroethene	0.12	J	0.09	U	0.26	J	0.18	U	0.14	U	31		30	
Trichlorofluoromethane	0.15	U	0.15	U	0.16	U	0.16	U	0.2	U	1.1		0.97	J
Vinyl chloride	0.14	U	0.14	U	0.13	U	0.13	U	0.23	U	0.13	U	0.13	U
Xylenes, Total	0.13	U	0.13	U	0.43	U	0.43	U	0.49	U	0.43	U	0.43	U

Attachment E-8. Sample Results for the Affected Area Groundwater Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	SW-SD-PW-17		SW-SD-PW-17		SW-SD-PW-23		SW-SD-PW-23		SW-SD-PW-30		SW-SD-PW-30	
Sample Name:	SW17-082411		SW17-082411		SW23-050511		SW23-082511		SW30-050511		SW30-082411	
Laboratory I.D.:	180-3419-6		180-3419-6		460-26568-22		180-3416-22		460-26568-32		180-3403-11	
Sample Date:	8/25/2011		8/25/2011		5/5/2011		8/25/2011		5/5/2011		8/24/2011	
Sample Depth (feet):	0-0		0-0		0-0		0-0		0-0		0-0	
Source:	TAI-P		0		TAIE		TAI-P		TAIE		TAI-P	
Analytes:	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.	ug/l	Qual.
Iron												
Diethyl phthalate	0.19	J	0.14	U			0.14	U			0.15	U
1,1,1-Trichloroethane	0.29	U	0.29	U	0.33	J	0.57	U	0.25	U	0.29	U
1,1-Dichloroethene	0.3	U	0.3	U	0.14	U	0.59	U	0.14	U	0.3	U
1,2-Dichlorobenzene	0.15	U	0.15	U	0.16	U	0.3	U	0.16	U	0.15	U
1,4-Dichlorobenzene	0.21	U	0.21	U	0.15	U	0.41	U	0.15	U	0.21	U
1,4-Dioxane	0.14	U	0.14	U	8.4	U	0.14	U	8.4	U	0.15	U
2-Butanone	0.55	U	0.55	U	0.82	R	1.1	U	0.82	R	0.55	U
4-Methyl-2-pentanone	0.53	U	0.53	U	0.68	U	1.1	U	0.68	U	0.53	U
Acetone	2.5	U	2.5	U	2.5	U	5	U	2.5	U	2.5	U
Acrolein	2.6	R	2.6	R	1.9	R	5.1	R	1.9	R	2.6	R
Benzene	0.11	U	0.11	U	0.13	U	0.21	U	0.13	U	0.11	U
Bromodichloromethane	0.13	U	0.13	U	0.093	U	0.26	U	0.093	U	0.13	U
Carbon disulfide	0.21	U	0.21	U	0.15	U	0.42	U	0.15	U	0.21	U
Carbon tetrachloride	0.14	U	0.14	U	0.19	U	0.27	U	0.19	U	0.14	U
Chlorobenzene	0.14	U	0.14	U	0.16	U	0.27	U	0.16	U	0.14	U
Chloroform	0.17	U	0.17	U	0.15	U	0.34	U	0.15	U	0.17	U
cis-1,2-Dichloroethene	0.24	U	0.24	U	0.2	U	0.47	U	0.2	U	0.24	U
Dichlorodifluoromethane	0.29	J	0.3	J	0.29	U	0.39	U	0.29	U	0.19	U
Ethylbenzene	0.23	U	0.23	U	0.25	U	0.45	U	0.25	U	0.23	U
m/p-Xylene	0.41	U	0.41	U	0.29	U	0.81	U	0.29	U	0.41	U
Methylene chloride	0.15	U	0.15	U	0.19	U	0.3	U	0.19	U	0.15	U
o-Xylene	0.11	U	0.11	U	0.15	U	0.22	U	0.15	U	0.11	U
p-Isopropyltoluene	0.18	U	0.18	U	0.19	U	0.37	U	0.19	U	0.18	U
Tetrachloroethene	0.15	U	0.15	U	0.2	U	0.3	U	0.2	U	0.15	U
Toluene	0.15	U	0.15	U	0.09	U	0.3	U	0.09	U	0.15	U
Trichloroethene	29		31		52		45		0.18	U	0.14	U
Trichlorofluoromethane	0.73	J	1		2.1		1.1	J	0.16	U	0.2	U
Vinyl chloride	0.23	U	0.23	U	0.13	U	0.45	U	0.13	U	0.23	U
Xylenes, Total	0.49	U	0.49	U	0.43	U	0.98	U	0.43	U	0.49	U

Attachment E-9a. Sample Results for the Former FWEC Facility Retention Pond Sediment Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	SW-SD-01		SW-SD-02		SW-SD-02		SW-SD-03		SW-SD-04		WWT-1		WWT-2		WWT-3		WWT-4	
Sample Name:	SD01-082411		SD02-082411_D		SD02-082411		SD03-082411		SD04-082411		WWT-1S		WWT-2S		WWT-3S		WWT-4S	
Laboratory I.D.:	180-3407-20		180-3407-13		180-3407-13		180-3407-16		180-3407-17		268477		268490		268489		268488	
Sample Date:	8/24/2011		8/24/2011		8/24/2011		8/24/2011		8/24/2011		6/20/1989		6/20/1989		6/20/1989		6/20/1989	
Sample Depth (feet):	0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		-		-		-		-	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		WCC, 1989		WCC, 1989		WCC, 1989		WCC, 1989	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Formaldehyde	0.51	J	0.99	J	1.4	J	0.35	J	0.91	J								
Cyanide, total	0.31	J	0.87		0.47	J	0.58		1.5		0.0024		0.0028		0.00081	U	0.0023	
Aluminum	4400		11000		12000		11000		12000		8.52		10.3		4.84		9.53	
Antimony	1.1	J	0.82	L	0.95	L	0.28	L	0.88	L								
Arsenic	5.2	K	9.8		9.6		5.8		12		0.0063		0.007		0.0037		0.0086	
Barium	31	B	57	B	64	B	26	B	88	B	0.0597		0.0555		0.0295	B	0.0588	
Beryllium	0.31		0.61		0.68		0.28		0.73		0.0012		0.0016		0.0009	B	0.00018	U
Cadmium	2.2	L	1.1	L	0.89	L	0.14	L	3.4	L	0.0038		0.0026		0.0014	B	0.0028	
Calcium	1700	B	770	B	830	B	340	B	3600	B	1.22		0.982		0.51	B	1.1	
Chromium	20	J	24	J	27	J	14	J	23	J	0.0236		0.0226		0.0093		0.0185	
Cobalt	4.6		7.3	K	8.2	K	6.7	K	19	K	0.0093		0.0109		0.0045	B	0.0068	
Copper	48	J	98	J	91	J	12	J	57	J	0.101		0.0878		0.0385		0.0921	
Iron	14000	J	16000	J	17000	J	17000	J	23000	J	13.6		16.5		7.22		14.6	
Lead	120	L	95	L	110	L	14	L	130	L	0.136		0.0961		0.0471		0.0914	
Magnesium	1100	B	2200	J	2500	J	1000	J	2200	J	2.51		2.22		1.14	B	2.3	
Manganese	180	J	110	J	130	J	75	J	2000	J	0.142		0.183		0.0697		0.169	
Mercury	0.032		0.11		0.15		0.033		0.14		0.0002	U	0.00024	U	0.00015	U	0.00016	U
Nickel	17	J	20	J	24	J	9.8	J	30	J	0.0342		0.0192		0.0137		0.0174	
Potassium	500		1200		1300		520		1200		0.727	U	1.01	U	0.554	U	0.862	
Selenium	0.67	U	0.74		0.75		0.6		0.67		0.0006		0.00069		0.00068	B	0.00052	
Silver	8.3	L	170	L	160	L	2.1	L	27	L	0.195		0.145		0.0737		0.184	
Sodium	48	B	58	B	63	B	25	B	54	B	0.651	U	0.907	U	0.497	U	0.572	U
Vanadium	13		23		24		22		27		0.0157		0.0186		0.0083	B	0.0141	
Zinc	550	B	180	J	220	J	56	J	520	J	0.583		0.481		0.253		0.462	
Aroclor 1248	1.3		0.0019	U	0.0016	U	0.00099	U	0.011	U	0.36	U	0.24	U			0.3	U
Aroclor 1260	0.28	J	0.6		0.38		0.049		0.24		0.71	U	0.63				0.6	U
4,4'-DDD	0.012	J	0.0069	J	0.0012	J	0.00036	J	0.00064	J	0.071	U	0.047	U			0.06	U
4,4'-DDE	0.0017	U	0.0015	U	0.0013	J	0.00048	J	0.001	J	0.071	U	0.047	U			0.06	U
4,4'-DDT	0.0066	J	0.0015	U	0.014	J	0.00016	U	0.00022	U	0.071	U	0.047	U			0.06	U
Acrolein	0.0097	R	0.017	R	0.014	R	0.009	R	0.012	R								
Aldrin	0.0021	U	0.0018	U	0.0003	U	0.00019	U	0.00053	J	0.036	U	0.024	U			0.03	U
beta-BHC	0.003	U	0.0026	U	0.00079	J	0.00027	U	0.00038	U	0.036	U	0.024	U			0.03	U
delta-BHC	0.014	J	0.0015	U	0.00025	U	0.00016	U	0.00045	J	0.036	U	0.024	U			0.03	U
Dieldrin	0.0059	J	0.0017	U	0.002	J	0.00052	J	0.0025	J	0.071	U	0.047	U			0.06	U
Endosulfan II	0.002	U	0.0082	J	0.0041	J	0.00077	J	0.0017	J	0.071	U	0.047	U			0.06	U
Endosulfan sulfate	0.0012	U	0.0084	J	0.0054	J	0.00064	J	0.0031	J	0.071	U	0.047	U			0.06	U
Endrin	0.017	J	0.0088	J	0.0048	J	0.00056	J	0.0011	J	0.071	U	0.047	U			0.06	U
Endrin aldehyde	0.0022	U	0.0041	J	0.00057	J	0.00031	J	0.00029	U								
Endrin ketone	0.0018	U	0.0092	J	0.0052	J	0.00058	J	0.0037	J								
gamma-BHC (Lindane)	0.0022	J	0.0054	J	0.00029	U	0.00018	U	0.0029		0.036	U	0.024	U			0.03	U
Heptachlor	0.0073	J	0.0022	U	0.00043	J	0.00023	U	0.00034	J	0.036	U	0.024	U			0.03	U
Heptachlor epoxide	0.018	J	0.01	J	0.00041	J	0.00027	J	0.00043	J	0.036	U	0.024	U			0.03	U
Methoxychlor	0.031	J	0.019	J	0.011	J	0.0015	J	0.0067	J	0.36	U	0.24	U			0.3	U
1,4-Dichlorobenzene	0.00088	U			0.0013	U	0.00082	U	0.0011	U								
2-Methylnaphthalene	5.3		0.02	J	0.016	J	0.0038	U	0.022	J	0.89	J	0.97	U	1.1	U	0.62	U
4-Chloroaniline	2.5	J	0.08	J	0.027	U	0.017	U	0.024	U	7.3	U	0.97	U	1.1	U	0.62	U
4-Methylphenol											7.3	U	0.97	U	0.15	J	0.11	J
Acenaphthene	29		0.057	J	0.035	J	0.0041	U	0.057	J	5.3	J	0.11	J	0.13	J	0.15	J
Acenaphthylene	1.6		0.022	J	0.017	J	0.0049	U	0.037	J	7.3	U	0.97	U	1.1	U	0.62	U
Anthracene	56		0.14		0.086		0.02	J	0.15		8.3		0.2	J	0.22	J	0.25	J
Benzo[a]anthracene	140		0.61		0.4		0.093		0.75		24		1		0.94	J	0.86	
Benzo[a]pyrene	110		0.72		0.55		0.13		1		17		1.2		0.94	J	1.1	
Benzo[b]fluoranthene	110		0.99		0.69		0.18		1.4		16		2.6		2.1		1.4	
Benzo[g,h,i]perylene	72		0.64		0.51		0.13		1		5.4	J	0.53	J	0.54	J	0.62	U
Benzo[k]fluoranthene	51		0.44		0.43		0.088		0.73		19		1.6		2.1		1.2	
Benzoic Acid											36	U	0.45	JB	0.26	J	0.28	JB
Bis(2-ethylhexyl)phthalate	0.45	U	0.29	J	0.2	J	0.035	J	0.071	J	1.8	J	1.6		1.3		2.2	
Butyl benzyl phthalate	0.38	U	0.056	U	0.046	U	0.029	U	0.042	J	7.3	U	0.34	J	1.1	U	0.62	U

Carbazole	46		0.19		0.14		0.03	J	0.26									
Chrysene	150		0.93		0.74		0.17		1.3		26		1.7		1.6		1.4	
Dibenz(a,h)anthracene	32		0.17		0.12		0.026	J	0.26		2	J	0.97	U	0.32	J	0.62	U
Dibenzofuran	22		0.056	J	0.036	J	0.021	U	0.055	J	3.5	J	0.97	U	0.14	J	0.13	J
Di-n-butyl phthalate	0.35	U	0.051	U	0.042	U	0.027	U	0.037	U	7.3	U	0.16	J	1.1	U	0.62	U
Fluoranthene	310	J	1.6		1.2		0.27		2.1		66		3.9		2.5		3.4	
Fluorene	36		0.093		0.052	J	0.0056	U	0.061		6	J	0.14	J	0.24	J	0.25	J
Indeno[1,2,3-cd]pyrene	67		0.55		0.44		0.12		0.85		6.1	J	0.46	J	0.48	J	0.39	J
Naphthalene	7.4		0.018	J	0.0058	U	0.0037	U	0.0051	U	7.3	U	0.97	U	1.1	U	0.62	U
Pentachlorophenol	0.25	U	0.037	U	0.03	U	0.019	U	0.026	U	1.5	J	4.7	U	5.2	U	3	U
Phenanthrene	280		1		0.71		0.16		1.2		61		1.7		1.8		1.9	
Pyrene	220		1.4		0.97		0.21		1.7		36		2.7		1.9		2.2	
1,4-Dichlorobenzene	0.00088	U			0.0013	U	0.00082	U	0.0011	U								
2-Butanone (MEK)	0.0012	U	0.0022	U	0.0018	U	0.0011	U	0.0016	U	0.022	U	0.017	J	0.024		0.006	J
Acetone	0.0069	U	0.012	U	0.01	U	0.0064	U	0.0088	U	0.28	B	0.24	B	0.19	B	0.099	B
Chloroform	0.0008	U	0.0014	U	0.0012	U	0.00075	U	0.001	U	0.003	J	0.005	J	0.002	J	0.009	U
Methylene chloride	0.00092	U	0.0017	U	0.0014	U	0.00086	U	0.0012	U	0.22	B	0.18	B	0.036	B	0.036	B

REFERENCES:

WCC, 1989. WCC, 1989. Site Remediation Program, Foster Wheeler Energy Corporation, Mountaintop Plant. Woodward-Clyde Consultants. December 1989.

NOTES:

B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
K - Reported Value may be biased high
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
R - Rejected
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloroethene, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dioxane, 2,4,5-T, 2,4,5-TP, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-D, 2,4-DB, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3/4-methylphenols, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-nitroaniline, 4-nitrophenol, acrylonitrile, aldrin, alpha-chlordane, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1254, Aroclor 1262, Aroclor 1268, benzene, benzyl alcohol, bis(2-ethylhexyl)phthalate, bromodichloromethane, bromoform, bromomethane, carbon disulfide, carbon tetrachloride, chlordane, chlorobenzene, chloroethane, chloromethane, cis-1,2-dichloroethene, cis-1,3-dichloropropene, dalapon, dibromodichloromethane, dicamba, dichlorodifluoromethane, dichloroprop, diethyl phthalate, dimethyl phthalate, di-n-octyl phthalate, dinoseb, endosulfan I, ethylbenzene, gamma-chlordane, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, isophorone, isopropylbenzene, m/p-xylene, MCPA, MCPP, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, o-xylene, phenol, p-isoproyltoluene, styrene, tetrachloroethene, thallium, toluene, toxaphene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, trichloroethene, trichlorofluoromethane, vinyl acetate, vinyl chloride, and xylenes, total.

Attachment E-9b. Sample Results for the Former FWEC Facility Outflow Channel Sediment Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	SD-37		SD-38		SD-39		SD-40		SD-41	
Sample Name:	SD-37-10132014		SD-38-10132014		SD-39-10132014		SD-40-10132014		SD-41-10132014	
Laboratory I.D.:	180-37779-1		180-37779-2		180-37779-5		180-37779-4		180-37779-3	
Sample Date:	41925		41925		41925		41925		41925	
Sample Depth (feet):	0-0		0-0		0-0		0-0		0-0	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Aluminum	6200		8000		6900		10000		4500	
Antimony	0.49	L	0.49	L	0.55	L	0.57	L	0.24	L
Arsenic	6.5		5.2		4.8		4.2		3.7	
Barium	36	B	46	B	32	B	55	B	28	B
Beryllium	0.41		0.44		0.41		0.79		0.29	
Cadmium	1.3	B	0.54	B	0.25	J	0.41	B	0.68	B
Calcium	1700		1600		1200		1000		1400	
Chromium	12		13		14		21		7	
Cobalt	7.7		7.4		7.9		10		11	
Copper	25		26		24		39		12	
Iron	17000	J	16000	J	12000	J	12000	J	11000	J
Lead	48		49		63		88		29	
Magnesium	1100		1600		1500		1700		1400	
Manganese	680	J	190	J	250	J	340	J	690	J
Mercury	0.054		0.067		0.099		0.061		0.034	
Nickel	14		15		15		18		13	
Potassium	430		400		300		610		260	J
Selenium	0.68		0.82		0.73		0.84		0.3	J
Silver	15		43		17		13		4.7	
Sodium	30	J	100	J	80	J	63	J	50	J
Vanadium	14		15		11		18		13	
Zinc	230	J	110	J	48	J	120	J	110	J
Acenaphthene	0.018	J	0.015	J	0.019	U	0.014	U	0.039	U
Acenaphthylene	0.011	J	0.0095	J	0.023	U	0.017	U	0.046	U
Anthracene	0.051		0.038	J	0.045	J	0.025	J	0.04	U
Benzo[a]anthracene	0.24		0.16		0.13	J	0.1	J	0.051	U
Benzo[a]pyrene	0.31		0.21		0.12	J	0.11	J	0.041	U
Benzo[b]fluoranthene	0.6		0.34		0.15	J	0.16		0.064	U
Benzo[g,h,i]perylene	0.36		0.22		0.16	J	0.1	J	0.04	U
Benzo[k]fluoranthene	0.17		0.16		0.095	J	0.082	J	0.082	U
Chrysene	0.47		0.32		0.16	J	0.16		0.048	U
Dibenz(a,h)anthracene	0.079		0.051		0.022	U	0.016	U	0.045	U
Fluoranthene	0.85		0.57		0.35		0.32		0.26	J
Fluorene	0.02		0.017	J	0.027	U	0.02	U	0.053	U
Indeno[1,2,3-cd]pyrene	0.3		0.21		0.11	J	0.092	J	0.042	U
Naphthalene	0.0054	J	0.0082	J	0.017	U	0.013	U	0.035	U
Phenanthrene	0.36		0.26		0.18	J	0.15		0.14	J
Pyrene	0.52		0.36		0.19	J	0.19		0.17	J

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
K - Reported Value may be biased high
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,2,2-tetrachloroethane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4,5-T, 2,4,5-TP, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-D, 2,4-DB, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, acenaphthene, acenaphthylene, acrolein, acrylonitrile, aldrin, alpha-BHC, alpha-chlordane, anthracene, antimony, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, arsenic, benzo[a]anthracene, benzo(a)pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, beryllium, beta-BHC, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate, bromodichloromethane, bromoform, bromomethane, butyl benzyl phthalate, calcium, carbazole, carbon tetrachloride, chlordane, chloroethane, chrysene, cis-1,3-dichloropropene, cobalt, delta-BHC, dibenz(a,h)anthracene, dibenzofuran, dibromochloromethane, dicamba, dichlorodifluoromethane, dichloroprop, dieldrin, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate,endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, fluoranthene, fluorene, gamma-BHC, gamma-chlordane, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, indeno(1,2,3-cd)pyrene, isophorone, isopropylbenzene, MCPA, mecoprop, methoxychlor, methylene chloride, naphthalene, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, pentachlorophenol, phenanthrene, phenol, p-isoproyltoluene, selenium, silver, styrene, thallium, toxaphene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, and vanadium.

Attachment E-10. Sample Results for the Affected area Watering Run Sediment Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	SW-SD-05		SW-SD-06		SW-SD-08		SW-SD-09		SW-SD-10		SW-SD-11		SW-SD-12		SW-SD-13		SW-SD-18		SW-SD-20	
Sample Name:	SD05-082411		SD06-082411		SD08-082411		SD09-082411		SD10-082411		SD11-082411		SD12-082411		SD13-082511		SD18-082511		SD20-082511	
Laboratory I.D.:	180-3407-1		180-3407-5		180-3407-15		180-3407-9		180-3407-14		180-3407-18		180-3407-10		180-3416-1		180-3416-7		180-3416-11	
Sample Date:	8/24/2011		8/24/2011		8/24/2011		8/24/2011		8/24/2011		8/24/2011		8/24/2011		8/25/2011		8/25/2011		8/25/2011	
Sample Depth (feet):	0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5	
Source:	TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P	
Analytes:	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
Formaldehyde	0.55	J	0.86	J	1.7	J	0.95	J	0.64	J	0.55	J	0.66	J	1	J	0.66	J	0.38	J
Cyanide, total	0.66		0.52	J			0.25	J	0.25	J	0.87									
Aluminum			12000				4100													
Antimony			1.3	U			0.34	L												
Arsenic			24				4.7													
Barium			180	B			88	B												
Beryllium			1.9				0.37													
Cadmium			0.52	J			0.2	L												
Calcium			1500	B			830	B												
Chromium			16	K			8.9	J												
Cobalt			39	K			7.7	K												
Copper			15	J			15	J												
Iron			47000				14000	J												
Lead			41				20	L												
Magnesium			690	J			1300	J												
Manganese			7500	J			930	J												
Mercury	0.077		0.033				0.0095	J												
Nickel			24	K			13	J												
Potassium			310	J			400													
Selenium			1.6	U			0.14	J												
Silver			0.45	U			0.037	R												
Sodium			55	J			120	J												
Thallium			1.8	J			0.13	U												
Vanadium			37				10													
Zinc			260	J			89	J												
2-Methylphenol	0.017	U	0.0036	U	0.02	U	0.031	U	0.029	U	0.018	U	0.0055	U	0.064	J	0.0071	U	0.0034	U
Anthracene	0.087		0.0021	J	0.0067	J	0.0086	U	0.012	J	0.0097	J	0.026		0.065	J	0.002	U	0.001	J
Carbazole	0.068		0.0016	J	0.0054	U	0.0081	U	0.0076	U	0.0047	U	0.016		0.057	J	0.0019	U	0.0009	U
Acetone	0.0073	U	0.0076	U	0.0085	U	0.0064	U	0.0061	U	0.0076	U	0.0059	U	0.0089	U	0.0061	U	0.0073	U
Acrolein	0.01	R	0.011	R	0.012	R	0.0091	R	0.0087	R	0.011	R	0.0083	R	0.013	R	0.0086	R	0.01	R
Chloroform	0.00086	U	0.00089	U	0.001	U	0.00075	U	0.00072	U	0.00089	U	0.00069	U	0.001	U	0.00071	U	0.00085	U
Methylene chloride	0.00099	U	0.001	U	0.0011	U	0.00086	U	0.00083	U	0.001	U	0.00086	J	0.0012	U	0.00082	U	0.00098	U
Trichloroethene	0.00097	U	0.001	U	0.0011	U	0.00085	U	0.00081	U	0.001	U	0.00077	U	0.0012	U	0.0008	U	0.00096	U

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
R - Rejected
U - Not detected

Data results were not available to create a list of nondetected analytes for this area.

SW-SD-22		SW-SD-25		SW-SD-25		SW-SD-26		SW-SD-28		SW-SD-PW-07		SW-SD-PW-14		SW-SD-PW-15		SW-SD-PW-16		SW-SD-PW-17		SW-SD-PW-19	
SD22-082511		SD25-082511_D		SD25-082511		SD26-082411		SD28-082411		SD07-082411		SD14-082511		SD15-082411		SD16-082411		SD17-082511		SD19-082511	
180-3416-15		180-3419-11		180-3419-11		180-3407-4		180-3407-6		180-3407-12		180-3416-3		180-3407-8		180-3407-19		180-3416-5		180-3416-9	
8/25/2011		8/25/2011		8/25/2011		8/24/2011		8/24/2011		8/24/2011		8/25/2011		8/24/2011		8/24/2011		8/25/2011		8/25/2011	
0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5	
TAI-P				TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P	
mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
0.65	J	0.66	J	0.46	J	0.92	J	0.66	J	1	J	0.74	J	0.84	J	0.75	J	0.63	J	0.6	J
										0.46						0.65	J			0.31	J
																4700				9300	B
																0.54	L			0.9	J
																7				28	
																170	B			2900	B
																0.71				2.3	
																0.74	L			3.3	
																620	B			2100	B
																11	J			19	B
																12	K			58	L
																20	J			27	
																18000	J			53000	B
																17	L			23	
																960	J			1100	B
																930	J			26000	B
																0.02	J			0.02	J
																18	J			140	L
																310	J			540	J
																0.69				6	U
																0.059	R			1.7	U
																89	J			140	B
																0.21	U			6	U
																11				20	
																210	J			680	J
0.0016	U	0.003	U	0.0022	U	0.024	U	0.0078	U	0.037	U	0.042	U	0.028	U	0.012	U	0.0076	U	0.054	U
0.00044	U	0.0075	J	0.00063	U	0.0066	U	0.0022	U	0.01	U	0.012	J	0.021	J	0.012	J	0.0021	U	0.017	J
0.00041	U	0.0011	J	0.00059	U	0.0062	U	0.002	U	0.0099	U	0.013	J	0.0074	U	0.015	J	0.002	U	0.014	U
0.0068	U	0.0065	U	0.02	J	0.01	U	0.0066	U	0.0079	U	0.009	U	0.0059	U	0.01	U	0.0066	U	0.012	U
0.0096	R	0.0092	R	0.014	R	0.014	R	0.0093	R	0.011	R	0.013	R	0.0083	R	0.014	R	0.0093	R	0.017	R
0.00079	U	0.001	J	0.0011	U	0.0012	U	0.00077	U	0.00092	U	0.0011	U	0.00069	U	0.0012	U	0.00077	U	0.0014	U
0.00091	U	0.014		0.0017	J	0.0014	U	0.00089	U	0.0011	U	0.0012	U	0.00079	U	0.0013	U	0.00088	U	0.0016	U
0.00089	U	0.037		0.0013	U	0.0013	U	0.00087	U	0.001	U	0.0012	U	0.00078	U	0.0013	U	0.012		0.0015	U

SW-SD-PW-21		SW-SD-PW-23		SW-SD-PW-24		SW-SD-PW-27		SW-SD-PW-29		SW-SD-PW-30	
SD21-082511		SD23-082511		SD24-082511		SD27-082411		SD29-082411		SD30-082411	
180-3416-13		180-3416-17		180-3416-19		180-3407-7		180-3407-2		180-3407-3	
8/25/2011		8/25/2011		8/25/2011		8/24/2011		8/24/2011		8/24/2011	
0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5	
TAI-P		TAI-P		TAI-P		TAI-P		TAI-P		TAI-P	
mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.
0.98	J	0.91	J	0.87	J	0.94	J	0.89	J	0.97	J
						0.14	J	0.28	J		
						2000		3900			
						0.12	L	0.19	L		
						2.1		3.5			
						31	B	63	B		
						0.21	J	0.41			
						0.39	L	0.41	L		
						170	J	460	B		
						3.1	J	6.1	J		
						3.5	K	8.2	K		
						3.5	J	7.1	J		
						5600	J	11000	J		
						5.4	L	11	L		
						400	J	1200	J		
						490	J	1000	J		
						0.0087	J	0.014	J		
						5.4	J	12	J		
						240	J	350			
						0.13	U	0.13	U		
						0.036	R	0.037	R		
						28	B	35	B		
						0.13	U	0.14	J		
						3.4		7.1			
						40	J	67	J		
0.0015	U	0.0034	U	0.0022	U	0.0077	U	0.015	U	0.0034	U
0.00041	U	0.0017	J	0.00078	J	0.0021	U	0.032	J	0.00094	U
0.00055	J	0.00091	U	0.00059	U	0.002	U	0.017	J	0.00089	U
0.0063	U	0.0074	U	0.0096	U	0.0065	U	0.0063	U	0.0073	U
0.0089	R	0.01	R	0.014	R	0.0092	R	0.0089	R	0.01	R
0.00074	U	0.00086	U	0.0011	U	0.00076	U	0.00073	U	0.00085	U
0.00085	U	0.00099	U	0.0013	U	0.00088	U	0.00084	U	0.00098	U
0.00083	U	0.00097	U	0.0013	U	0.00086	U	0.00083	U	0.00095	U

Attachment E-11. Sample Results for the Former FWEC Facility Retention Pond Surface Water Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	SW-SD-01		SW-SD-02		SW-SD-02		SW-SD-03	
Sample Name:	SW01-082411		SW02-082411_D		SW02-082411		SW03-082411	
Laboratory I.D.:	180-3403-6		180-3403-4		180-3403-4		180-3403-8	
Sample Date:	8/24/2011		8/24/2011		8/24/2011		8/24/2011	
Sample Depth (feet):	0-0		0-0		0-0		0-0	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.
Aluminum	0.013	B	0.014	B	0.015	B	0.015	B
Barium	0.02	J	0.01	J	0.01	J	0.01	J
Calcium	44		26		26		23	
Cobalt	0.0004	U	0.0004	U	0.00042	J	0.0004	U
Copper	0.0029	J	0.0027	U	0.0029	J	0.0027	U
Iron	0.061	J	0.046	J	0.052	J	0.064	J
Magnesium	1.4	J	0.88	J	0.89	J	0.81	J
Manganese	0.0038	J	0.0014	J	0.002	J	0.0014	J
Nickel	0.0076	J	0.0016	U	0.0022	J	0.0016	U
Potassium	1.6	J	0.92	J	0.9	J	1.1	J
Sodium	2.9	J	1	J	1.2	J	0.77	J
Zinc	0.018	K	0.014	K	0.013	K	0.011	K
Butyl benzyl phthalate	0.00041	J	0.00057	J	0.00058	J	0.00049	J
Fluoranthene	0.000055	J	0.000016	U	0.000016	U	0.000041	J
Phenanthrene	0.000061	J	0.000042	U	0.000042	U	0.00005	J
Pyrene	0.000031	J	0.000016	U	0.000016	U	0.000027	J

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,4-dioxane, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2,4-dinitrophenol, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-butanone, 2-chloroethyl vinyl ether, 2-chloronapthalene, 2-chlorophenol, 2-hexanone, 2-methylnaphthalene, 2-methylphenol, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, 4,6-dinitro-2-methylphenol, 4-bromophenylphenyl ether, 4-chloro-3-methylphenol, 4-chloroaniline, 4-chlorophenyl phenyl ether, 4-methyl-2-pentanone, 4-methylphenol, 4-nitroaniline, 4-nitrophenol, acenaphthene, acenaphthylene, acetone, acrolein, acrylonitrile, aldrin, alpha-BHC, anthracene, antimony, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, arsenic, benzene, benzo[a]anthracene, benzo(a)pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, beryllium, beta-BHC, bis(2-chloro-1-methylethyl)ether, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate, bromodichloromethane, bromoform, bromomethane, cadmium, carbazole, carbon disulfide, carbon tetrachloride, chlordane, chlorobenzene, chloroethane, chloroform, chloromethane, chromium, chrysene, cis-1,2-dichloroethene, cis-1,3-dichloropropene, cyanide, delta-BHC, dibenz(a,h)anthracene, dibenzofuran, dibromochloromethane, dichlorodifluoromethane, dieldrin, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, ethylbenzene, fluorene, formaldehyde, gamma-BHC, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, indeno(1,2,3-cd)pyrene, isophorone, isopropylbenzene, lead, m/p xylene, mercury, methoxychlor, methylene chloride, naphthalene, nitrobenzene, N-nitrosodi-n-propylamine, N-nitrosodiphenylamine, o-xylene, pentachlorophenol, phenol, p-isoproyltoluene, selenium, silver, styrene, tetrachloroethene, thallium, toluene, toxaphene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, trichloroethene, trichlorofluoromethane, vanadium, vinyl chloride, and xylenes, total.

Attachment E-12. Sample Results for the Former FWEC Facility Watering Run Surface Water Used in the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	181C-SPRING		181C-SPRING		192C-SPRING		201C-SPRING		201C-SPRING		CSG-SPRING		SW-SD-05	
Sample Name:	181 CHURCH RD - SPRING		181 Spring - 09202013		192 CHURCH RD - SPRING		201 CHURCH RD-SPRING		201 Spring - 09202013		Camp St. George Spring -		SW05-050511	
Laboratory I.D.:	460-56586-7		460-63403-4		460-56586-5		460-56711-1		460-63403-3		460-63403-2		460-26568-9	
Sample Date:	5/22/2013		9/20/2013		5/22/2013		5/23/2013		9/20/2013		9/20/2013		5/5/2011	
Sample Depth (feet):	0-0		0-0		0-0		0-0		0-0		0-0		0-0	
Source:	Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations	
Analytes:	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.
Formaldehyde	0.005	U			0.005	U	0.005	U					0.005	U
Aluminum														
Antimony														
Barium														
Beryllium														
Calcium														
Chromium														
Copper														
Iron														
Magnesium														
Manganese														
Nickel														
Potassium														
Sodium														
Zinc														
Carbazole	0.0012	U			0.0012	U	0.0012	U						
1,1,1-Trichloroethane	0.00071	J	0.00054	J	0.00006	U	0.00033	J	0.00021	J	0.00006	U	0.00025	U
Diethyl phthalate	0.0014	U			0.0014	U	0.0014	U						
2-Butanone	0.0023	U	0.0023	U	0.0023	U	0.0023	U	0.0023	U	0.0023	U	0.00082	
4-Methyl-2-pentanone	0.00099	U	0.00099	U	0.00099	U	0.00099	U	0.00099	U	0.00099	U	0.00068	U
Acetone	0.0027	U	0.0027	U	0.0027	U	0.0027	U	0.0027	U	0.0027	U	0.0025	U
Bromodichloromethane	0.00012	U	0.00012	U	0.00012	U	0.00012	U	0.00012	U	0.00026	J	0.000093	U
Chloroform	0.00008	U	0.00008	U	0.00008	U	0.00008	U	0.000085	J	0.0035		0.00015	U
Dichlorodifluoromethane	0.00022	U	0.00022	U	0.00022	U	0.00022	U	0.00022	U	0.00053	J	0.00029	U
Trichloroethene	0.00009	U	0.00016	J	0.0013		0.061		0.048		0.009		0.00018	U
Trichlorofluoromethane	0.00015	U	0.00015	U	0.00015	U	0.0018	J	0.00088	J	0.0026		0.00016	U

NOTES:
B - Reported value may be wholly or partially due to contamination in an associated blank sample
J - Estimated
K - Reported Value may be biased high
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

The following chemical compounds were analyzed for but were not detected in any sample: 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,4-dioxane, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2-chloroethyl vinyl ether, 2-hexanone, 2-methylphenol, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-BHC, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260 Aroclor 1262, Aroclor 1268, arsenic, benzene, beta-BHC, bis(2-chloroethyl)ether, bromoform, bromomethane, cadmium, carbon disulfide, carbon tetrachloride, chlordane, chlorobenzene, chloroethane, chloromethane, cis-1,2-dichloroethene, cis-1,3-dichloropropene, cobalt, cyanide, delta-BHC, dibromochloromethane, dieldrin, diethyl phthalate, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, ethylbenzene, gamma-BHC, heptachlor, heptachlor epoxide, isopropylbenzene, lead, m/p xylene, mercury, methoxychlor, methylene chloride, o-xylene, phenol, p-isoproyltoluene, selenium, silver, styrene, tetrachloroethene, thallium, toluene, toxaphene, trans-1,2-dichloroethene, trans-1,3-dichloropropene, vanadium, vinyl chloride, and xylenes, total.

SW-SD-06		SW-SD-06		SW-SD-PW-07		SW-SD-PW-07		SW-SD-08		SW-SD-08		SW-SD-09		SW-SD-09		SW-SD-10		SW-SD-10		SW-SD-11	
SW06-050511		SW06-082411		SW07-050511		SW07-082411		SW08-050511		SW08-082411		SW09-050511		SW09-082411		SW10-050511		SW10-082411		SW11-050511	
460-26568-10		180-3419-2		460-26568-13		180-3403-3		460-26568-14		180-3403-7		460-26568-16		180-3403-16		460-26568-17		180-3403-5		460-26568-18	
5/5/2011		8/25/2011		5/5/2011		8/24/2011		5/5/2011		8/24/2011		5/5/2011		8/24/2011		5/5/2011		8/24/2011		5/5/2011	
0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0	
Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations	
mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.
0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
		0.73	B											0.0097	B						
		0.0013	U											0.0013	U						
		0.033	J											0.043	J						
		0.00038	B											0.00023	U						
		9.3												11							
		0.0012	J											0.00057	U						
		0.0027	U											0.0027	U						
		0.72												0.012	U						
		2.1	J											3.1	J						
		0.077												0.083							
		0.0019	J											0.0017	J						
		0.89	J											0.91	J						
		13												26							
		0.018	J											0.01	K						
		0.000016	U			0.000015	U			0.000016	U			0.000015	U			0.000015	U		
0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U
		0.00014	U			0.00014	U			0.00014	U			0.00014	U			0.00014	U		
0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082	
0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U
0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U
0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U
0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U
0.00018	U	0.00014	U	0.00018	U	0.00014	U	0.00018	U	0.00014	U	0.0005	J	0.00038	J	0.00018	U	0.00014	U	0.00018	U
0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U

SW-SD-11		SW-SD-12		SW-SD-12		SW-SD-13		SW-SD-13		SW-SD-PW-15		SW-SD-PW-15		SW-SD-PW-16		SW-SD-PW-16		SW-SD-18		SW-SD-18	
SW11-082411		SW12-050511		SW12-082411		SW13-050511		SW13-082411		SW15-050511		SW15-082411		SW16-050511		SW16-082411		SW18-050511		SW18-082411	
180-3403-9		460-26568-19		180-3403-18		460-26568-27		180-3419-4		460-26568-29		180-3403-17		460-26568-31		180-3419-3		460-26568-33		180-3419-7	
8/24/2011		5/5/2011		8/24/2011		5/5/2011		8/25/2011		5/5/2011		8/24/2011		5/5/2011		8/25/2011		5/5/2011		8/25/2011	
0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0	
Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations	
mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.
0.0093	J	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
																0.057	B				
																0.0018	J				
																0.032	J				
																0.00023	U				
																7.9					
																0.00066	K				
																0.0037	J				
																0.1					
																1.6	J				
																0.0057	J				
																0.0016	U				
																1.1	J				
																26					
																0.014	K				
0.000015	U			0.000016	U			0.000015	U			0.000015	U			0.000016	U			0.000016	U
0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U
0.00014	U			0.00099	J			0.00014	U			0.00014	U			0.0013				0.00014	U
0.00055	U	0.0032	J	0.00055	U	0.0039	J	0.0031	J	0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U
0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00079	J	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U
0.0025	U	0.0074	J	0.0025	U	0.0097	J	0.031		0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.014	
0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U
0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U
0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U
0.00014	U	0.00018	U	0.00014	U	0.00018	U	0.00014	U	0.0013		0.0027		0.001		0.00069	J	0.0015		0.0013	
0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U

SW-SD-PW-19		SW-SD-PW-19		SW-SD-20		SW-SD-20		SW-SD-PW-21		SW-SD-PW-21		SW-SD-22		SW-SD-22		SW-SD-PW-24		SW-SD-PW-24		SW-SD-25	
SW19-050511		SW19-082411		SW20-050511		SW20-082411		SW21-050511		SW21-082411		SW22-050511		SW22-082511		SW24-050511		SW24-082511		SW25-050511	
460-26568-34		180-3419-8		460-26568-15		180-3419-9		460-26568-20		180-3419-10		460-26568-21		180-3416-21		460-26568-23		180-3416-23		460-26568-24	
5/5/2011		8/25/2011		5/5/2011		8/25/2011		5/5/2011		8/25/2011		5/5/2011		8/25/2011		5/5/2011		8/25/2011		5/5/2011	
0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0	
Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations	
mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.
0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
		0.041	B																		
		0.0023	J																		
		0.031	J																		
		0.00023	U																		
		7.9																			
		0.00057	U																		
		0.0029	J																		
		0.11																			
		1.8	J																		
		0.0015	J																		
		0.0016	U																		
		1.1	J																		
		23																			
		0.0092	K																		
		0.000053	J			0.000015	U			0.000015	U			0.000015	U			0.000015	U		
0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U
		0.00014	U			0.00014	U			0.00014	U			0.00014	U			0.00014	U		
0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082	
0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U
0.0025	U	0.024		0.0025	U	0.0033	J	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U
0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U
0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U
0.00034	J	0.00037	J	0.00018	U	0.00014	U	0.00018	U	0.00014	U	0.00018	U	0.00014	U	0.00055	J	0.00014	U	0.00018	U
0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U

SW-SD-25		SW-SD-26		SW-SD-26		SW-SD-PW-27		SW-SD-PW-27		SW-SD-28		SW-SD-28		SW-SD-PW-29		SW-SD-PW-29	
SW25-082511		SW26-050511		SW26-082411		SW27-050511		SW27-082411		SW28-050511		SW28-082411		SW29-050511		SW29-082411	
180-3416-24		460-26568-8		180-3403-12		460-26568-11		180-3403-15		460-26568-12		180-3403-14		460-26568-7		180-3403-10	
8/25/2011		5/5/2011		8/24/2011		5/5/2011		8/24/2011		5/5/2011		8/24/2011		5/5/2011		8/24/2011	
0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0		0-0	
Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations		Final RI Investigations	
mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.
0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
								0.065	B							0.0097	U
								0.0013	U							0.0013	U
								0.044	J							0.041	J
								0.00023	U							0.00023	U
								13								13	
								0.00057	U							0.00057	U
								0.0027	U							0.0027	U
								0.012	U							0.012	U
								2.8	J							2.7	J
								0.012	J							0.028	
								0.0016	J							0.0016	U
								0.85	J							0.84	J
								18								19	
								0.016	K							0.0061	K
0.000015	U			0.000016	U			0.000015	U			0.000016	U			0.000015	U
0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U	0.00025	U	0.00029	U
0.00014	U			0.00015	U			0.00014	U			0.00015	U			0.00014	U
0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U	0.00082		0.00055	U
0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U	0.00068	U	0.00053	U
0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U	0.000093	U	0.00013	U
0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U	0.00015	U	0.00017	U
0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U	0.00029	U	0.00019	U
0.00014	U	0.00018	U	0.00014	U	0.00018	U	0.00014	U	0.00018	U	0.00014	U	0.00018	U	0.00014	U
0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U	0.00016	U	0.0002	U

Attachment E-13. Sample Results for the Former FWEC MIP 2 Groundwater Used for the Indoor Air Component of the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Location:	MIP2-B20A		MIP2-B20A		MIP2-B30	
Sample Name:	GW-MIP2-B20A		GW-MIP2-B20A_D		GW-MIP2-B30	
Laboratory I.D.:	460-20598-6		460-20598-6		460-20598-7	
Sample Date:	12/1/2010		12/1/2010		12/1/2010	
Sample Depth (feet):	0		0		0	
Source:	RI Field Investigations		RI Field Investigations		RI Field Investigations	
Analytes:	mg/l	Qual.	mg/l	Qual.	mg/l	Qual.
Formaldehyde	0.0342	J	0.0379	J	0.0117	J
Aluminum	5.42		7.91		513	
Antimony	0.0046	U	0.0049	J	0.023	U
Arsenic	0.0067		0.0081		0.18	
Barium	0.181	J	0.168	J	3.49	
Beryllium	0.00094	U	0.00094	U	0.0412	
Calcium	7.76		7.43		94.9	
Chromium	0.012		0.0126		2.17	
Cobalt	0.0859		0.0838		0.878	
Copper	0.0358		0.0363		1.15	
Iron	10.2		8.71		1160	
Lead	0.0104	B	0.0099	B	2.46	
Magnesium	6.2		5.99		110	
Manganese	9.38		9.04		64.3	
Mercury	0.00018	U	0.00018	U	0.0017	
Nickel	0.0409		0.0391	J	1.19	
Potassium	4.11	L	3.43	L	29.7	L
Sodium	13.3	L	12.4	L	9.8	L
Vanadium	0.0058	J	0.0064	J	0.575	
Zinc	0.0818		0.0807		3.77	
4,4'-DDT	0.000037	J			0.00001	U
delta-BHC	0.000015	J			0.0000093	U
gamma-BHC (Lindane)	0.000018	J			0.000012	U
2-Methylnaphthalene	0.0045	J	0.0069	J	0.0035	U
Benzo[a]anthracene	0.00027	U	0.0003	U	0.00073	J
Benzo[a]pyrene	0.00018	U	0.0002	U	0.00042	J
Benzo[b]fluoranthene	0.00021	U	0.00023	U	0.00058	J
Methoxychlor	0.00018				0.000013	U
Naphthalene	0.013		0.02		0.0041	U
Phenanthrene	0.0045	J	0.0054	J	0.004	U
1,1,1-Trichloroethane	34		26		0.025	
1,1,2-Trichloroethane	0.031	J	0.029	J	0.0001	U
1,1-Dichloroethane	2.4		2		0.0036	
1,1-Dichloroethene	4.5		3.3		0.012	
1,2-Dichloroethane	0.024	U	0.024	U	0.00042	J
1,4-Dioxane	0.73	L	0.76	L	0.013	L
Acetone	1.6		1.6		0.0025	U
Acrolein*	0.19	R	0.19	R	0.0019	R
Benzene	0.013	U	0.013	U	0.00051	J
Chloroform	0.015	U	0.015	U	0.0003	J
cis-1,2-Dichloroethene	0.02	U	0.02	U	0.004	
Ethylbenzene	0.035	J	0.028	J	0.00025	U
Tetrachloroethene	0.055	J	0.047	J	0.03	
Toluene	0.009	U	0.009	U	0.0002	J
Trichloroethene	0.053	J	0.018	U	0.0063	
Xylenes, Total	0.26	J	0.21	J	0.00043	U

NOTES:
* Acrolein was not used in the risk assessment because the data was rejected during the validation process.
J - Estimated
L - Reported value may be biased low
mg/kg - milligrams per kilogram
Qual - qualifier
U - Not detected

Attachment E-14.Sample Results for the Additional Samples Collected for the Purpose of Chromium Speciation Used for the Baseline Human Health Risk Assessment
Mountain Top, Pennsylvania

Surface Water and Groundwater Results[(a)]

PEA		Watering Run		Watering Run		NA		NA		NA		NA		NA		NA	
Matrix		Surface Water		Surface Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
Sample_Tag		DUP-SW		SW-06-C-GB		DUP 1-041316 GW		DUP 1-041316 GW		EB-01-C-GWMW041316-110		EB-01-C-GWMW041316-110		FB-1		FB-1	
Lab_ID		1616031-18RE1		1616031-16RE1		1616031-22RE1		1616031-23		1616031-20RE1		1616031-21		1616031-24RE1		1616031-25	
Sample Date		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016	
Analyte	**Units**																
Chromium (Total) - Total	µg/L	0.365	J	1.1	J		R				R			0.041	J		
Chromium (Total) - Dissolved	µg/L	0.366	J	0.378	J		R				R			0.034	J		
Chromium (VI) - Dissolved	µg/L	0.112		0.106					R				R			0.03	U

(a) Section 6.1 of the report discusses the hexavalent chromium, and explains that because the presence of hexavalent chromium in groundwater is unknown, all chromium in groundwater was conservatively assumed to be hexavalent chromium.

Sediment and Soil Results

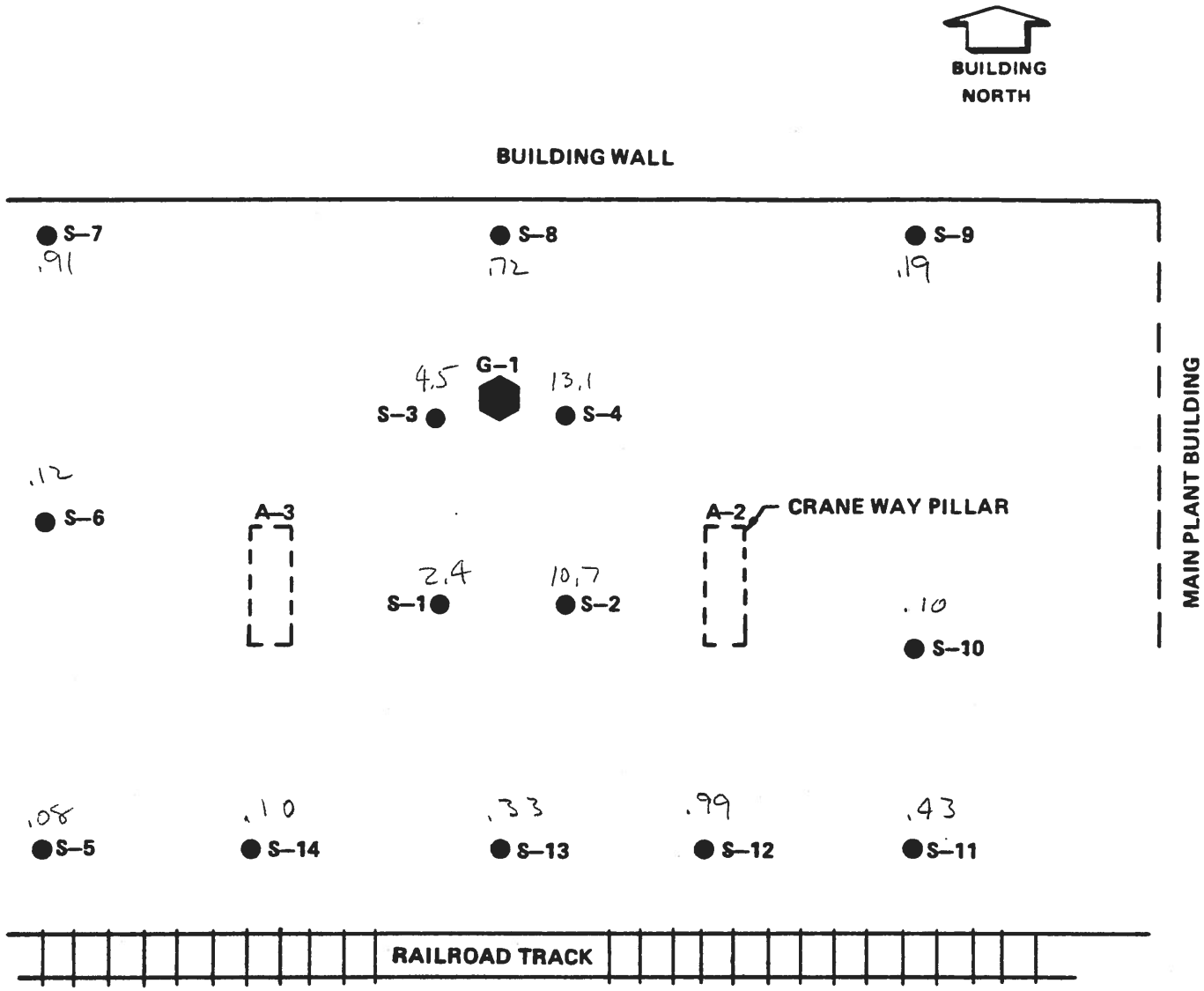
PEA		Ret Pond		Ret Pond		ShotBlast		ShotBlast		ShotBlast		ExWaste		ExWaste		ExWaste		ExWaste	
Matrix		Sed		Sed		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Sample_Tag		DUP 2-041316		SD-02-C-GB-SS		FCR-03-C-GB-SS		FCR-04-C-GB-SS		FCR-05-C-GB-SS		FCR-06-C-GB-SS		FCR-07-C-GB-SS		FCR-08-C-GB-SS		FCR-09-C-GB-SS	
Lab_ID		1616031-06		1616031-05		1616031-04		1616031-03		1616031-01		1616031-15		1616031-12		1616031-13		1616031-14	
Sample Date		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016		04/13/2016	
Analyte	**Units**																		
Chromium (Total) - Total	mg/kg dry	32.0		30.4		23.6	J	40.6	J	52.4	J	22	J	15.6	J	19.8	J	15.4	J
Chromium (VI) - Dissolved	mg/kg dry	0.015	UJ	0.014	UJ	0.332		0.184		0.945		0.003	U	0.003	U	0.003	U	0.003	U
Percent Total Solids	**%**	13.85		14.10		76.10		82.36		89.41		66.02		73.99		66.58		69.99	
Oxidation/Reduction Potential	mV dry	431	J	427	J	417	J	420	J	418		494		474		476		467	
pH	pH units dry	7.16		7.22		7.23		7.16		6.74		5.02		5.56		5.69		6.06	

J = estimated value
R = rejected and unusable
U = undetected
UJ- = undetected with low biased detection limit

ATTACHMENT F

HISTORICAL DATA RESULTS USED IN THE BASELINE HUMAN HEALTH RISK ASSESSMENT

From WCC, 1986 (GFEE, 1985) WCC, 1986. Field Investigation Report-Phase I for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. June 1986. (Data comes from GFEE, found within FSP of this report.)



LEGEND:

- ● SURFACE SAMPLE
- ⬢ SUBSURFACE SAMPLE

GANNETT FLEMING SURFACE SOIL SAMPLE LOCATIONS FOSTER WHEELER MOUNTAINTOP PLANT		
WOODWARD—CLYDE CONSULTANTS CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS WAYNE, NEW JERSEY		
DR. BY: TJD	SCALE: NONE	PROJ. NO.: 85C4462
CK'D. BY: FS	DATE: 5 FEB 1986	FIG. NO.: 1–3

GANNETT • MCCREATH LABORATORIES
ANALYTICAL AND CONSULTING CHEMISTS
P.O. BOX 1963
HARRISBURG, PA 17105
TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - NOVEMBER 25, 1985

CREST FOAM

SAMPLE ID NUMBER - 854153

SAMPLE DESIGNATION - S-1

DATE RECEIVED - NOV 07,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TCE	2.4 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT B-5

GANNETT - MCCREATH LABORATORIES
ANALYTICAL AND CONSULTING CHEMISTS
P.O. BOX 1963
HARRISBURG, PA 17105
TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - NOVEMBER 25, 1985

CREST FOAM

SAMPLE ID NUMBER - 854154

SAMPLE DESIGNATION - S-2

DATE RECEIVED - NOV 07,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TCE	10.7 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT B-5

GANNETT • MCCREATH LABORATORIES
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HARRISBURG, PA 17105
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LABORATORY NO. 023791001 DATE - NOVEMBER 25, 1985

CREST FOAM

SAMPLE ID NUMBER - 854155

SAMPLE DESIGNATION - S-3

DATE RECEIVED - NOV 07,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TCE	4.5 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT B-5

GANNETT • MCCREATH LABORATORIES
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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - NOVEMBER 25, 1985

CREST FOAM

SAMPLE ID NUMBER - 854156

SAMPLE DESIGNATION - S-4

DATE RECEIVED - NOV 07,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TCE	13.1 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT D-5

GANNETT - MCCREATH LABORATORIES
ANALYTICAL AND CONSULTING CHEMISTS
P.O. BOX 1963
HARRISBURG, PA 17105
TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854453

SAMPLE DESIGNATION - S-5

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.08 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

GANNETT • MCCREATH LABORATORIES
ANALYTICAL AND CONSULTING CHEMISTS
P.O. BOX 1963
HARRISBURG, PA 17105
TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854454

SAMPLE DESIGNATION - S-6

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.12 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

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P.O. BOX 1963
HARRISBURG, PA 17105
TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854455

SAMPLE DESIGNATION - S-7

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.91 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854456

SAMPLE DESIGNATION - 0-8

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.72 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

GANNETT • MCCREATH LABORATORIES
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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854457

SAMPLE DESIGNATION - S-9

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.19 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

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EXHIBIT C-1

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LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854458

SAMPLE DESIGNATION - S-10

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.10 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854459

SAMPLE DESIGNATION - S-11

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.43 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

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EXHIBIT C-1

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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854460

SAMPLE DESIGNATION - S-12

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.99 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

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EXHIBIT C-1

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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854461

SAMPLE DESIGNATION - S-13

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.33 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

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EXHIBIT C-1

GANNETT - MCCREATH LABORATORIES
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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854462

SAMPLE DESIGNATION - S-14

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.10 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

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P.O. BOX 1963
HARRISBURG, PA 17105
TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854451

SAMPLE DESIGNATION - G-1A

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	0.55 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

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TELEPHONE (717) 763-7211

LABORATORY NO. 023791001 DATE - DECEMBER 23, 1985

CREST FOAM

SAMPLE ID NUMBER - 854452

SAMPLE DESIGNATION - G-1

DATE RECEIVED - DEC 06,1985

THE RESULTS OF ANALYSES PERFORMED ON THE ABOVE REFERENCED SAMPLE ARE AS FOLLOWS:

ANALYSIS PERFORMED	RESULT
TRICHLOROETHYLENE	2.48 PPM

PPM - PARTS PER MILLION

RESPECTFULLY SUBMITTED,

GANNETT - MC CREATH LABORATORIES

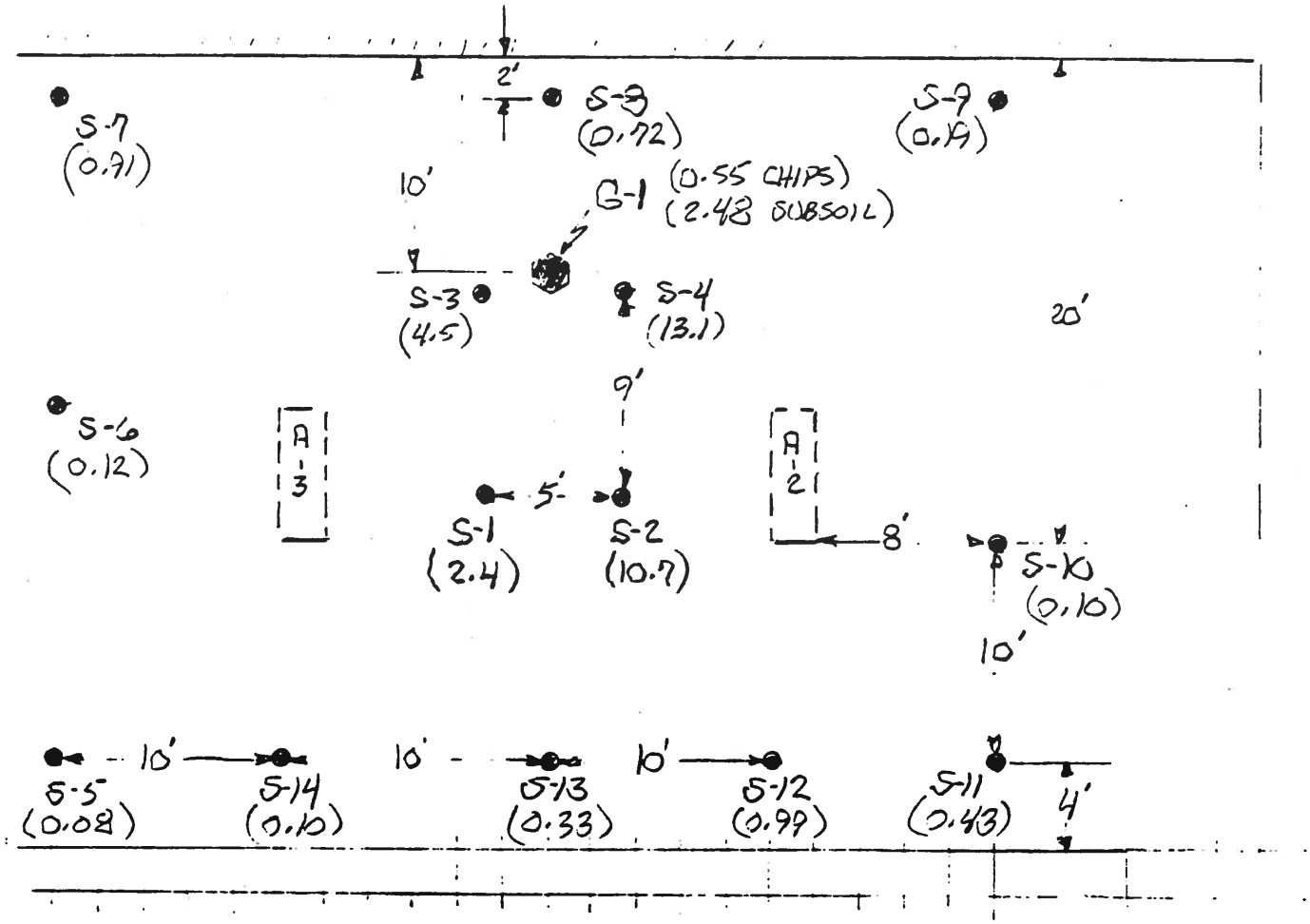
Max E. Snavely

MAX E. SNAVELY, SUPERVISOR

EXHIBIT C-1

BY [illegible] DATE 12/6/85 SUBJECT SAMPLE [illegible]
CHKD BY ____ DATE ____ FORMER VARNI [illegible] SITE
SHEET NO ____ OF ____
JOB NO [illegible]

SAMPLES S-1 THRU S-4 [illegible] 11/7/85
S-5 THRU S-14 " 12/5/85
G-1 " "



o SURFACE SAMPLE (ppm)

⬡ SUBSURFACE SAMPLE (ppm)

EXHIBIT C-1

From WCC, 1986. Field Investigation Report-Phase I for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. June 1986.

TABLE 3-I
RESULTS OF MW-4 SOIL SAMPLE ANALYSES
(18 April 1986)

	SS-1	SS-2	SS-3	SS-4*	SS-5*	SS-6**	SS-7**
Depth in feet	0.7-2.0	2.0-4.0	4.0-6.0	4.0-6.0	8.0-10.0	10.0-12.0	15.6-16.4
Organic Vapor Analysis (ppm)[a]							
HNU Scan of Spoon	400	350	30	40-50	50	60-70	20
HNU Scan of Headspace	200	100	300	360	380	400	110
Laboratory Analyses (ppb)[a]							
Total Purgable Halocarbons	47,500	NA	NA	725	633	3,530	1,960
Trichloroethylene (TCE)	29,000	NA	NA	620	510	3,400	1,700
1,1,2 Trichloroethane (TCA)	7,500	NA	NA	3.2	ND	3.6	ND
1,1,2,2 Tetrachloroethane	11,000	NA	NA	2.9	ND	ND	ND
Chloroform	ND	NA	NA	99	123	130	26

* Hardpan
** Bedrock
ND = Not detected
NA = Not analyzed - samples lost by laboratory before analysis.

(a) The HNU measures organic vapors detectable through photo ionization. It reports organic vapors as parts-per-million in air without differentiating individual contributing gases. Results reported by the laboratory are in parts-per-billion units as expressed by the ug/kg concentration of specific chemicals in soil. Though shown together here for easy cross reference it is impossible to directly compare concentrations between the two different media.

F294/306

water and wastewater testing specialists

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LABORATORY REPORT

Job No. H05457 Date 5/22/86

Client

Woodward Clyde Consultants
201 Willowbrook Blvd.
Wayne, N.J. 07470
Attn: Roger Henning

Sample(s) Reference

Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Foster Wheeler
Mountaintop, PA
Soil Samples

Date Samples (X) received ( ) collected by General Testing 4/21/86

P.O. # _____

ANALYTICAL RESULTS, ug/kg

	Sample Description	A SS-1	B SS-2	C SS-3	D SS-4
	Analysis * by GC Method 601 (in order of elution)				
	Date(s) Collected	4/18	4/18	4/18	4/18
	Time(s) Collected	8:17	9:15	9:52	10:26
	Date Analyzed	4/29			4/29
1-1	Chloromethane	< 1000			< 10
2	Bromomethane	< 1000			< 10
3	Dichlorodifluoromethane &	< 1000			< 10
1-4	Vinyl Chloride **	< 1000			< 10
1-5	Chloroethane	< 1000	SAMPLES LOST		< 10
6	Methylene Chloride	< 1000			< 2
7	Trichlorofluoromethane	< 1000			< 2
1-8	1,1-Dichloroethene	< 1000			< 2
9	1,1-Dichloroethane	< 1000			< 2
0	1,2-Dichloroethene	< 1000			< 2
1-11	Chloroform	< 1000			99
12	1,2-Dichloroethane	< 1000			< 2
3	1,1,1-Trichloroethane	< 1000			< 2
1-14	Carbon Tetrachloride	< 1000			< 2
1-15	Bromodichloromethane	< 1000			< 2
6	1,2-Dichloropropane	< 1000			< 2
7	1,3-Dichloropropene (Trans)	< 1000			< 2
1-18	Trichloroethene	29,000			620
19	1,3-Dichloropropene (Cis) &	< 1000			< 2
20	Dibromochloromethane &	< 1000			< 2
1-21	1,1,2-Trichloroethane **	7,500			3.2
1-22	2-Chloroethylvinyl Ether	< 1000			< 5
23	Bromoform	< 1000			< 5
24	1,1,2,2-Tetrachloroethane	11,000			2.9
1-25	Tetrachloroethene	< 1000			< 1
26	Chlorobenzene	< 1000			< 5
27	1,3-Dichlorobenzene (m)	< 1000			< 5
1-28	1,2-Dichlorobenzene (o)	< 1000			< 5
29	1,4-Dichlorobenzene (p)	< 1000			< 5

** Elute Together

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
NY LABORATORY CERTIFICATION ID #: 10145
NJ ID #: 73331 in Rochester, ID #: 02317 in Hackensack

Laboratory Director

1/84

general testing corporation

water and wastewater testing specialists

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Rochester, NY 14608
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85 Trinity Place
Hackensack, NJ 07601
(201) 488-5242

LABORATORY REPORT

Job No. H05457 Date 5/22/86

Client
Woodward Clyde Consultants
201 Willowbrook Blvd.
Wayne, N.J. 07470
Attn: Roger Henning

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Foster Wheeler
Mountaintop PA

Date Samples (X) received ( ) collected by General Testing 4/21/86

P.O. # _____

ANALYTICAL RESULTS, ug/kg

	Sample Description	E	F	G
	Analysis * by GC Method 601 (in order of elution)	SS-5	SS-6	SS-7
	Date(s) Collected	4/18	4/18	4/18
	Time(s) Collected	10:54	11:45	15:25
	Date Analyzed	4/29	4/29	4/29
1-1	Chloromethane	< 5	< 10	< 50
-2	Bromomethane	< 5	< 10	< 50
-3	Dichlorodifluoromethane &	< 5	< 10	< 50
1-4	Vinyl Chloride **	< 5	< 10	< 50
-5	Chloroethane	< 5	< 10	< 50
-6	Methylene Chloride	< 2	< 2	< 10
1-7	Trichlorofluoromethane	< 2	< 2	< 10
-8	1,1-Dichloroethene	< 2	< 2	< 10
-9	1,1-Dichloroethane	< 2	< 2	< 10
-0	1,2-Dichloroethene	< 2	< 2	< 10
1-11	Chloroform	123	130	26
2	1,2-Dichloroethane	< 2	< 2	< 10
3	1,1,1-Trichloroethane	< 2	< 2	< 10
1-14	Carbon Tetrachloride	< 2	< 2	< 10
5	Bromodichloromethane	< 2	< 2	< 10
6	1,2-Dichloropropane	< 2	< 2	< 10
1-17	1,3-Dichloropropene (Trans)	< 2	< 2	< 10
1-18	Trichloroethene	510	3400	1740
9	1,3-Dichloropropene (Cis) &	< 5	< 5	< 20
-0	Dibromochloromethane &	< 5	< 5	< 20
1-21	1,1,2-Trichloroethane **	< 5	< 5	< 20
2	2-Chloroethylvinyl Ether	< 5	< 5	< 20
3	Bromoform	< 5	< 5	< 20
1-24	1,1,2,2-Tetrachloroethane	< 1	< 2	< 10
1-25	Tetrachloroethene	< 1	3.6	< 10
6	Chlorobenzene	< 5	< 5	< 20
1-27	1,3-Dichlorobenzene (m)	< 5	< 5	< 20
1-28	1,2-Dichlorobenzene (o)	< 5	< 5	< 20
9	1,4-Dichlorobenzene (p)	< 5	< 5	< 20

** Elute Together

* EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
NY LABORATORY CERTIFICATION ID #: 10145
NJ ID #: 73331 in Rochester; ID #: 02317 in Hackensack

Laboratory Director

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general testing corporation

water and wastewater testing specialists

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85 Trinity Place
Hackensack, NJ 07601
(201) 488-5242

LABORATORY REPORT

Job No. H05457 Date 5/22/86

Client
Woodward Clyde Consultants
201 Willowbrook Blvd.
Wayne, N.J. 07470
Attn: Roger Henning

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Foster Wheeler
Mountaintop, PA
Quality Assurance Data

Date Samples (X) received ( ) collected by General Testing 4/21/86

P.O. # _____

ANALYTICAL RESULTS, ug/kg

	Sample Description	D Replicate		SPIKE RECOVERY Amt Added	SPIKE RECOVERY Per Cent Recovered
	Analysis * by GC Method 601 (in order of elution)				
	Date(s) Collected	4/18			
	Time(s) Collected	10:26			
	Date Analyzed	5/13			
1-1	Chloromethane	< 10			
2	Bromomethane	< 10			
3	Dichlorodifluoromethane &	< 10			
1-4	Vinyl Chloride **	< 10			
5	Chloroethane	< 10			
6	Methylene Chloride	< 2		60.0	132
1-7	Trichlorofluoromethane	< 2			
1-8	1,1-Dichloroethene	< 2			
9	1,1-Dichloroethane	< 2			
-10	1,2-Dichloroethene	< 2		82.2	118
-11	Chloroform	130			
2	1,2-Dichloroethane	< 2			
3	1,1,1-Trichloroethane	< 2		97.0	124
-14	Carbon Tetrachloride	< 2		59.6	119
-15	Bromodichloromethane	< 2			
16	1,2-Dichloropropane	< 2			
1-17	1,3-Dichloropropene (Trans)	< 2			
1-18	Trichloroethene	630			
19	1,3-Dichloropropene (Cis) &	< 5			
20	Dibromochloromethane &	< 5			
1-21	1,1,2-Trichloroethane **	< 5			
22	2-Chloroethylvinyl Ether	< 5			
23	Bromoform	< 5			
1-24	1,1,2,2-Tetrachloroethane	< 2			
1-25	Tetrachloroethene	< 2		62.0	109
26	Chlorobenzene	< 5			
1-27	1,3-Dichlorobenzene (m)	< 5			
1-28	1,2-Dichlorobenzene (o)	< 5			
29	1,4-Dichlorobenzene (p)	< 5			

** Elute Together

* EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
NY LABORATORY CERTIFICATION ID #: 10145
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Laboratory Director

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(201) 488-5242

LABORATORY REPORT

Job No. H05457 Date 5/22/86

Client
Woodward Clyde Consultants
201 Willowbrook Blvd.
Wayne, N.J. 07470
Attn: Roger Henning

Sample(s) Reference
Surrogate Standard Recoveries
For EPA Method 601/602

Foster Wheeler
Mountaintop, PA

Date Samples (X) received ( ) collected by General Testing 4/21/86

P.O. # _____

ANALYTICAL RESULTS
ug/kg unless stated otherwise)

Sample Description	A SS-1	B SS-2	C SS-3	D SS-4
Date(s) Collected	4/18	4/18	4/18	4/18
Time(s)	8:17	9:15	9:52	10:26
% RECOVERY:				
Bromochloromethane	98%			93%
2-Bromo-1-chloropropane	105%			

*EPA 40 CFR Part 136 10/84
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LABORATORY REPORT

Job No. H05457 Date 5/22/86

Client

Woodward Clyde Consultants
201 Willowbrook Blvd.
Wayne, N.J. 07470
Attn: Roger Henning

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602

Foster Wheeler
Mountaintop, PA

Date Samples (X) received ( ) collected by General Testing 4/21/86

P.O. # _____

ANALYTICAL RESULTS

ug/kg unless stated otherwise)

Sample Description	E SS-5	F SS-6	G SS-7	
Date(s) Collected	4/18	4/18	4/18	
Time(s)	10:54	11:45	15:25	
% RECOVERY:				
Bromochloromethane	106%	119%	83%	
2-Bromo-1-chloropropane	121%		60%	

*EPA 40 CFR Part 136 10/84

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NY LABORATORY CERTIFICATION ID #: 10145

NJ ID #: 73331 in Rochester; ID #: 02317 in Hackensack

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LABORATORY REPORT

Job No. H05457 Date 5/22/86

Client

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201 Willowbrook Blvd.
Wayne, N.J. 07470
Attn: Roger Henning

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602

Foster Wheeler
Mountaintop, PA
Quality Assurance Data

Date Samples (X) received ( ) collected by General Testing 4/21/86

ANALYTICAL RESULTS

P.O. # _____

ug/kg unless stated otherwise)

Sample Description	D QC			
Date(s) Collected	4/18			
Time(s)	10:26			
% RECOVERY:				
Bromochloromethane	106%			
2-Bromo-1-chloropropane	128%			

*EPA 40 CFR Part 136 10/84

Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.

NY LABORATORY CERTIFICATION ID #: 10145

NJ ID #: 73331 in Rochester; ID #: 02317 in Hackensack.

Laboratory Director

1/84

From WCC, 1987. Field Investigation Report-Phase II for Foster Wheeler Energy Corporation and Foster Wheeler Corporation Mountaintop Plant. Woodward-Clyde Consultants. February 1987.

TABLE 1

SUMMARY OF GC601 SOIL LABORATORY RESULTS

BORING NUMBER & SAMPLE DEPTH	Trichloro-ethene (ppb)	1,2 Dichloro-ethene (ppb)	Methylene Chloride (ppb)	111 Tri-chloroethane (ppb)	Tetrachloro ethene (ppb)	DATE COLLECTED
B5; 0 to 2 ft.	21	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/22/86
B5; 12.5 to 14.5ft.	335	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/22/86
B6; 0 to 5ft.	376	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/22/86
B6;12 to 14ft.	20	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/22/86
B6; 0 to 5ft.(DUP)	650	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/22/86
B7; 12 to 12.9ft.	6.5	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/23/86
B8; 0 to 5ft.	4.7	B.D.L.	B.D.L.	B.D.L.	2.4	9/23/86
B12; 0 to 5ft.	2.4	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/23/86
B13; 0 to 5ft.	27	7.1	B.D.L.	1.5	B.D.L.	9/23/86
B13; 0 to 5ft(DUP)	14	4.2	B.D.L.	B.D.L.	B.D.L.	9/23/86
TRIP BLANK	B.D.L.	B.D.L.	3.6	B.D.L.	B.D.L.	9/23/86
LAB BLANK	B.D.L.	B.D.L.	B.D.L.	1	B.D.L.	9/23/86
B22; 4 to 8ft.	110	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/24/86
B22; 4 to 8ft.(DUP)	90	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/24/86
B26; 8 to 11ft.	190	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/25/86
B28; 0 to 7.5ft.	1100	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/25/86
B30; 7 to 9ft.	4260	B.D.L.	B.D.L.	B.D.L.	21	9/25/86
B31; 9 to 10.1ft.	490	B.D.L.	B.D.L.	B.D.L.	58	9/25/86
B32; 7 to 9.5ft.	770	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/25/86
B33: 7 to 9.5ft.	29	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/26/86
B34; 5 to 5.6ft.	160	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/26/86
TRIP BLANK	B.D.L.	B.D.L.	1.6	B.D.L.	B.D.L.	9/26/86
LAB BLANK	B.D.L.	B.D.L.	B.D.L.	B.D.L.	B.D.L.	9/26/86
B.D.L.- MEANS BELOW THE DETECTION LIMITS OF THE LABORATORY						

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LABORATORY REPORT

Job No. 62538 Date 10/6/86

Client
Ms. Mary Stevenson
Woodward Clyde Consultants
201 Willowbrook Boulevard
Wayne, New Jersey 07470

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Mountain Top Soils

Date Samples (x) received ( ) collected by General Testing 9/23/86

P.O. # _____

ANALYTICAL RESULTS, ug/kg

	Sample Description Analysis * by GC Method 601 (in order of elution)	A B5-1	B B5-4	C B6-5	D B6-1
	Date(s) Collected	9/22/86	9/22/86	9/22/86	9/22/86
	Time(s) Collected	-	-	-	-
	Date Analyzed	9/24/86	9/24/86	9/24/86	9/24/86
1-1	Chloromethane	<50	<50	<50	<50
1-2	Bromomethane	<50	<50	<50	<50
1-3	Dichlorodifluoromethane	<50	<50	<50	<50
1-4	Vinyl Chloride	<50	<50	<50	<50
1-5	Chloroethane	<50	<50	<50	<50
1-6	Methylene Chloride	<10	<10	<10	<10
1-7	Trichlorofluoromethane	<10	<10	<10	<10
1-8	1,1-Dichloroethene	<10	<10	<10	<10
1-9	1,1-Dichloroethane	<10	<10	<10	<10
1-10	1,2-Dichloroethene	<10	<10	<10	<10
1-11	Chloroform	<10	<10	<10	<10
1-12	1,2-Dichloroethane	<10	<10	<10	<10
1-13	1,1,1-Trichloroethane	<10	<10	<10	<10
1-14	Carbon Tetrachloride	<10	<10	<10	<10
1-15	Bromodichloromethane	<10	<10	<10	<10
1-16	1,2-Dichloropropane	<10	<10	<10	<10
1-17	1,3-Dichloropropene (Trans)	<10	<10	<10	<10
1-18	Trichloroethene	21	335	20	376
1-19	1,3-Dichloropropene (Cis)	<20	<20	<20	<20
1-20	Dibromochloromethane	<20	<20	<20	<20
1-21	1,1,2-Trichloroethane	<20	<20	<20	<20
1-22	2-Chloroethylvinyl Ether	<20	<20	<20	<20
1-23	Bromoform	<20	<20	<20	<20
1-24	1,1,2,2-Tetrachloroethane	<10	<10	<10	<10
1-25	Tetrachloroethene	<10	<10	<10	<10
1-26	Chlorobenzene	<20	<20	<20	<20
1-27	1,3-Dichlorobenzene (m)	<20	<20	<20	<20
1-28	1,2-Dichlorobenzene (o)	<20	<20	<20	<20
1-29	1,4-Dichlorobenzene (p)	<20	<20	<20	<20

** Elute Together

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA. (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
NY LABORATORY CERTIFICATION ID #: 10145
NJ ID #: 73331 in Rochester, ID #: 02317 in Hackensack.

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LABORATORY REPORT

Job No. 62538 Date 10/6/86

Client Ms. Mary Stevenson
Woodward Clyde Consultants

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602
Mountain Top
Soils

Date Samples (x) received ( ) collected by General Testing 9/23/86

P.O. # _____

ANALYTICAL RESULTS

(mg/l unless stated otherwise)

Sample Description	A B5-1	B B5-4	C B6-5	D B6-1
Date(s)	9/22/86	9/22/86	9/22/86	9/22/86
Time(s)	-	-	-	-
% RECOVERY:				
Bromochloromethane	91%	76%	97%	76%
2-Bromo-1-chloropropane	81%	65%	88%	87%

*EPA 40 CFR Part 136 10/84
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LABORATORY REPORT

Job No. 62538 Date 10/6/86

Client

Ms. Mary Stevenson
Woodward Clyde Consultants

Sample(s) Reference

Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Mountain Top Soils

Date Samples (x) received ( ) collected by General Testing 9/23/86

P.O. # _____

ANALYTICAL RESULTS, ug/kg

	Sample Description	Duplicate D B6-1			
	Analysis * by GC Method 601 (in order of elution)				
	Date(s) Collected	9/22/86			
	Time(s) Collected	-			
	Date Analyzed	9/24/86			
1-1	Chloromethane	<50			
1-2	Bromomethane	<50			
1-3	Dichlorodifluoromethane	<50			
1-4	Vinyl Chloride	<50			
1-5	Chloroethane	<50			
1-6	Methylene Chloride	<10			
1-7	Trichlorofluoromethane	<10			
1-8	1,1-Dichloroethene	<10			
1-9	1,1-Dichloroethane	<10			
1-10	1,2-Dichloroethene	<10			
1-11	Chloroform	<10			
1-12	1,2-Dichloroethane	<10			
1-13	1,1,1-Trichloroethane	<10			
1-14	Carbon Tetrachloride	<10			
1-15	Bromodichloromethane	<10			
1-16	1,2-Dichloropropane	<10			
1-17	1,3-Dichloropropene (Trans)	<10			
1-18	Trichloroethene	650			
1-19	1,3-Dichloropropene (Cis)	<20			
1-20	Dibromochloromethane	<20			
1-21	1,1,2-Trichloroethane	<20			
1-22	2-Chloroethylvinyl Ether	<20			
1-23	Bromoform	<20			
1-24	1,1,2,2-Tetrachloroethane	<10			
1-25	Tetrachloroethene	<10			
1-26	Chlorobenzene	<20			
1-27	1,3-Dichlorobenzene (m)	<20			
1-28	1,2-Dichlorobenzene (o)	<20			
1-29	1,4-Dichlorobenzene (p)	<20			

** Elute Together

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LABORATORY REPORT

Job No. 62538 Date 10/6/86

Client Ms. Mary Stevenson
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201 Willowbrook Bouoevard
Wayne, NJ 07470

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602

Mountain Top Soils

Date Samples (x) received ( ) collected by General Testing . 9/23/86

P.O. # _____

ANALYTICAL RESULTS

(mg/l unless stated otherwise)

Sample Description	Duplicate D B6-1			
Date(s)	9/22/86			
Time(s)	-			
% RECOVERY:				
Bromochloromethane	121%			
2-Bromo-1-chloropropane	126%			

*EPA 40 CFR Part 136 10/84

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NY LABORATORY CERTIFICATION ID #: 10145

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LABORATORY REPORT

Job No. 62567 Date 10/21/86

Client
Ms. Mary Stevenson
Woodward Clyde Consultants
201 Willowbrook Boulevard
Wayne, NJ 07470

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)
Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/25/86

P.O. # _____

ANALYTICAL RESULTS,
(ug/kg wet weight)

	Sample Description	A	B	C	D
	Analysis * by GC Method 601 (in order of elution)	B-8-1	B-12-1	B-7-4	B-13-1
	Date(s) Collected	9/23/86	9/23/86	9/23/86	9/23/86
	Time(s) Collected	-	-	-	-
	Date Analyzed	10/4/86	10/5/86	10/5/86	10/5/86
1-1	Chloromethane	<10	<10	<10	<10
-2	Bromomethane	<10	<10	<10	<10
-3	Dichlorodifluoromethane	<10	<10	<10	<10
1-4	Vinyl Chloride	<10	<10	<10	<10
1-5	Chloroethane	<10	<10	<10	<10
-6	Methylene Chloride	<2	<2	<2	<2
-7	Trichlorofluoromethane	<2	<2	<2	<2
1-8	1,1-Dichloroethene	<2	<2	<2	<2
-9	1,1-Dichloroethane	<2	<2	<2	<2
10	1,2-Dichloroethene	<2	<2	26	7.1
1-11	Chloroform	<2	<2	<2	<2
12	1,2-Dichloroethane	<2	<2	<2	<2
13	1,1,1-Trichloroethane	<2	<2	<2	1.5
-14	Carbon Tetrachloride	<2	<2	<2	<2
1-15	Bromodichloromethane	<2	<2	<2	<2
16	1,2-Dichloropropane	<2	<2	<2	<2
17	1,3-Dichloropropene (Trans)	<2	<2	<2	<2
1-18	Trichloroethene	4.7	2.4	6.5	27
19	1,3-Dichloropropene (Cis)	<4	<4	<4	<4
20	Dibromochloromethane	<4	<4	<4	<4
1-21	1,1,2-Trichloroethane	<4	<4	<4	<4
1-22	2-Chloroethylvinyl Ether	<4	<4	<4	<4
23	Bromoform	<4	<4	<4	<4
24	1,1,2,2-Tetrachloroethane	<2	<2	<2	<2
1-25	Tetrachloroethene	2.4	<2	<2	<2
26	Chlorobenzene	<4	<4	<4	<4
27	1,3-Dichlorobenzene (m)	<4	<4	<4	<4
1-28	1,2-Dichlorobenzene (o)	<4	<4	<4	<4
1-29	1,4-Dichlorobenzene (p)	<4	<4	<4	<4
	** Elute Together				

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
NY LABORATORY CERTIFICATION ID #: 10145
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LABORATORY REPORT

Job No. 62567 Date 10/21/86

Client

Ms. Mary Stevenson
Woodward Clyde Consultants
201 Willowbrook Boulevard
Wayne, NJ 07470

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602

Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/25/86

P.O. # _____

ANALYTICAL RESULTS

(mg/l unless stated otherwise)

Sample Description	A	B	C	D
	B-8-1	B-12-1	B-7-4	B-13-1
Date(s)	9/23/86	9/23/86	9/23/86	9/23/86
Time(s)	-	-	-	-
% RECOVERY:				
Bromochloromethane	106%	101%	103%	99%
2-Bromo-1-chloropropane	110%	85%	97%	102%

*EPA 40 CFR Part 136 10/84

Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.

NY LABORATORY CERTIFICATION ID #: 10145

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LABORATORY REPORT

Job No. 62567 Date 10/21/86

Client
Ms. Mary Stevenson
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201 Willowbrook Boulevard
Wayne, NJ 07470

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)
Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/25/86

P.O. # _____

ANALYTICAL RESULTS,
(ug/l)

	Sample Description	E			
	Analysis * by GC Method 601 (in order of elution)	Trip Blank	Lab Blank		
	Date(s) Collected	9/23/86	-		
	Time(s) Collected	-	-		
	Date Analyzed	10/5/86	10/5/86		
1-1	Chloromethane	<5	<5		
1-2	Bromomethane	<5	<5		
1-3	Dichlorodifluoromethane	<5	<5		
1-4	Vinyl Chloride	<5	<5		
1-5	Chloroethane	<5	<5		
1-6	Methylene Chloride	3.6	1.0		
1-7	Trichlorofluoromethane	<1	<1		
1-8	1,1-Dichloroethene	<1	<1		
1-9	1,1-Dichloroethane	<1	<1		
1-10	1,2-Dichloroethene	<1	<1		
1-11	Chloroform	<1	<1		
1-12	1,2-Dichloroethane	<1	<1		
1-13	1,1,1-Trichloroethane	<1	<1		
1-14	Carbon Tetrachloride	<1	<1		
1-15	Bromodichloromethane	<1	<1		
1-16	1,2-Dichloropropane	<1	<1		
1-17	1,3-Dichloropropene (Trans)	<1	<1		
1-18	Trichloroethene	<1	<1		
1-19	1,3-Dichloropropene (Cis)	<2	<2		
1-20	Dibromochloromethane	<2	<2		
1-21	1,1,2-Trichloroethane	<2	<2		
1-22	2-Chloroethylvinyl Ether	<2	<2		
1-23	Bromoform	<2	<2		
1-24	1,1,2,2-Tetrachloroethane	<1	<1		
1-25	Tetrachloroethene	<1	<1		
1-26	Chlorobenzene	<2	<2		
1-27	1,3-Dichlorobenzene (m)	<2	<2		
1-28	1,2-Dichlorobenzene (o)	<2	<2		
1-29	1,4-Dichlorobenzene (p)	<2	<2		
	** Elute Together				

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
NY LABORATORY CERTIFICATION ID #: 10145
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LABORATORY REPORT

Job No. 62567 Date 10/21/86

Client
Ms. Mary Stevenson
Woodward Clyde Consultants
201 Willowbrook Boulevard
Wayne, NJ 07470

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)
Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/25/86

P.O. # _____

ANALYTICAL RESULTS,
(ug/kg wet weight)

	Sample Description Analysis * by GC Method 601 (in order of elution)	D B-13-1 Duplicate		Spiked Amount Added	Recovery % Recovery
	Date(s) Collected	9/23/86			
	Time(s) Collected	-			
	Date Analyzed	10/5/86			
1-1	Chloromethane	<10		24.6	104%
-2	Bromomethane	<10		36.7	89%
-3	Dichlorodifluoromethane	<10			
1-4	Vinyl Chloride	<10			
1-5	Chloroethane	<10		42.5	102%
-6	Methylene Chloride	<2		33.1	99%
-7	Trichlorofluoromethane	<2		32.8	110%
1-8	1,1-Dichloroethene	<2		39.0	95%
-9	1,1-Dichloroethane	<2		44.6	90%
0	1,2-Dichloroethene	4.2		36.0	83%
1-11	Chloroform	<2		27.7	96%
12	1,2-Dichloroethane	<2		32.9	112%
13	1,1,1-Trichloroethane	<2		32.9	93%
1-14	Carbon Tetrachloride	<2		37.9	93%
1-15	Bromodichloromethane	<2		51.7	81%
6	1,2-Dichloropropane	<2		42.8	88%
7	1,3-Dichloropropene (Trans)	<2		35.5	84%
1-18	Trichloroethene	14		52.0	93%
19	1,3-Dichloropropene (Cis)	<4			
0	Dibromochloromethane	<4			
1-21	1,1,2-Trichloroethane	<4			
1-22	2-Chloroethylvinyl Ether	<4			
23	Bromoform	<4		47.6	101%
24	1,1,2,2-Tetrachloroethane	<2			
1-25	Tetrachloroethene	<2			
26	Chlorobenzene	<4		55.1	79%
27	1,3-Dichlorobenzene (m)	<4			
1-28	1,2-Dichlorobenzene (o)	<4			
1-29	1,4-Dichlorobenzene (p)	<4			
	** Elute Together				

*EPA 40 CFR Part 136 10/84
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NJ ID #: 73331 in Rochester; ID #: 02317 in Hackensack.

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LABORATORY REPORT

Job No. 62567 Date 10/21/86

Client

Ms. Mary Stevenson
Woodward Clyde Consultants
201 Willowbrook Boulevard
Wayne, NJ 07470

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602
Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/25/86

P.O. # _____

ANALYTICAL RESULTS

(mg/l unless stated otherwise)

Sample Description	E Trip Blank	Lab Blank		
Date(s)	9/23/86	-		
Time(s)	-	-		
% RECOVERY:				
Bromochloromethane	119%	114%		
2-Bromo-1-chloropropane	134%	129%		

*EPA 40 CFR Part 136 10/84
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LABORATORY REPORT

Job No. 62567 Date 10/21/86

Client

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201 Willowbrook Boulevard
Wayne, NJ 07470

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602

Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/25/86

P.O. # _____

ANALYTICAL RESULTS

(mg/l unless stated otherwise)

Sample Description	B-13-1 Duplicate			
Date(s)	9/23/86			
Time(s)	-			
% RECOVERY:				
Bromochloromethane	96%			
2-Bromo-1-chloropropane	105%			

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
NY LABORATORY CERTIFICATION ID #: 10145
NJ ID #: 73331 in Rochester; ID #: 02317 in Hackensack.

Marshall Shanno

Ass't Laboratory Director

1/84

general testing corporation

water and wastewater testing specialists

710 Exchange Street
Rochester, NY 14608
(716) 454-3760

85 Trinity Place
Hackensack, NJ 07601
(201) 488-5242

LABORATORY REPORT

Job No. 62650 Date 10/30/86

Client Ms. Mary Stevenson
Woodward Clyde Consultants

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602

Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/30/86

P.O. # _____

ANALYTICAL RESULTS

(mg/l unless stated otherwise)

Sample Description	A B-22-3	B B-26-3	C B-31-4	D B-30-3
Date(s)	9/24/86	9/24/86	9/25/86	9/25/86
Time(s)	-	-	-	-
% RECOVERY:				
Bromochloromethane	101%	115%	101%	99%
2-Bromo-1-chloropropane	119%	124%	97%	97%

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
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LABORATORY REPORT

Job No. 62650 Date 10/30/86

Client
Ms. Mary Stevenson
Woodward Clyde Consultants
201 Willowbrook Boulevard
Wayne, NJ 07470

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)
Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/30/86

P.O. # _____

ANALYTICAL RESULTS,

ug/kg

	Sample Description	A	B	C	D
	Analysis * by GC Method 601 (in order of elution)	B-22-3	B-26-3	B-31-4	B-30-3
	Date(s) Collected	9/24/86	9/24/86	9/25/86	9/25/86
	Time(s) Collected	-	-	-	-
	Date Analyzed	10/8/86	10/8/86	10/8/86	10/9/86
1-1	Chloromethane	<10	<10	<10	<100
1-2	Bromomethane	<10	<10	<10	<100
1-3	Dichlorodifluoromethane	<10	<10	<10	<100
1-4	Vinyl Chloride	<10	<10	<10	<100
1-5	Chloroethane	<10	<10	<10	<100
1-6	Methylene Chloride	<2	<2	<2	<20
1-7	Trichlorofluoromethane	<2	<2	<2	<20
1-8	1,1-Dichloroethene	<2	<2	<2	<20
1-9	1,1-Dichloroethane	<2	<2	<2	<20
1-10	1,2-Dichloroethene	<2	<2	<2	<20
1-11	Chloroform	<2	<2	<2	<20
1-12	1,2-Dichloroethane	<2	<2	<2	<20
1-13	1,1,1-Trichloroethane	<2	<2	<2	<20
1-14	Carbon Tetrachloride	<2	<2	<2	<20
1-15	Bromodichloromethane	<2	<2	<2	<20
1-16	1,2-Dichloropropane	<2	<2	<2	<20
1-17	1,3-Dichloropropene (Trans)	<2	<2	<2	<20
1-18	Trichloroethene	110	190	490	4260
1-19	1,3-Dichloropropene (Cis)	<4	<4	<4	<40
1-20	Dibromochloromethane	<4	<4	<4	<40
1-21	1,1,2-Trichloroethane	<4	<4	<4	<40
1-22	2-Chloroethylvinyl Ether	<4	<4	<4	<40
1-23	Bromoform	<4	<4	<4	<40
1-24	1,1,2,2-Tetrachloroethane	<2	<2	<2	<20
1-25	Tetrachloroethene	<2	<2	58	21
1-26	Chlorobenzene	<4	<4	<4	<40
1-27	1,3-Dichlorobenzene (m)	<4	<4	<4	<40
1-28	1,2-Dichlorobenzene (o)	<4	<4	<4	<40
1-29	1,4-Dichlorobenzene (p)	<4	<4	<4	<40
	** Elute Together				

*EPA 40 CFR Part 136 10/84

Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA. (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.

NY LABORATORY CERTIFICATION ID #: 10145
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LABORATORY REPORT

Job No. 62650 Date 10/30/86

Client
Ms. Mary Stevenson
Woodward Clyde Consultants

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Date Samples (x) received ( ) collected by General Testing
Foster Wheeler/Mountain Top
9/30/86

P.O. # _____

ANALYTICAL RESULTS,

ug/kg

	Sample Description	E	F	G	H
	Analysis * by GC Method 601 (in order of elution)	B-28-1	B-32-3	B-33-3	B-34-2
	Date(s) Collected	9/25/86	9/25/86	9/26/86	9/26/86
	Time(s) Collected	-	-	-	-
	Date Analyzed	10/9/86	10/9/86	10/9/86	10/9/86
1-1	Chloromethane	<25	<25	<25	<25
1-2	Bromomethane	<25	<25	<25	<25
3	Dichlorodifluoromethane	<25	<25	<25	<25
1-4	Vinyl Chloride	<25	<25	<25	<25
1-5	Chloroethane	<25	<25	<25	<25
6	Methylene Chloride	<5	<5	<5	<5
7	Trichlorofluoromethane	<5	<5	<5	<5
1-8	1,1-Dichloroethene	<5	<5	<5	<5
9	1,1-Dichloroethane	<5	<5	<5	<5
0	1,2-Dichloroethene	<5	<5	<5	<5
11	Chloroform	<5	<5	<5	<5
1-12	1,2-Dichloroethane	<5	<5	<5	<5
3	1,1,1-Trichloroethane	<5	<5	<5	<5
4	Carbon Tetrachloride	<5	<5	<5	<5
1-15	Bromodichloromethane	<5	<5	<5	<5
6	1,2-Dichloropropane	<5	<5	<5	<5
7	1,3-Dichloropropene (Trans)	<5	<5	<5	<5
1-18	Trichloroethene	1100	770	29	160
1-19	1,3-Dichloropropene (Cis)	<10	<10	<10	<10
0	Dibromochloromethane	<10	<10	<10	<10
1	1,1,2-Trichloroethane	<10	<10	<10	<10
1-22	2-Chloroethylvinyl Ether	<10	<10	<10	<10
3	Bromoform	<10	<10	<10	<10
4	1,1,2,2-Tetrachloroethane	<5	<5	<5	<5
1-25	Tetrachloroethene	<5	<5	<5	<5
1-26	Chlorobenzene	<10	<10	<10	<10
7	1,3-Dichlorobenzene (m)	<10	<10	<10	<10
1-28	1,2-Dichlorobenzene (o)	<10	<10	<10	<10
1-29	1,4-Dichlorobenzene (p)	<10	<10	<10	<10
	** Elute Together				

*EPA 40 CFR Part 136 10/84

Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA. (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.

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LABORATORY REPORT

Job No. 62650 Date 10/30/86

Client Ms. Mary Stevenson
Woodward Clyde Consultants

Sample(s) Reference

Surrogate Standard Recoveries
For EPA Method 601/602
Foster Wheeler/Mountain Top

Date Samples (x) received ( ) collected by General Testing 9/30/86

P.O. # _____

ANALYTICAL RESULTS

(mg/l unless stated otherwise)

Sample Description	E B-28-1	F B-32-3	G B-33-3	H B-34-2
Date(s)	9/25/86	9/25/86	9/26/86	9/26/86
Time(s)	-	-	-	-
% RECOVERY:				
Bromochloromethane	78%	81%	93%	96%
2-Bromo-1-chloropropane	72%	83%	93%	89%

*EPA 40 CFR Part 136 10/84

Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA. (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.

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LABORATORY REPORT

Job No. 62650 Date 10/30/86

Client
Ms. Mary Stevenson
Woodward Clyde Consultants

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Date Samples (X) received ( ) collected by General Testing
Foster Wheeler/Mountain Top
9/30/86

P.O. # _____

ANALYTICAL RESULTS,

ug/l

	Sample Description Analysis * by GC Method 601 (in order of elution)	I Trip Blank	Lab Blank	EPA CHECK True Value	EPA CHECK % Recovery
	Date(s) Collected	9/29/86			
	Time(s) Collected	-			
	Date Analyzed	10/1/86	10/9/86		
1-1	Chloromethane	<5	<5		
1-2	Bromomethane	<5	<5		
1-3	Dichlorodifluoromethane	<5	<5		
1-4	Vinyl Chloride	<5	<5		
1-5	Chloroethane	<5	<5		
1-6	Methylene Chloride	1.6	<1		
1-7	Trichlorofluoromethane	<1	<1		
1-8	1,1-Dichloroethene	<1	<1		
1-9	1,1-Dichloroethane	<1	<1		
1-10	1,2-Dichloroethene	<1	<1		
1-11	Chloroform	<1	<1	43.0	120%
1-12	1,2-Dichloroethane	<1	<1	22.2	131%
1-13	1,1,1-Trichloroethane	<1	<1	14.3	100%
1-14	Carbon Tetrachloride	<1	<1	10.0	124%
1-15	Bromodichloromethane	<1	<1		
1-16	1,2-Dichloropropane	<1	<1		
1-17	1,3-Dichloropropene (Trans)	<1	<1		
1-18	Trichloroethene	<1	<1	12.0	113%
1-19	1,3-Dichloropropene (Cis)	<2	<2		
1-20	Dibromochloromethane	<2	<2		
1-21	1,1,2-Trichloroethane	<2	<2		
1-22	2-Chloroethylvinyl Ether	<2	<2		
1-23	Bromoform	<2	<2		
1-24	1,1,2,2-Tetrachloroethane	<1	<1		
1-25	Tetrachloroethene	<1	<1	6.2	84%
1-26	Chlorobenzene	<2	<2		
1-27	1,3-Dichlorobenzene (m)	<2	<2		
1-28	1,2-Dichlorobenzene (o)	<2	<2		
1-29	1,4-Dichlorobenzene (p)	<2	<2		
	** Elute Together				

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
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LABORATORY REPORT

Job No. 62650 Date 10/30/86

Client
Ms. Mary Stevenson
Woodward Clyde Consultants

Sample(s) Reference
Priority Pollutant Data
29 Purgeable Halocarbons
(Volatile Organic Halogens)

Date Samples (X) received ( ) collected by General Testing
Foster Wheeler/Mountain Top
9/30/86

P.O. # _____

ANALYTICAL RESULTS,

ug/kg

	Sample Description Analysis * by GC Method 601 (in order of elution)	A B-22-3 Duplicate	Spiked Recovery Amount Added	 % Recovery	
	Date(s) Collected	9/24/86			
	Time(s) Collected	-			
	Date Analyzed	10/9/86			
1-1	Chloromethane	<25			
-2	Bromomethane	<25			
-3	Dichlorodifluoromethane	<25			
1-4	Vinyl Chloride	<25			
1-5	Chloroethane	<25			
-6	Methylene Chloride	<5	33.1	80%	
-7	Trichlorofluoromethane	<5			
1-8	1,1-Dichloroethene	<5			
-9	1,1-Dichloroethane	<5			
10	1,2-Dichloroethene	<5	35.9	93%	
1-11	Chloroform	<5			
1-12	1,2-Dichloroethane	<5			
13	1,1,1-Trichloroethane	<5			
-14	Carbon Tetrachloride	<5	37.9	83%	
1-15	Bromodichloromethane	<5			
16	1,2-Dichloropropane	<5			
17	1,3-Dichloropropene (Trans)	<5			
1-18	Trichloroethene	90	51.9	96%	
19	1,3-Dichloropropene (Cis)	<10			
20	Dibromochloromethane	<10			
1-21	1,1,2-Trichloroethane	<10			
1-22	2-Chloroethylvinyl Ether	<10			
23	Bromoform	<10			
24	1,1,2,2-Tetrachloroethane	<5			
1-25	Tetrachloroethene	<5	37.4	87%	
26	Chlorobenzene	<10			
27	1,3-Dichlorobenzene (m)	<10			
1-28	1,2-Dichlorobenzene (o)	<10			
1-29	1,4-Dichlorobenzene (p)	<10			
	** Elute Together				

*EPA 40 CFR Part 136 10/84
Analytical procedures in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition and Methods for Chemical Analysis of Water and Wastes, EPA (<) indicates lowest detectable concentration with procedure used. Data on quality control performed with above sample(s) is available upon request.
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NJ ID #: 73331 in Rochester; ID #: 02317 in Hackensack.

Marshall Stevens
Laboratory Director
Ass't

From WCC, 1989. Site Remediation Program, Foster Wheeler Energy Corporation, Mountaintop Plant. Woodward-Clyde Consultants. December 1989.

TABLE 8-2

WASTEWATER TREATMENT FACILITY
TCL SEDIMENT SAMPLE RESULTS SUMMARY
FOSTER WHEELER, MOUNTAINTOP, PA

	RETENTION POND				CLARIFIER
	WWT - 1S mg/kg	WWT - 2S mg/kg	WWT - 3S mg/kg	WWT - 4S mg/kg	WWT - 5S mg/kg
1. VOLATILES					
Acetone	.28 B	.24 B	.19 B	.099 B	1.9
Methylene Chloride	.22 B	.18 B	.036 B	.036 B	.6 B
Chloroform	.003 J	.005 J	.002 J	.006 J	.035 J
2-Butanone		.017 J	0.024		0.66
4-Methyl-2-Pentanone					.063 J
Toluene					0.3
Chlorobenzenes					0.21
Total Xylenes					.068 J
2. SEMI-VOLATILES					
2-Methylnaphthalene	.89 J				
Acenaphthene	5.3 J	.11 J	.13 J	.15 J	
Dibenzofuran	3.5 J		.14 J	.13 J	
Fluorene	6.0 J	.14 J	.24 J	.25 J	
Pentachlorophenol	1.5 J				
Phenanthrene	61	1.7	1.8	1.9	7.3
Anthracene	8.3	.2 J	.22 J	.25 J	2.0 J
Fluoranthrene	66	3.9	2.5	3.4	31
Pyrene	36	2.7	1.9	2.2	27
Benzo (a) Anthracene	24	1	.94 J	0.86	13
Chrysene	26	1.7	1.6	1.4	15
bis (2-Ethylhexyl) Phthalate	1.8 J	1.6	1.3	2.2	1.5 J
Benzo (b) Fluoranthene	16	2.6	2.1 X	1.4	6.7
Benzo (k) Fluoranthene	19	1.6	2.1 X	1.2	9.3
Benzo (a) Pyrene	17	1.2	.94 J	1.1	5.2 J
Indeno (1,2,3-cd) Pyrene	6.1 J	.46 J	.48 J	.39 J	2.2 J
Dibenzo (a,h) Anthracene	2.0 J		.32 J		
Benzo (g,h,i) Perylene	5.4 J	.53 J	.54 J		2.1 J
1,4-Dichlorobenzene		.1 J		.2 J	
Benzoic Acid		.45 BJ	.26 J	.28 BJ	
Di-n-Butylphthalate		.16 J			
Butylbenzylphthalate		.34 J			
4-Methylphenol			.15 J	.11 J	

NOTES: ND - Not detected.

A - TIC is a suspected aldol-condensation product.

B - Analyte was also found in the blank.

J - Estimated value; Tentatively identified compound or indicates presence of a compound below the sample quantitation limit.

X - Coelution of the analytes benzo (b & k) fluoranthene was observed.

WASTEWATER TREATMENT FACILITY
TCL SEDIMENT SAMPLE RESULTS SUMMARY
FOSTER WHEELER, MOUNTAINTOP, PA

	RETENTION POND				CLARIFIER
	WWT - 1S mg/kg	WWT - 2S mg/kg	WWT - 3S mg/kg	WWT - 4S mg/kg	WWT - 5S mg/kg
3. SEMI-VOLATILE TIC's					
Blank Contaminant				1.4 BJ	10.0 BJ
Aldol	3.7 AJ	10.4 AJ		4.8 AJ	84.6 AJ
Trisulfide, Dimethyl					4.7 J
Heptadecane,2,6-Dimethyl		6.3 J	3.3 J	58.4 J	37 J
Anthracene,1-Methyl	5.9 J				
Dodecane,3-Methyl-					8.0 J
Benzo Pyrene isomer	5.2 J				
Benzo Fluoranthene isomer	13 J				
11H-Benzo (A) Fluorene					4 J
Vitamin E Acetate (VAN)					52 J
Unknown	103.7 J	50.4 J	115.75 J	183.2 J	658.7 J
Unknown Hydrocarbon	4.4 J	13.8 J	2.8 J	16.0 J	46 J
Unknown Sub. Hydrocarbon	10 J				
Unknown Sub. Naphthal					7.3 J
Unknown PNA	57.5 J				
4. PESTICIDES	ND		ND	ND	ND
Aroclor-1260		0.63			

NOTES: ND - Not detected.
A - TIC is a suspected aldol-condensation product.
B - Analyte was also found in the blank.
J - Estimated value; Tentatively identified compound or indicates presence of a compound below the sample quantitation limit.
X - Coelution of the analytes benzo (b & k) fluoranthene was observed.

WASTEWATER TREATMENT FACILITY
TCL SEDIMENT SAMPLE RESULTS SUMMARY
FOSTER WHEELER, MOUNTAINTOP, PA

	RETENTION POND				CLARIFIER
	WWT - 1S mg/kg	WWT - 2S mg/kg	WWT - 3S mg/kg	WWT - 4S mg/kg	WWT - 5S mg/kg
5. METALS					
Aluminum	8520	10300	4840	9530	4560
Arsenic	6.3	7	3.7	8.6	145 B
Barium	59.7 B	55.5 B	29.5 B	58.8 B	339 B
Beryllium	1.2 B	1.6 B	0.90 B		
Cadmium	3.8	2.6 B	1.4 B	2.8	341
Calcium	1220 B	982 B	510 B	1100 B	19300
Chromium	23.6	22.6	9.3	18.5	101
Cobalt	9.3 B	10.9 B	4.5 B	6.8 B	65.9 B
Copper	101	87.8	38.5	92.1	872
Iron	13600	16500	7220	14600	767000
Lead	136	96.1	47.1	91.4	532
Magnesium	2510	2220 B	1140 B	2300	2930 B
Manganese	142	183	69.7	169	7520
Nickel	34.2	19.2 B	13.7	17.4	100 B
Potassium				862 B	
Selenium	0.6 B	0.69 B	0.68 B	0.52 B	
Silver	195	145	73.7	184	1320
Vanadium	15.7 B	18.6 B	8.3 B	14.1 B	15.2 B
Zinc	583	481	253	462	2290
Cyanide	2.4	2.8		2.3	23.7

NOTES: ND - Not detected.

A - TIC is a suspected aldol-condensation product.

B - Analyte was also found in the blank.

J - Estimated value; Tentatively identified compound or indicates presence of a compound below the sample quantitation limit.

X - Coelution of the analytes benzo (b & k) fluoranthene was observed.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-1S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268477

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068477B19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 55 Date Analyzed: 06/21/89

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	22	U
74-83-9	Bromomethane	22	U
75-01-4	Vinyl Chloride	22	U
75-00-3	Chloroethane	22	U
75-09-2	Methylene Chloride	220	B
67-64-1	Acetone	280	B
75-15-0	Carbon Disulfide	11	U
75-35-4	1,1-Dichloroethene	11	U
75-34-3	1,1-Dichloroethane	11	U
540-59-0	1,2-Dichloroethene (total)	11	U
67-66-3	Chloroform	3	J
107-06-2	1,2-Dichloroethane	11	U
78-93-3	2-Butanone	22	U
71-55-6	1,1,1-Trichloroethane	11	U
56-23-5	Carbon Tetrachloride	11	U
108-05-4	Vinyl Acetate	22	U
75-27-4	Bromodichloromethane	11	U
78-87-5	1,2-Dichloropropane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
79-01-6	Trichloroethene	11	U
124-48-1	Dibromochloromethane	11	U
79-00-5	1,1,2-Trichloroethane	11	U
71-43-2	Benzene	11	U
10061-02-6	Trans-1,3-Dichloropropene	11	U
75-25-2	Bromoform	11	U
108-10-1	4-Methyl-2-Pentanone	22	U
591-78-6	2-Hexanone	22	U
127-18-4	Tetrachloroethene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
108-88-3	Toluene	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
100-42-5	Styrene	11	U
1330-20-7	Total Xylenes	11	U

FORM I VOA 1/87 Rev.

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-1S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268477

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068477B19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 55 Date Analyzed: 06/21/89

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC 1/87 Rev.

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-1S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268477

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GDJ68477C21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 55 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/22/89

GPC Cleanup: (Y/N) N pH: 6.7 Dilution Factor: 10.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	7300	U
111-44-4	bis(2-Chloroethyl)Ether	7300	U
95-57-8	2-Chlorophenol	7300	U
541-73-1	1,3-Dichlorobenzene	7300	U
106-46-7	1,4-Dichlorobenzene	7300	U
100-51-6	Benzyl Alcohol	7300	U
95-50-1	1,2-Dichlorobenzene	7300	U
95-48-7	2-Methylphenol	7300	U
39638-32-9	bis(2-Chloroisopropyl)Ether	7300	U
106-44-5	4-Methylphenol	7300	U
621-64-7	N-Nitroso-Di-n-Propylamine	7300	U
67-72-1	Hexachloroethane	7300	U
98-95-3	Nitrobenzene	7300	U
78-59-1	Isophorone	7300	U
88-75-5	2-Nitrophenol	7300	U
105-67-9	2,4-Dimethylphenol	7300	U
65-85-0	Benzoic Acid	36000	U
111-91-1	bis(2-Chloroethoxy)Methane	7300	U
120-83-2	2;4-Dichlorophenol	7300	U
120-82-1	1,2,4-Trichlorobenzene	7300	U
91-20-3	Naphthalene	7300	U
106-47-8	4-Chloroaniline	7300	U
87-68-3	Hexachlorobutadiene	7300	U
59-50-7	4-Chloro-3-Methylphenol	7300	U
91-57-6	2-Methylnaphthalene	890	J
77-47-4	Hexachlorocyclopentadiene	7300	U
88-06-2	2,4,6-Trichlorophenol	7300	U
95-95-4	2,4,5-Trichlorophenol	36000	U
91-58-7	2-Chloronaphthalene	7300	U
88-74-4	2-Nitroaniline	36000	U
131-11-3	Dimethyl Phthalate	7300	U
208-96-8	Acenaphthylene	7300	U
606-20-2	2,6-Dinitrotoluene	7300	U

FORM I SV-1 1/87 Rev.

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-1S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268477

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GDJ68477C21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 55 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/22/89

GPC Cleanup: (Y/N) N pH: 6.7 Dilution Factor: 10.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	36000	U
83-32-9	Acenaphthene	5300	J
51-28-5	2,4-Dinitrophenol	36000	U
100-02-7	4-Nitrophenol	36000	U
132-64-9	Dibenzofuran	3500	J
121-14-2	2,4-Dinitrotoluene	7300	U
84-66-2	Diethylphthalate	7300	U
7005-72-3	4-Chlorophenyl-phenylether	7300	U
86-73-7	Fluorene	6000	J
100-01-6	4-Nitroaniline	36000	U
534-52-1	4,6-Dinitro-2-Methylphenol	36000	U
86-30-6	N-Nitrosodiphenylamine (1)	7300	U
101-55-3	4-Bromophenyl-phenylether	7300	U
118-74-1	Hexachlorobenzene	7300	U
87-86-5	Pentachlorophenol	1500	J
85-01-8	Phenanthrene	61000	
120-12-7	Anthracene	8300	
84-74-2	Di-n-Butylphthalate	7300	U
206-44-0	Fluoranthene	66000	
129-00-0	Pyrene	36000	
85-68-7	Butylbenzylphthalate	7300	U
91-94-1	3,3'-Dichlorobenzidine	15000	U
56-55-3	Benzo(a)Anthracene	24000	
218-01-9	Chrysene	26000	
117-81-7	bis(2-Ethylhexyl)Phthalate	1800	J
117-84-0	Di-n-Octyl Phthalate	7300	U
205-99-2	Benzo(b)Fluoranthene	16000	
207-08-9	Benzo(k)Fluoranthene	19000	
50-32-8	Benzo(a)Pyrene	17000	
193-39-5	Indeno(1,2,3-cd)Pyrene	6100	J
53-70-3	Dibenzo(a,h)Anthracene	2000	J
191-24-2	Benzo(g,h,i)Perylene	5400	J

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-1S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268477

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GDJ68477C21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 55 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/22/89

GPC Cleanup: (Y/N) N pH: 6.7 Dilution Factor: 10.0

Number TICs found: 21

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	ALDOL	6.70	3700	AJ
2.	UNKNOWN HYDROCARBON	12.72	4400	J
3.	UNKNOWN SUBST. HYDROCARBON	13.87	10000	J
4. 610-48-0	ANTHRACENE, 1-METHYL-	14.27	5900	J
5.	UNKNOWN PNA	14.32	12000	J
6.	UNKNOWN PNA	14.45	13000	J
7.	UNKNOWN	14.70	4400	J
8.	UNKNOWN	15.74	4400	J
9.	UNKNOWN PNA	15.89	4400	J
10.	UNKNOWN PNA	16.05	8100	J
11.	UNKNOWN PNA	16.14	4400	J
12.	UNKNOWN PNA	16.20	5900	J
13.	UNKNOWN PNA	16.89	3000	J
14.	UNKNOWN PNA	17.09	3700	J
15.	UNKNOWN PNA	17.25	3000	J
16.	UNKNOWN	19.72	3000	J
17.	BENZO PYRENE ISOMER	20.72	5200	J
18.	BENZO FLUORANTHENE ISOMER	21.32	13000	J
19.	UNKNOWN	24.12	53000	J
20.	UNKNOWN	24.90	33000	J
21.	UNKNOWN	25.07	5900	J

FORM I SV-TIC 1/87 Rev.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-1S

Lab Name: COMPUCHEM LABORATORIES Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268477

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 55 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/23/89

GPC Cleanup: (Y/N) N pH: 6.7 Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	36.	U
319-85-7	beta-BHC	36.	U
319-86-8	delta-BHC	36.	U
58-89-9	gamma-BHC (Lindane)	36.	U
76-44-8	Heptachlor	36.	U
309-00-2	Aldrin	36.	U
1024-57-3	Heptachlor epoxide	36.	U
959-98-8	Endosulfan I	36.	U
60-57-1	Dieldrin	71.	U
72-55-9	4,4'-DDE	71.	U
72-20-8	Endrin	71.	U
33213-65-9	Endosulfan II	71.	U
72-54-8	4,4'-DDD	71.	U
1031-07-8	Endosulfan sulfate	71.	U
50-29-3	4,4'-DDT	71.	U
72-43-5	Methoxychlor	360	U
53494-70-5	Endrin ketone	71.	U
5103-71-9	alpha-Chlordane	360	U
5103-74-2	gamma-Chlordane	360	U
8001-35-2	Toxaphene	710	U
12674-11-2	Aroclor-1016	360	U
11104-28-2	Aroclor-1221	360	U
11141-16-5	Aroclor-1232	360	U
53469-21-9	Aroclor-1242	360	U
12672-29-6	Aroclor-1248	360	U
11097-69-1	Aroclor-1254	710	U
11096-82-5	Aroclor-1260	710	U

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

WWT-1S

Lab Name: COMPUCHEM LABORATORIES Contract: 787

Lab Code: COMPU Case No.: 15660 SAS No.: _____ SDG No.: 16983A

Matrix (soil/water): SOIL Lab Sample ID: 268492

Level (low/med): LOW Date Received: 06/20/89

% Solids: 45.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8520			P
7440-36-0	Antimony	13.2	U	N	P
7440-38-2	Arsenic	6.3			F
7440-39-3	Barium	59.7	B		P
7440-41-7	Beryllium	1.2	B		P
7440-43-9	Cadmium	3.8		*	P
7440-70-2	Calcium	1220	B		P
7440-47-3	Chromium	23.6			P
7440-48-4	Cobalt	9.3	B		P
7440-50-8	Copper	101			P
7439-89-6	Iron	13600			P
7439-92-1	Lead	136		*	P
7439-95-4	Magnesium	2510		E	P
7439-96-5	Manganese	142		*	P
7439-97-6	Mercury	.20	U		CV
7440-02-0	Nickel	34.2			P
7440-09-7	Potassium	727	U		P
7782-49-2	Selenium	.60	B	WN	F
7440-22-4	Silver	195			P
7440-23-5	Sodium	651	U		P
7440-28-0	Thallium	.44	U	N	F
7440-62-2	Vanadium	15.7	B		P
7440-66-6	Zinc	583		E	P
	Cyanide	2.4		*	AS

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: YES

Comments:

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INDEPENDENT'S COPY 168

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-2S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268490

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068490B19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 66 Date Analyzed: 06/21/89

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	29	U
74-83-9	Bromomethane	29	U
75-01-4	Vinyl Chloride	29	U
75-00-3	Chloroethane	29	U
75-09-2	Methylene Chloride	180	B
67-64-1	Acetone	240	B
75-15-0	Carbon Disulfide	15	U
75-35-4	1,1-Dichloroethene	15	U
75-34-3	1,1-Dichloroethane	15	U
540-59-0	1,2-Dichloroethene (total)	15	U
67-66-3	Chloroform	5	J
107-06-2	1,2-Dichloroethane	15	U
78-93-3	2-Butanone	17	J
71-55-6	1,1,1-Trichloroethane	15	U
56-23-5	Carbon Tetrachloride	15	U
108-05-4	Vinyl Acetate	29	U
75-27-4	Bromodichloromethane	15	U
78-87-5	1,2-Dichloropropane	15	U
10061-01-5	cis-1,3-Dichloropropene	15	U
79-01-6	Trichloroethene	15	U
124-48-1	Dibromochloromethane	15	U
79-00-5	1,1,2-Trichloroethane	15	U
71-43-2	Benzene	15	U
10061-02-6	Trans-1,3-Dichloropropene	15	U
75-25-2	Bromoform	15	U
108-10-1	4-Methyl-2-Pentanone	29	U
591-78-6	2-Hexanone	29	U
127-18-4	Tetrachloroethene	15	U
79-34-5	1,1,2,2-Tetrachloroethane	15	U
108-88-3	Toluene	15	U
108-90-7	Chlorobenzene	15	U
100-41-4	Ethylbenzene	15	U
100-42-5	Styrene	15	U
1330-20-7	Total Xylenes	15	U

FORM I VOA 1/87 Rev.

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-2S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268490

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068490B19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 66 Date Analyzed: 06/21/89

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC 1/87 Rev.

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-2S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268490

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH068490B21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 66 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/22/89

GPC Cleanup: (Y/N) N pH: 6.9 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	970	U
111-44-4	bis(2-Chloroethyl)Ether	970	U
95-57-8	2-Chlorophenol	970	U
541-73-1	1,3-Dichlorobenzene	970	U
106-46-7	1,4-Dichlorobenzene	100	J
100-51-6	Benzyl Alcohol	970	U
95-50-1	1,2-Dichlorobenzene	970	U
95-48-7	2-Methylphenol	970	U
39638-32-9	bis(2-Chloroisopropyl)Ether	970	U
106-44-5	4-Methylphenol	970	U
621-64-7	N-Nitroso-Di-n-Propylamine	970	U
67-72-1	Hexachloroethane	970	U
98-95-3	Nitrobenzene	970	U
78-59-1	Isophorone	970	U
88-75-5	2-Nitrophenol	970	U
105-67-9	2,4-Dimethylphenol	970	U
65-85-0	Benzoic Acid	450	BJ
111-91-1	bis(2-Chloroethoxy)Methane	970	U
120-83-2	2,4-Dichlorophenol	970	U
120-82-1	1,2,4-Trichlorobenzene	970	U
91-20-3	Naphthalene	970	U
106-47-8	4-Chloroaniline	970	U
87-68-3	Hexachlorobutadiene	970	U
59-50-7	4-Chloro-3-Methylphenol	970	U
91-57-6	2-Methylnaphthalene	970	U
77-47-4	Hexachlorocyclopentadiene	970	U
88-06-2	2,4,6-Trichlorophenol	970	U
95-95-4	2,4,5-Trichlorophenol	4700	U
91-58-7	2-Chloronaphthalene	970	U
88-74-4	2-Nitroaniline	4700	U
131-11-3	Dimethyl Phthalate	970	U
208-96-8	Acenaphthylene	970	U
606-20-2	2,6-Dinitrotoluene	970	U

FORM I SV-1 1/87 Rev.

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-2S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268490

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH068490B21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 66 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/22/89

GPC Cleanup: (Y/N) N pH: 6.9 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	4700	U
83-32-9	Acenaphthene	110	J
51-28-5	2,4-Dinitrophenol	4700	U
100-02-7	4-Nitrophenol	4700	U
132-64-9	Dibenzofuran	970	U
121-14-2	2,4-Dinitrotoluene	970	U
84-66-2	Diethylphthalate	970	U
7005-72-3	4-Chlorophenyl-phenylether	970	U
86-73-7	Fluorene	140	J
100-01-6	4-Nitroaniline	4700	U
534-52-1	4,6-Dinitro-2-Methylphenol	4700	U
86-30-6	N-Nitrosodiphenylamine (1)	970	U
101-55-3	4-Bromophenyl-phenylether	970	U
118-74-1	Hexachlorobenzene	970	U
87-86-5	Pentachlorophenol	4700	U
85-01-8	Phenanthrene	1700	
120-12-7	Anthracene	200	J
84-74-2	Di-n-Butylphthalate	160	J
206-44-0	Fluoranthene	3900	
129-00-0	Pyrene	2700	
85-68-7	Butylbenzylphthalate	340	J
91-94-1	3,3'-Dichlorobenzidine	1900	U
56-55-3	Benzo(a)Anthracene	1000	
218-01-9	Chrysene	1700	
117-81-7	bis(2-Ethylhexyl)Phthalate	1600	
117-84-0	Di-n-Octyl Phthalate	970	U
205-99-2	Benzo(b)Fluoranthene	2600	
207-08-9	Benzo(k)Fluoranthene	1600	
50-32-8	Benzo(a)Pyrene	1200	
193-39-5	Indeno(1,2,3-cd)Pyrene	460	J
53-70-3	Dibenzo(a,h)Anthracene	970	U
191-24-2	Benzo(g,h,i)Perylene	530	J

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-2S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268490

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH068490B21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 66 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/22/89

GPC Cleanup: (Y/N) N pH: 6.9 Dilution Factor: 1.00

Number TICs found: 22

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	ALDOL	6.75	7500	AJ
2.	ALDOL	6.85	2900	AJ
3.	UNKNOWN HYDROCARBON	12.39	3500	J
4. 54105-67-8	HEPTADECANE, 2,6-DIMETHYL-	12.75	6300	J
5.	UNKNOWN HYDROCARBON	13.37	4700	J
6.	UNKNOWN HYDROCARBON	13.50	2000	J
7.	UNKNOWN HYDROCARBON	13.84	3600	J
8.	UNKNOWN	14.20	2000	J
9.	UNKNOWN	14.34	3400	J
10.	UNKNOWN	14.85	2200	J
11.	UNKNOWN	15.17	1700	J
12.	UNKNOWN	15.34	2100	J
13.	UNKNOWN	15.69	2300	J
14.	UNKNOWN	15.89	4200	J
15.	UNKNOWN	15.92	4300	J
16.	UNKNOWN	16.07	9600	J
17.	UNKNOWN	16.15	6600	J
18.	UNKNOWN	16.27	2900	J
19.	UNKNOWN	16.34	1800	J
20.	UNKNOWN	16.39	2700	J
21.	UNKNOWN	17.00	2800	J
22.	UNKNOWN	17.47	1800	J

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-2S

Lab Name: COMPUCHEM LABORATORIES Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268490

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 66 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/24/89

GPC Cleanup: (Y/N) N pH: 6.9 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	24.	U
319-85-7	beta-BHC	24.	U
319-86-8	delta-BHC	24.	U
58-89-9	gamma-BHC (Lindane)	24.	U
76-44-8	Heptachlor	24.	U
309-00-2	Aldrin	24.	U
1024-57-3	Heptachlor epoxide	24.	U
959-98-8	Endosulfan I	24.	U
60-57-1	Dieldrin	47.	U
72-55-9	4,4'-DDE	47.	U
72-20-8	Endrin	47.	U
33213-65-9	Endosulfan II	47.	U
72-54-8	4,4'-DDD	47.	U
1031-07-8	Endosulfan sulfate	47.	U
50-29-3	4,4'-DDT	47.	U
72-43-5	Methoxychlor	240	U
53494-70-5	Endrin ketone	47.	U
5103-71-9	alpha-Chlordane	240	U
5103-74-2	gamma-Chlordane	240	U
8001-35-2	Toxaphene	470	U
12674-11-2	Aroclor-1016	240	U
11104-28-2	Aroclor-1221	240	U
11141-16-5	Aroclor-1232	240	U
53469-21-9	Aroclor-1242	240	U
12672-29-6	Aroclor-1248	240	U
11097-69-1	Aroclor-1254	470	U
11096-82-5	Aroclor-1260	630	

FORM I PEST 1/87 Rev.

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

WWT-2S

Lab Name: COMPUCHEM LABORATORIES Contract: 787

Lab Code: COMPU Case No.: 15660 SAS No.: _____ SDG No.: 16983A

Matrix (soil/water): SOIL Lab Sample ID: 268502

Level (low/med): LOW Date Received: 06/20/89

% Solids: 34.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10300			P
7440-36-0	Antimony	18.4	U	N	P
7440-38-2	Arsenic	7.0			F
7440-39-3	Barium	55.5	B		P
7440-41-7	Beryllium	1.6	B		P
7440-43-9	Cadmium	2.6	B	*	P
7440-70-2	Calcium	982	B		P
7440-47-3	Chromium	22.6			P
7440-48-4	Cobalt	10.9	B		P
7440-50-8	Copper	87.8			P
7439-89-6	Iron	16500			P
7439-92-1	Lead	96.1		*	P
7439-95-4	Magnesium	2220	B	E	P
7439-96-5	Manganese	183		*	P
7439-97-6	Mercury	.24	U		CV
7440-02-0	Nickel	19.2	B		P
7440-09-7	Potassium	1010	U		P
7782-49-2	Selenium	.69	B	N	F
7440-22-4	Silver	145			P
7440-23-5	Sodium	907	U		P
7440-28-0	Thallium	.61	U	N	F
7440-62-2	Vanadium	18.6	B		P
7440-66-6	Zinc	481		E	P
	Cyanide	2.8		*	AS

Color Before: BLACK Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: YES

Comments:
FORM 1 - PAGE 4

FORM I - IN 7/87

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-3S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268489

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068489B19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 39 Date Analyzed: 06/21/89

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	16	U
74-83-9	Bromomethane	16	U
75-01-4	Vinyl Chloride	16	U
75-00-3	Chloroethane	16	U
75-09-2	Methylene Chloride	36	B
67-64-1	Acetone	190	B
75-15-0	Carbon Disulfide	8	U
75-35-4	1,1-Dichloroethene	8	U
75-34-3	1,1-Dichloroethane	8	U
540-59-0	1,2-Dichloroethene (total)	8	U
67-66-3	Chloroform	2	J
107-06-2	1,2-Dichloroethane	8	U
78-93-3	2-Butanone	24	
71-55-6	1,1,1-Trichloroethane	8	U
56-23-5	Carbon Tetrachloride	8	U
108-05-4	Vinyl Acetate	16	U
75-27-4	Bromodichloromethane	8	U
78-87-5	1,2-Dichloropropane	8	U
10061-01-5	cis-1,3-Dichloropropene	8	U
79-01-6	Trichloroethene	8	U
124-48-1	Dibromochloromethane	8	U
79-00-5	1,1,2-Trichloroethane	8	U
71-43-2	Benzene	8	U
10061-02-6	Trans-1,3-Dichloropropene	8	U
75-25-2	Bromoform	8	U
108-10-1	4-Methyl-2-Pentanone	16	U
591-78-6	2-Hexanone	16	U
127-18-4	Tetrachloroethene	8	U
79-34-5	1,1,2,2-Tetrachloroethane	8	U
108-88-3	Toluene	8	U
108-90-7	Chlorobenzene	8	U
100-41-4	Ethylbenzene	8	U
100-42-5	Styrene	8	U
1330-20-7	Total Xylenes	8	U

FORM I VOA 1/87 Rev.

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-3S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268489

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068489B19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 39 Date Analyzed: 06/21/89

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC 1/87 Rev.

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-3S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268489

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GJD68489B20

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 39 dec. ____ Date Extracted: 06/23/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/23/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	1100	U
111-44-4	bis(2-Chloroethyl)Ether	1100	U
95-57-8	2-Chlorophenol	1100	U
541-73-1	1,3-Dichlorobenzene	1100	U
106-46-7	1,4-Dichlorobenzene	1100	U
100-51-6	Benzyl Alcohol	1100	U
95-50-1	1,2-Dichlorobenzene	1100	U
95-48-7	2-Methylphenol	1100	U
39638-32-9	bis(2-Chloroisopropyl)Ether	1100	U
106-44-5	4-Methylphenol	150	J
621-64-7	N-Nitroso-Di-n-Propylamine	1100	U
67-72-1	Hexachloroethane	1100	U
98-95-3	Nitrobenzene	1100	U
78-59-1	Isophorone	1100	U
88-75-5	2-Nitrophenol	1100	U
105-67-9	2,4-Dimethylphenol	1100	U
65-85-0	Benzoic Acid	260	J
111-91-1	bis(2-Chloroethoxy)Methane	1100	U
120-83-2	2,4-Dichlorophenol	1100	U
120-82-1	1,2,4-Trichlorobenzene	1100	U
91-20-3	Naphthalene	1100	U
106-47-8	4-Chloroaniline	1100	U
87-68-3	Hexachlorobutadiene	1100	U
59-50-7	4-Chloro-3-Methylphenol	1100	U
91-57-6	2-Methylnaphthalene	1100	U
77-47-4	Hexachlorocyclopentadiene	1100	U
88-06-2	2,4,6-Trichlorophenol	1100	U
95-95-4	2,4,5-Trichlorophenol	5200	U
91-58-7	2-Chloronaphthalene	1100	U
88-74-4	2-Nitroaniline	5200	U
131-11-3	Dimethyl Phthalate	1100	U
208-96-8	Acenaphthylene	1100	U
606-20-2	2,6-Dinitrotoluene	1100	U

FORM I SV-1 1/87 Rev.

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-3S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268489

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GJD68489B20

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 39 dec. ____ Date Extracted: 06/23/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/23/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	5200	U
83-32-9	Acenaphthene	130	J
51-28-5	2,4-Dinitrophenol	5200	U
100-02-7	4-Nitrophenol	5200	U
132-64-9	Dibenzofuran	140	J
121-14-2	2,4-Dinitrotoluene	1100	U
84-66-2	Diethylphthalate	1100	U
7005-72-3	4-Chlorophenyl-phenylether	1100	U
86-73-7	Fluorene	240	J
100-01-6	4-Nitroaniline	5200	U
534-52-1	4,6-Dinitro-2-Methylphenol	5200	U
86-30-6	N-Nitrosodiphenylamine (1)	1100	U
101-55-3	4-Bromophenyl-phenylether	1100	U
118-74-1	Hexachlorobenzene	1100	U
87-86-5	Pentachlorophenol	5200	U
85-01-8	Phenanthrene	1800	
120-12-7	Anthracene	220	J
84-74-2	Di-n-Butylphthalate	1100	U
206-44-0	Fluoranthene	2500	
129-00-0	Pyrene	1900	
85-68-7	Butylbenzylphthalate	1100	U
91-94-1	3,3'-Dichlorobenzidine	2200	U
56-55-3	Benzo(a)Anthracene	940	J
218-01-9	Chrysene	1600	
117-81-7	bis(2-Ethylhexyl)Phthalate	1300	
117-84-0	Di-n-Octyl Phthalate	1100	U
205-99-2	Benzo(b)Fluoranthene	2100	X
207-08-9	Benzo(k)Fluoranthene	2100	X
50-32-8	Benzo(a)Pyrene	940	J
193-39-5	Indeno(1,2,3-cd)Pyrene	480	J
53-70-3	Dibenzo(a,h)Anthracene	320	J
191-24-2	Benzo(g,h,i)Perylene	540	J

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-3S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268489

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GJD68489B20

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 39 dec. ____ Date Extracted: 06/23/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/23/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.0

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 54105-67-8	HEPTADECANE, 2,6-DIMETHYL-	12.45	3300	J
2.	UNKNOWN HYDROCARBON	13.15	2800	J
3.	UNKNOWN	15.25	3000	J
4.	UNKNOWN	16.00	1300	J
5.	UNKNOWN	16.24	1500	J
6.	UNKNOWN	16.62	2700	J
7.	UNKNOWN	17.04	2200	J
8.	UNKNOWN	17.77	550	J
9.	UNKNOWN	17.95	2600	J
10.	UNKNOWN	18.09	2800	J
11.	UNKNOWN	19.00	1300	J
12.	UNKNOWN	19.05	2600	J
13.	UNKNOWN	19.15	5200	J
14.	UNKNOWN	20.09	30000	J
15.	UNKNOWN	20.32	12000	J
16.	UNKNOWN	20.34	25000	J
17.	UNKNOWN	20.60	6700	J
18.	UNKNOWN	21.22	5500	J
19.	UNKNOWN	21.37	5200	J
20.	UNKNOWN	21.72	5600	J

FORM I SV-TIC 1/87 Rev.

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

WWT-3S

Lab Name: COMPUCHEM LABORATORIES Contract: 787

Lab Code: COMPU Case No.: 15660 SAS No.: _____ SDG No.: 16983A

Matrix (soil/water): SOIL Lab Sample ID: 268501

Level (low/med): LOW Date Received: 06/20/89

% Solids: 61.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4840			P
7440-36-0	Antimony	10.1	U	N	P
7440-38-2	Arsenic	3.7			F
7440-39-3	Barium	29.5	B		P
7440-41-7	Beryllium	.90	B		P
7440-43-9	Cadmium	1.4	B	*	P
7440-70-2	Calcium	510	B		P
7440-47-3	Chromium	9.3			P
7440-48-4	Cobalt	4.5	B		P
7440-50-8	Copper	38.5			P
7439-89-6	Iron	7220			P
7439-92-1	Lead	47.1		*	P
7439-95-4	Magnesium	1140	B	E	P
7439-96-5	Manganese	69.7		*	P
7439-97-6	Mercury	.15	U		CV
7440-02-0	Nickel	13.7			P
7440-09-7	Potassium	554	U		P
7782-49-2	Selenium	.68	B	WN	F
7440-22-4	Silver	73.7			P
7440-23-5	Sodium	497	U		P
7440-28-0	Thallium	.34	U	N	F
7440-62-2	Vanadium	8.3	B		P
7440-66-6	Zinc	253		E	P
	Cyanide	.81	U	*	AS

Color Before: BLACK Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

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FORM I - IN 7/87

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-4S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268488

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068488C19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 47 Date Analyzed: 06/22/89

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	19	U
74-83-9	Bromomethane	19	U
75-01-4	Vinyl Chloride	19	U
75-00-3	Chloroethane	19	U
75-09-2	Methylene Chloride	36	B
67-64-1	Acetone	99	B
75-15-0	Carbon Disulfide	9	U
75-35-4	1,1-Dichloroethene	9	U
75-34-3	1,1-Dichloroethane	9	U
540-59-0	1,2-Dichloroethene (total)	9	U
67-66-3	Chloroform	9	U
107-06-2	1,2-Dichloroethane	9	U
78-93-3	2-Butanone	6	J
71-55-6	1,1,1-Trichloroethane	9	U
56-23-5	Carbon Tetrachloride	9	U
108-05-4	Vinyl Acetate	19	U
75-27-4	Bromodichloromethane	9	U
78-87-5	1,2-Dichloropropane	9	U
10061-01-5	cis-1,3-Dichloropropene	9	U
79-01-6	Trichloroethene	9	U
124-48-1	Dibromochloromethane	9	U
79-00-5	1,1,2-Trichloroethane	9	U
71-43-2	Benzene	9	U
10061-02-6	Trans-1,3-Dichloropropene	9	U
75-25-2	Bromoform	9	U
108-10-1	4-Methyl-2-Pentanone	19	U
591-78-6	2-Hexanone	19	U
127-18-4	Tetrachloroethene	9	U
79-34-5	1,1,2,2-Tetrachloroethane	9	U
108-88-3	Toluene	9	U
108-90-7	Chlorobenzene	9	U
100-41-4	Ethylbenzene	9	U
100-42-5	Styrene	9	U
1330-20-7	Total Xylenes	9	U

FORM I VOA 1/87 Rev.

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-4S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268488

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH068488C19

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 47 Date Analyzed: 06/22/89

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC 1/87 Rev.

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-4S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268488

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH068488B21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 47 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/21/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	620	U
111-44-4	bis(2-Chloroethyl)Ether	620	U
95-57-8	2-Chlorophenol	620	U
541-73-1	1,3-Dichlorobenzene	620	U
106-46-7	1,4-Dichlorobenzene	200	J
100-51-6	Benzyl Alcohol	620	U
95-50-1	1,2-Dichlorobenzene	620	U
95-48-7	2-Methylphenol	620	U
39638-32-9	bis(2-Chloroisopropyl)Ether	620	U
106-44-5	4-Methylphenol	110	J
621-64-7	N-Nitroso-Di-n-Propylamine	620	U
67-72-1	Hexachloroethane	620	U
98-95-3	Nitrobenzene	620	U
78-59-1	Isophorone	620	U
88-75-5	2-Nitrophenol	620	U
105-67-9	2,4-Dimethylphenol	620	U
65-85-0	Benzoic Acid	280	BJ
111-91-1	bis(2-Chloroethoxy)Methane	620	U
120-83-2	2,4-Dichlorophenol	620	U
120-82-1	1,2,4-Trichlorobenzene	620	U
91-20-3	Naphthalene	620	U
106-47-8	4-Chloroaniline	620	U
87-68-3	Hexachlorobutadiene	620	U
59-50-7	4-Chloro-3-Methylphenol	620	U
91-57-6	2-Methylnaphthalene	620	U
77-47-4	Hexachlorocyclopentadiene	620	U
88-06-2	2,4,6-Trichlorophenol	620	U
95-95-4	2,4,5-Trichlorophenol	3000	U
91-58-7	2-Chloronaphthalene	620	U
88-74-4	2-Nitroaniline	3000	U
131-11-3	Dimethyl Phthalate	620	U
208-96-8	Acenaphthylene	620	U
606-20-2	2,6-Dinitrotoluene	620	U

FORM I SV-1 1/87 Rev.

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-4S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268488

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH068488B21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 47 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/21/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	3000	U
83-32-9	Acenaphthene	150	J
51-28-5	2,4-Dinitrophenol	3000	U
100-02-7	4-Nitrophenol	3000	U
132-64-9	Dibenzofuran	130	J
121-14-2	2,4-Dinitrotoluene	620	U
84-66-2	Diethylphthalate	620	U
7005-72-3	4-Chlorophenyl-phenylether	620	U
86-73-7	Fluorene	250	J
100-01-6	4-Nitroaniline	3000	U
534-52-1	4,6-Dinitro-2-Methylphenol	3000	U
86-30-6	N-Nitrosodiphenylamine (1)	620	U
101-55-3	4-Bromophenyl-phenylether	620	U
118-74-1	Hexachlorobenzene	620	U
87-86-5	Pentachlorophenol	3000	U
85-01-8	Phenanthrene	1900	
120-12-7	Anthracene	250	J
84-74-2	Di-n-Butylphthalate	620	U
206-44-0	Fluoranthene	3400	
129-00-0	Pyrene	2200	
85-68-7	Butylbenzylphthalate	620	U
91-94-1	3,3'-Dichlorobenzidine	1200	U
56-55-3	Benzo(a)Anthracene	860	
218-01-9	Chrysene	1400	
117-81-7	bis(2-Ethylhexyl)Phthalate	2200	
117-84-0	Di-n-Octyl Phthalate	620	U
205-99-2	Benzo(b)Fluoranthene	1400	
207-08-9	Benzo(k)Fluoranthene	1200	
50-32-8	Benzo(a)Pyrene	1100	
193-39-5	Indeno(1,2,3-cd)Pyrene	390	J
53-70-3	Dibenzo(a,h)Anthracene	620	U
191-24-2	Benzo(g,h,i)Perylene	620	U

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 1/87 Rev.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

WWT-4S

Lab Name: COMPUCHEM LABS Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268488

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH068488B21

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 47 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/21/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: 22

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	BLANK CONTAMINANT	5.78	1400	BJ
2.	ALDOL	6.70	4800	AJ
3. 54105-67-8	HEPTADECANE, 2,6-DIMETHYL-	12.35	9400	J
4.	UNKNOWN	12.65	7500	J
5. 54105-67-8	HEPTADECANE, 2,6-DIMETHYL-	12.72	26000	J
6. 54105-67-8	HEPTADECANE, 2,6-DIMETHYL-	13.35	23000	J
7.	UNKNOWN	13.50	5600	J
8.	UNKNOWN	13.59	8200	J
9.	UNKNOWN HYDROCARBON	13.82	16000	J
10.	UNKNOWN	14.32	7500	J
11.	UNKNOWN	14.62	5600	J
12.	UNKNOWN	14.72	9400	J
13.	UNKNOWN	14.84	6900	J
14.	UNKNOWN	15.30	6100	J
15.	UNKNOWN	15.85	3900	J
16.	UNKNOWN	15.90	6900	J
17.	UNKNOWN	16.00	4000	J
18.	UNKNOWN	16.05	7500	J
19.	UNKNOWN	16.14	5500	J
20.	UNKNOWN	24.24	58000	J
21.	UNKNOWN	25.06	35000	J
22.	UNKNOWN	25.17	5600	J

FORM I SV-TIC 1/87 Rev.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

WWT-4S

Lab Name: COMPUCHEM LABORATORIES Contract: (2-88)-REVS

Lab Code: COMPU Case No.: 16983 SAS No.: _____ SDG No.: 53

Matrix: (soil/water) SOIL Lab Sample ID: 268488

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

Level: (low/med) LOW Date Received: 06/20/89

% Moisture: not dec. 47 dec. ____ Date Extracted: 06/21/89

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/23/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 2.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	30.	U
319-85-7	beta-BHC	30.	U
319-86-8	delta-BHC	30.	U
58-89-9	gamma-BHC (Lindane)	30.	U
76-44-8	Heptachlor	30.	U
309-00-2	Aldrin	30.	U
1024-57-3	Heptachlor epoxide	30.	U
959-98-8	Endosulfan I	30.	U
60-57-1	Dieldrin	60.	U
72-55-9	4,4'-DDE	60.	U
72-20-8	Endrin	60.	U
33213-65-9	Endosulfan II	60.	U
72-54-8	4,4'-DDD	60.	U
1031-07-8	Endosulfan sulfate	60.	U
50-29-3	4,4'-DDT	60.	U
72-43-5	Methoxychlor	300	U
53494-70-5	Endrin ketone	60.	U
5103-71-9	alpha-Chlordane	300	U
5103-74-2	gamma-Chlordane	300	U
8001-35-2	Toxaphene	600	U
12674-11-2	Aroclor-1016	300	U
11104-28-2	Aroclor-1221	300	U
11141-16-5	Aroclor-1232	300	U
53469-21-9	Aroclor-1242	300	U
12672-29-6	Aroclor-1248	300	U
11097-69-1	Aroclor-1254	600	U
11096-82-5	Aroclor-1260	600	U

FORM I PEST 1/87 Rev.

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

WWT-4S

Lab Name: COMPUCHEM LABORATORIES Contract: 787

Lab Code: COMPU Case No.: 15660 SAS No.: _____ SDG No.: 16983A

Matrix (soil/water): SOIL Lab Sample ID: 268500

Level (low/med): LOW Date Received: 06/20/89

% Solids: 52.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9530			P
7440-36-0	Antimony	11.6	U	N	P
7440-38-2	Arsenic	8.6			F
7440-39-3	Barium	58.8	B		P
7440-41-7	Beryllium	.18	U		P
7440-43-9	Cadmium	2.8		*	P
7440-70-2	Calcium	1100	B		P
7440-47-3	Chromium	18.5			P
7440-48-4	Cobalt	6.8	B		P
7440-50-8	Copper	92.1			P
7439-89-6	Iron	14600			P
7439-92-1	Lead	91.4		*	P
7439-95-4	Magnesium	2300		E	P
7439-96-5	Manganese	169		*	P
7439-97-6	Mercury	.16	U		CV
7440-02-0	Nickel	17.4			P
7440-09-7	Potassium	862	B		P
7782-49-2	Selenium	.52	B	N	F
7440-22-4	Silver	184			P
7440-23-5	Sodium	572	U		P
7440-28-0	Thallium	.40	U	N	F
7440-62-2	Vanadium	14.1	B		P
7440-66-6	Zinc	462		E	P
	Cyanide	2.3		*	AS

Color Before: BLACK Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

FORM 1 - PAGE 2

FORM I - IN 7/87

From WCC, 1991. Letter to Mr. Christopher Thomas, Environmental Engineer, Enforcement and Title III Section, USEPA Region III. Re: Soil Investigation in the Vicinity of the Former Source Area. Woodward-Clyde Consultants. July 16, 1991.Driscoll, Fletcher G. 1986. Groundwater and Wells, Second Edition. Johnson Screens, St. Paul Minnesota. 1089pp.

Table 5

Soil Analytical Data Summary[1]
Former Vapor Degreaser Area
Former Foster Wheeler Energy Corporate Project
Mountain Top, Pennsylvania

	Act 2 Standard[3]			Sample Identification/Date Collected													
Parameter[2]	Direct Contact		Soil-to-Groundwater	S-1 11/07/1985[4]	S-2 11/07/1985[4]	S-3 11/07/1985[4]	S-4 11/07/1985[4]	S-5 12/06/1985[4]	S-6 12/06/1985[4]	S-7 12/06/1985[4]	S-8 12/06/1985[4]	S-9 12/06/1985[4]	S-10 12/06/1985[4]	S-11 12/06/1985[4]	S-12 12/06/1985[4]	S-13 12/06/1985[4]	S-14 12/06/1985[4]
Depth Collected (feet)	0-2	2-15															
Volatile Organic Compounds (VOCs)																	
Chloroform	17	19	10	NA[9]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2 Tetrachloroethane	28	33	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2 Dichloroethene[8]	1,900	2,100	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1 Trichloroethane	10,000	10,000	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2 Trichloroethane (TCA)	100	120	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene (PCE)	1,500	3,300	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethylene (TCE)	970	1,100	0.5	2.4	10.7	4.5	13.1	0.08	0.12	0.91	0.72	0.19	0.10	0.43	0.99	0.33	0.10

	Act 2 Standard[3]			Sample Identification/Date Collected													
Parameter[2]	Direct Contact		Soil-to-Groundwater	G-1A 12/06/1985[4]	G-1 12/06/1985[4]	SS-1 (MW-4) 4/18/1986[5]	SS-4 (MW-4) 4/18/1986[5]	SS-5 (MW-4) 4/18/1986[5]	SS-6 (MW-4) 4/18/1986[5]	SS-7 4/18/1986[5]	B-5 9/22/1986[6]	B-6 9/22/1986[6]	B-6 Duplicate 9/22/1986[6]	B-8 9/23/1986[6]	B-12 9/23/1986[6]	B-13 9/23/1986[6]	B-13 Duplicate 9/23/1986[6]
Depth Collected (feet)	0-2	2-15				0.7 - 2.0	4.0 - 6.0	8.0 - 10.0	10.0 - 12.0	15.6 - 16.4	0.0 - 2.0	0.0 - 5.0	0.0 - 5.0	0.0 - 5.0	0.0 - 5.0	0.0 - 5.0	0.0 - 5.0
Volatile Organic Compounds (VOCs)																	
Chloroform	17	19	10	NA	NA	ND	0.099	0.123	0.13	0.026	NA	NA	NA	NA	NA	NA	NA
1,1,2,2 Tetrachloroethane	28	33	0.03	NA	NA	11	0.0029	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
1,2 Dichloroethene[8]	1,900	2,100	7	NA	NA	NA	NA	NA	NA	NA	ND[10]	ND	ND	ND	ND	0.0071	0.0042
1,1,1 Trichloroethane	10,000	10,000	20	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	0.0015	ND
1,1,2 Trichloroethane (TCA)	100	120	0.5	NA	NA	**7.5**	0.0032	ND	0.0036	ND	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene (PCE)	1,500	3,300	0.5	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	0.0024	ND	ND	ND
Trichloroethylene (TCE)	970	1,100	0.5	0.55	2.48	**29**	**0.62**	**0.51**	**3.4**	**1.7**	0.021	0.376	**0.65**	0.0047	0.0024	0.027	0.014

	Act 2 Standard[3]			Sample Identification/Date Collected												
Parameter[2]	Direct Contact		Soil-to-Groundwater	B-28 9/25/1986[6]	B-31 9/25/1986[6]	B-32 9/25/1986[6]	B-33 9/26/1986[6]	B-34 9/26/1986[6]	TB-1 05/13/1991[7]	TB-1 5/13/1991[7]	TB-2 05/13/1991[7]	TB-2 5/13/1991[7]	TB-3 05/13/1991[7]	TB-3 05/13/1991[7]	TB-4 5/13/1991[7]	TB-4 05/13/1991[7]
Depth Collected (feet)	0-2	2-15		0.0 - 7.5	9.0 - 10.0	7.0 - 9.5	7.0 - 9.5	5.0 - 5.6	6.5 - 8.5	14 - 16	4 - 5.6	12 - 14	13 - 15	4 - 4.5	9 - 11	13 - 15
Volatile Organic Compounds (VOCs)																
Chloroform	17	19	10	NA	NA	NA	NA	NA	NI[11]	NI	NI	NI	NI	NI	NI	NI
1,1,2,2 Tetrachloroethane	28	33	0.03	NA	NA	NA	NA	NA	NI	NI	NI	NI	NI	NI	NI	NI
1,2 Dichloroethene[8]	1,900	2,100	7	ND	ND	ND	ND	ND	NI	NI	NI	NI	NI	NI	NI	NI
1,1,1 Trichloroethane	10,000	10,000	20	ND	ND	ND	ND	ND	NI	NI	NI	NI	NI	NI	NI	NI
1,1,2 Trichloroethane (TCA)	100	120	0.5	NA	NA	NA	NA	NA	NI	NI	NI	NI	NI	NI	NI	NI
Tetrachloroethene (PCE)	1,500	3,300	0.5	ND	0.058	ND	ND	ND	NI	NI	NI	NI	NI	NI	NI	NI
Trichloroethylene (TCE)	970	1,100	0.5	**1.1**	0.49	**0.77**	0.029	0.16	30 ppm[12]	0.180 ppm[12]	0.860 ppm[12]	1900 ppm [12]	NI	NI	NI	NI

See footnotes at end of table.

Table 5 (cont.)

Parameter[2]	Act 2 Standard[3] Direct Contact		Act 2 Standard[3] Soil-to-Groundwater	Sample Identification/Date Collected TB-5 5/13/1991[7]	TB-5 05/13/1991[7]	TB-6 5/13/1991[7]	TB-6 05/13/1991[7]
Depth Collected (feet)	0-2	2-15		4 - 4.8	9.5 - 11.5	4 - 6	12-Oct
Volatile Organic Compounds (VOCs)							
Chloroform	17	19	10	NI	NI	NI	NI
1,1,2,2 Tetrachloroethane		33	0.03	NI	NI	NI	NI
1,2 Dichloroethene[8]	1,900	2,100	7	NI	NI	NI	NI
1,1,1 Trichloroethane	10,000	10,000	20	NI	NI	NI	NI
1,1,2 Trichloroethane (TCA)	100	120	0.5	NI	NI	NI	NI
Tetrachloroethene (PCE)	1,500	3,300	0.5	NI	NI	NI	NI
Trichloroethylene (TCE)	970	1,100	0.5	NI	0.11 ppm[12]	NI	NI

Footnotes

[1]Concentrations are expressed in milligrams per kilogram. Values presented in bold text exceed the appropriate Act 2 Standard.

[2]Only those parameters detected above the laboratory detection limit are presented on this table.

[3]Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2) medium-specific concentration (MSC). This standard represents the more conservative of either the non-residential direct contact or the soil-to-groundwater standards for used aquifers (total dissolved solids less than or equal to 2,500 milligrams per liter).

[4]Data was obtained from Gannet Flemming Environmental Engineers, Inc., January 27, 1986 Letter Report, Mountain Top Plant, provided by Foster Wheeler Energy Corporation.

[5]Data was obtained from Woodward-Clyde Consultants (WCC), June 1986, Field Investigation Report-Phase I.

[6]Data was obtained from WCC, February 1987, Field Investigation Report-Phase II and WCC, June 8, 1988, Site Investigation Program, Foster Wheeler Energy Corporation, Mountaintop Plant. Volume 2 of 3.

[7]Data was obtained from WCC, July 16, 1991, "Soil Investigation in the Vicinity of the Former Source Area" Letter Report.

[8]The more conservative standard for cis- and trans-1,2 dichloroethene is cited.

[9]Not analyzed.

[10]Not detected.

[11]No information available in the report available to AGI.

[12]Parts per million.

ATTACHMENT G

PROUCL OUTPUT FOR THE AFFECTED AREA GROUNDWATER TCE CONCENTRATIONS WITH AND WITHOUT THE POTENTIAL OUTLIER

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			6/20/2016 2:35:42 PM								
5	From File			AA-GW-TCEwithwithout.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	TCEwith110											
11												
12	General Statistics											
13	Total Number of Observations					97	Number of Distinct Observations					60
14	Number of Detects					78	Number of Non-Detects					19
15	Number of Distinct Detects					57	Number of Distinct Non-Detects					3
16	Minimum Detect					0.12	Minimum Non-Detect					0.09
17	Maximum Detect					110	Maximum Non-Detect					0.18
18	Variance Detects					615	Percent Non-Detects					19.59%
19	Mean Detects					26.24	SD Detects					24.8
20	Median Detects					19	CV Detects					0.945
21	Skewness Detects					1.298	Kurtosis Detects					1.374
22	Mean of Logged Detects					2.587	SD of Logged Detects					1.5
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.859	Normal GOF Test on Detected Observations Only					
26	5% Shapiro Wilk P Value					4.403E-10	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.148	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.1	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	Mean					21.12	Standard Error of Mean					2.495
33	SD					24.41	95% KM (BCA) UCL					25.41
34	95% KM (t) UCL					25.26	95% KM (Percentile Bootstrap) UCL					25.23
35	95% KM (z) UCL					25.22	95% KM Bootstrap t UCL					25.53
36	90% KM Chebyshev UCL					28.6	95% KM Chebyshev UCL					31.99
37	97.5% KM Chebyshev UCL					36.69	99% KM Chebyshev UCL					45.94
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.52	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.788	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.0868	Kolmogrov-Smirnoff GOF					
43	5% K-S Critical Value					0.105	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.864	k star (bias corrected MLE)					0.839
48	Theta hat (MLE)					30.37	Theta star (bias corrected MLE)					31.26
49	nu hat (MLE)					134.8	nu star (bias corrected)					130.9
50	MLE Mean (bias corrected)					26.24	MLE Sd (bias corrected)					28.64
51												
52	Gamma Kaplan-Meier (KM) Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
53					k hat (KM)	0.748					nu hat (KM)	145.2
54					Approximate Chi Square Value (145.16, α)	118.3					Adjusted Chi Square Value (145.16, β)	117.9
55					95% Gamma Approximate KM-UCL (use when n>=50)	25.91					95% Gamma Adjusted KM-UCL (use when n<50)	25.99
56												
57					**Gamma ROS Statistics using Imputed Non-Detects**							
58					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
59					GROS may not be used when kstar of detected data is small such as < 0.1							
60					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
61					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
62					Minimum	0.01					Mean	21.11
63					Maximum	110					Median	13
64					SD	24.54					CV	1.163
65					k hat (MLE)	0.376					k star (bias corrected MLE)	0.372
66					Theta hat (MLE)	56.09					Theta star (bias corrected MLE)	56.81
67					nu hat (MLE)	73.02					nu star (bias corrected)	72.09
68					MLE Mean (bias corrected)	21.11					MLE Sd (bias corrected)	34.63
69											Adjusted Level of Significance (β)	0.0475
70					Approximate Chi Square Value (72.09, α)	53.54					Adjusted Chi Square Value (72.09, β)	53.3
71					95% Gamma Approximate UCL (use when n>=50)	28.42					95% Gamma Adjusted UCL (use when n<50)	28.55
72												
73					**Lognormal GOF Test on Detected Observations Only**							
74					Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**					
75					5% Lilliefors Critical Value	0.1	Detected Data Not Lognormal at 5% Significance Level					
76					**Detected Data Not Lognormal at 5% Significance Level**							
77												
78					**Lognormal ROS Statistics Using Imputed Non-Detects**							
79					Mean in Original Scale	21.24					Mean in Log Scale	1.99
80					SD in Original Scale	24.43					SD in Log Scale	1.832
81					95% t UCL (assumes normality of ROS data)	25.36					95% Percentile Bootstrap UCL	25.51
82					95% BCA Bootstrap UCL	25.7					95% Bootstrap t UCL	25.93
83					95% H-UCL (Log ROS)	71.27						
84												
85					**DL/2 Statistics**							
86					**DL/2 Normal**		**DL/2 Log-Transformed**					
87					Mean in Original Scale	21.11					Mean in Log Scale	1.518
88					SD in Original Scale	24.54					SD in Log Scale	2.562
89					95% t UCL (Assumes normality)	25.25					95% H-Stat UCL	360.3
90					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
91												
92					**Nonparametric Distribution Free UCL Statistics**							
93					**Detected Data appear Gamma Distributed at 5% Significance Level**							
94												
95					**Suggested UCL to Use**							
96					95% KM (Chebyshev) UCL	31.99					95% GROS Approximate Gamma UCL	28.42
97					95% Approximate Gamma KM-UCL	25.91						
98												
99					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
100					Recommendations are based upon data size, data distribution, and skewness.							
101					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
102					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
103												
104	**TCEwith27**											

	A	B	C	D	E	F	G	H	I	J	K	L
105												
106	General Statistics											
107	Total Number of Observations					97	Number of Distinct Observations					60
108	Number of Detects					78	Number of Non-Detects					19
109	Number of Distinct Detects					57	Number of Distinct Non-Detects					3
110	Minimum Detect					0.12	Minimum Non-Detect					0.09
111	Maximum Detect					86	Maximum Non-Detect					0.18
112	Variance Detects					530.6	Percent Non-Detects					19.59%
113	Mean Detects					24.83	SD Detects					23.04
114	Median Detects					19	CV Detects					0.928
115	Skewness Detects					1.148	Kurtosis Detects					0.756
116	Mean of Logged Detects					2.51	SD of Logged Detects					1.543
117												
118	Normal GOF Test on Detects Only											
119	Shapiro Wilk Test Statistic					0.858	Normal GOF Test on Detected Observations Only					
120	5% Shapiro Wilk P Value					3.872E-10	Detected Data Not Normal at 5% Significance Level					
121	Lilliefors Test Statistic					0.143	Lilliefors GOF Test					
122	5% Lilliefors Critical Value					0.1	Detected Data Not Normal at 5% Significance Level					
123	Detected Data Not Normal at 5% Significance Level											
124												
125	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
126	Mean					19.98	Standard Error of Mean					2.325
127	SD					22.75	95% KM (BCA) UCL					23.73
128	95% KM (t) UCL					23.85	95% KM (Percentile Bootstrap) UCL					24.03
129	95% KM (z) UCL					23.81	95% KM Bootstrap t UCL					24.15
130	90% KM Chebyshev UCL					26.96	95% KM Chebyshev UCL					30.12
131	97.5% KM Chebyshev UCL					34.5	99% KM Chebyshev UCL					43.12
132												
133	Gamma GOF Tests on Detected Observations Only											
134	A-D Test Statistic					0.69	Anderson-Darling GOF Test					
135	5% A-D Critical Value					0.789	Detected data appear Gamma Distributed at 5% Significance Level					
136	K-S Test Statistic					0.0938	Kolmogrov-Smirnoff GOF					
137	5% K-S Critical Value					0.105	Detected data appear Gamma Distributed at 5% Significance Level					
138	Detected data appear Gamma Distributed at 5% Significance Level											
139												
140	Gamma Statistics on Detected Data Only											
141	k hat (MLE)					0.84	k star (bias corrected MLE)					0.816
142	Theta hat (MLE)					29.56	Theta star (bias corrected MLE)					30.42
143	nu hat (MLE)					131	nu star (bias corrected)					127.3
144	MLE Mean (bias corrected)					24.83	MLE Sd (bias corrected)					27.48
145												
146	Gamma Kaplan-Meier (KM) Statistics											
147	k hat (KM)					0.772	nu hat (KM)					149.7
148	Approximate Chi Square Value (149.67, α)					122.4	Adjusted Chi Square Value (149.67, β)					122
149	95% Gamma Approximate KM-UCL (use when n>=50)					24.44	95% Gamma Adjusted KM-UCL (use when n<50)					24.51
150												
151	Gamma ROS Statistics using Imputed Non-Detects											
152	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
153	GROS may not be used when kstar of detected data is small such as < 0.1											
154	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
155	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
156	Minimum					0.01	Mean					20.02

	A	B	C	D	E	F	G	H	I	J	K	L
157					Maximum	86					Median	13
158					SD	22.84					CV	1.141
159					k hat (MLE)	0.415					k star (bias corrected MLE)	0.409
160					Theta hat (MLE)	48.28					Theta star (bias corrected MLE)	48.99
161					nu hat (MLE)	80.45					nu star (bias corrected)	79.29
162					MLE Mean (bias corrected)	20.02					MLE Sd (bias corrected)	31.32
163											Adjusted Level of Significance (β)	0.0475
164					Approximate Chi Square Value (79.29, α)	59.78					Adjusted Chi Square Value (79.29, β)	59.52
165					95% Gamma Approximate UCL (use when n>=50)	26.56					95% Gamma Adjusted UCL (use when n<50)	26.67
166												
167					**Lognormal GOF Test on Detected Observations Only**							
168					Lilliefors Test Statistic	0.147			**Lilliefors GOF Test**			
169					5% Lilliefors Critical Value	0.1			Detected Data Not Lognormal at 5% Significance Level			
170					**Detected Data Not Lognormal at 5% Significance Level**							
171												
172					**Lognormal ROS Statistics Using Imputed Non-Detects**							
173					Mean in Original Scale	20.09					Mean in Log Scale	1.899
174					SD in Original Scale	22.78					SD in Log Scale	1.881
175					95% t UCL (assumes normality of ROS data)	23.93					95% Percentile Bootstrap UCL	23.96
176					95% BCA Bootstrap UCL	24.13					95% Bootstrap t UCL	24.28
177					95% H-UCL (Log ROS)	73.23						
178												
179					**DL/2 Statistics**							
180					**DL/2 Normal**				**DL/2 Log-Transformed**			
181					Mean in Original Scale	19.98					Mean in Log Scale	1.456
182					SD in Original Scale	22.88					SD in Log Scale	2.557
183					95% t UCL (Assumes normality)	23.84					95% H-Stat UCL	332.9
184					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
185												
186					**Nonparametric Distribution Free UCL Statistics**							
187					**Detected Data appear Gamma Distributed at 5% Significance Level**							
188												
189					**Suggested UCL to Use**							
190					95% KM (Chebyshev) UCL	30.12					95% GROS Approximate Gamma UCL	26.56
191					95% Approximate Gamma KM-UCL	24.44						
192												
193					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
194					Recommendations are based upon data size, data distribution, and skewness.							
195					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
196					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
197												

ATTACHMENT H

STATISTICAL COMPARISON OF PEAS TO SITE-SPECIFIC SOIL BACKGROUND CONCENTRATIONS

Attachment H

Statistical Comparison of PEAs to Site-Specific Soil Background

1.0 Introduction

This attachment describes the methodology used to statistically compare the concentration of various inorganic constituents in soil for each of the potential exposure areas (PEAs) to their respective site-specific background concentration. This statistical methodology is based on published USEPA guidance (2002, 2006b, 2013a). The following key issues are addressed in the background characterization methodology.

- Handling of non-detect analytical results;
- Testing for statistical outliers; and
- Comparing PEA sample results to background.

The following sections explain how these issues are addressed.

1.1 Non-Detect Analytical Results

A certain proportion of the measured concentrations of trace elements in background data sets are commonly reported as "not detected." In accordance with USEPA guidance (USEPA 2009), non-detect analytical results (non-detects) were replaced with a value equal to the level of detection (LOD) which was taken as the equivalent to the method detection limit (MDL) for the purpose of calculating the mean, median, and standard deviation sample population statistics. The analytical laboratory routinely assigns "estimated" ("J") qualifiers to results that fall between the LOD and the limit of quantitation (LOQ), so it is possible that concentrations reported as non-detect are between zero and the LOD. The use of the LOQ or one-half of the LOQ as a surrogate value for non-detects (as is sometimes done) would, for this data set, result in some non-detect results being assigned values that are greater than the low J-flagged detections, which is not desirable.

Calculations for data sets containing non-detect results use the Kaplan-Meier Method, as implemented in the ProUCL (USEPA 2013b). This method minimizes the bias introduced by the presence of non-detect results with varying reporting limits.

1.2 Statistical Outliers

According to USEPA guidance, a data point should not be eliminated from the background data set simply because it is the highest value that was observed (USEPA, 2002). Dixon's Test for Outliers (USEPA, 2002; USEPA, 2013b) was used to identify any samples that may not be consistent with the rest of the background data set. Based on the results of this test, surface sample location BS-9-GB-SS appears to be a statistical outlier for barium, cobalt, manganese,

selenium, and thallium. Although outliers may also represent true extreme values of a distribution and indicate more variability in the background population than was expected, the presence of multiple extreme values at a single location is good evidence that the location is not representative of background conditions. In fact the concentrations of manganese and thallium in the soil sample from sampling location BS-9-GB-SS are more than five-fold greater than the next highest concentration. Therefore, the soil sampling results for BS-9-GB-SS from the 0 – 1 foot interval were excluded from subsequent background analysis and comparisons between the individual PEAs and background. The ProUCL outputs for the outlier tests for constituents with no non-detect results and for those with non-detects reported are included as Tables H-1 and H-2, respectively.

1.3 PEA Comparisons to Background

A statistical comparison was performed using the PEA dataset and the site-specific background dataset to determine if the site sample population data for the chemicals of interest from each PEA are significantly different than the background population for that chemical. USEPA's Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites (USEPA, 2002) was followed for performing the distribution comparisons.

There are two general types of statistical site-to-background comparisons. Parametric comparisons, such as the two-sample *t*-test, require the means, standard deviations, and sample sizes of the two distributions that are being compared. Nonparametric comparison tests, such as the Wilcoxon Rank Sum test and the Gehan test, require the actual full data sets rather than just their summary statistics. The Wilcoxon Rank Sum (WRS) test (which is also referred to as the Wilcoxon Mann-Whitney Test or WMW) was used to compare concentrations of each element in the surface versus subsurface samples, as recommended by USEPA guidance (USEPA 1989, 1996, and 2009). The WRS procedure tests the null hypothesis that the two groups of samples are drawn from the same population. It is a nonparametric test that is performed with the actual sets of concentrations rather than summary parameters such as the mean or standard deviation, so it is valid for a wide range of distributional shapes. The use of nonparametric hypothesis tests for background comparisons greatly reduces the sensitivity of test results to the presence of outliers.

The WRS test calculates the W statistic, which is then used to find the two-sided significance expressed as a p-level. The p-level results range from 0.0 to 1.0, and can be thought of as the probability of the null hypothesis being true. If the test yields a p-level less than 0.05, then there is a statistically significant difference between the medians of the groups at a 95-percent confidence level. If the p-level is greater than 0.05, then the null hypothesis is accepted, and the groups are assumed to be drawn from the same population.

The two-sample t Test was used to compare the concentrations for samples collected in a PEA to the appropriate background concentrations for normally or lognormally distributed data sets. The Students t Test utilizes a pooled estimate of the variance of the two data sets. Implicit in this method is the assumption of equality of the two variances. Therefore, if the F-Test for equality of the two variances of the two data sets (PEA and background) indicated that the variances were

not equal, the Welch-Satterwaite's version of the t Test for unequal variance was used (USEPA 2013b). For nonparametric data sets, the WRS test was used. These are the preferred tests for evaluating a shift in the distribution (i.e., the entire distribution of observed measurements from the PEA is shifted to higher values than those in background). This would be the case for a large-scale or area-wide source of contamination. For those data sets that included multiple non-detects at several different LODs, Gehan's test was used instead of the WMW test. The Gehan test is a generalized version of the WRS test. The Gehan test addresses multiple detection limits using a modified ranking procedure rather than relying on the "all ties get the same rank" approach used in the WRS test.

Table H-3 summarizes p-values, the t test, WMW test or Gehan test results for each PEA/metal pair tested. When the p-value is less than the critical value of 0.05, the null hypothesis that the site population is equal to or less than the background was rejected.

1.4 References

USEPA (U.S. Environmental Protection Agency), 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites. EPA 540-R-01-003. OSWER 9285.7-41. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. September 2002.

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——————. 2013a. "ProUCL Version 5.0 User Guide." Office of Research and Development. EPA/600/R-07/041.

——————. 2013b. "ProUCL Version 5.0.00 Technical Guide." Office of Research and Development, EPA/600/R-07/041.

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Uncensored Variables**							
2				**User Selected Options**								
3			Date/Time of Computation	6/6/2016 12:37:06 PM								
4				From File	Table 4-1Z Background ProUCL_a.xls							
5				Full Precision	OFF							
6												
7												
8			**Dixon's Outlier Test for Aluminum**									
9												
10	Number of Observations = 21											
11	10% critical value: 0.391											
12	5% critical value: 0.44											
13	1% critical value: 0.524											
14												
15	**1. Observation Value 21000 is a Potential Outlier (Upper Tail)?**											
16												
17	Test Statistic: 0.339											
18												
19	For 10% significance level, 21000 is not an outlier.											
20	For 5% significance level, 21000 is not an outlier.											
21	For 1% significance level, 21000 is not an outlier.											
22												
23	**2. Observation Value 1890 is a Potential Outlier (Lower Tail)?**											
24												
25	Test Statistic: 0.085											
26												
27	For 10% significance level, 1890 is not an outlier.											
28	For 5% significance level, 1890 is not an outlier.											
29	For 1% significance level, 1890 is not an outlier.											
30												
31												
32			**Dixon's Outlier Test for Arsenic**									
33												
34	Number of Observations = 21											
35	10% critical value: 0.391											
36	5% critical value: 0.44											
37	1% critical value: 0.524											
38												
39	**1. Observation Value 7.39 is a Potential Outlier (Upper Tail)?**											
40												
41	Test Statistic: 0.125											
42												
43	For 10% significance level, 7.39 is not an outlier.											
44	For 5% significance level, 7.39 is not an outlier.											
45	For 1% significance level, 7.39 is not an outlier.											
46												
47	**2. Observation Value 1.14 is a Potential Outlier (Lower Tail)?**											
48												
49	Test Statistic: 0.298											
50												
51	For 10% significance level, 1.14 is not an outlier.											
52	For 5% significance level, 1.14 is not an outlier.											
53	For 1% significance level, 1.14 is not an outlier.											
54												
55												

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
56	**Dixon's Outlier Test for Barium**											
57												
58	Number of Observations = 21											
59	10% critical value: 0.391											
60	5% critical value: 0.44											
61	1% critical value: 0.524											
62												
63	**1. Observation Value 201 is a Potential Outlier (Upper Tail)?**											
64												
65	Test Statistic: 0.740											
66												
67	For 10% significance level, 201 is an outlier.											
68	For 5% significance level, 201 is an outlier.											
69	For 1% significance level, 201 is an outlier.											
70												
71	**2. Observation Value 17.7 is a Potential Outlier (Lower Tail)?**											
72												
73	Test Statistic: 0.064											
74												
75	For 10% significance level, 17.7 is not an outlier.											
76	For 5% significance level, 17.7 is not an outlier.											
77	For 1% significance level, 17.7 is not an outlier.											
78												
79												
80	**Dixon's Outlier Test for Calcium**											
81												
82	Number of Observations = 21											
83	10% critical value: 0.391											
84	5% critical value: 0.44											
85	1% critical value: 0.524											
86												
87	**1. Observation Value 3860 is a Potential Outlier (Upper Tail)?**											
88												
89	Test Statistic: 0.658											
90												
91	For 10% significance level, 3860 is an outlier.											
92	For 5% significance level, 3860 is an outlier.											
93	For 1% significance level, 3860 is an outlier.											
94												
95	**2. Observation Value 23.3 is a Potential Outlier (Lower Tail)?**											
96												
97	Test Statistic: 0.005											
98												
99	For 10% significance level, 23.3 is not an outlier.											
100	For 5% significance level, 23.3 is not an outlier.											
101	For 1% significance level, 23.3 is not an outlier.											
102												
103												

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
104	**Dixon's Outlier Test for Chromium**											
105												
106	Number of Observations = 21											
107	10% critical value: 0.391											
108	5% critical value: 0.44											
109	1% critical value: 0.524											
110												
111	**1. Observation Value 15.7 is a Potential Outlier (Upper Tail)?**											
112												
113	Test Statistic: 0.090											
114												
115	For 10% significance level, 15.7 is not an outlier.											
116	For 5% significance level, 15.7 is not an outlier.											
117	For 1% significance level, 15.7 is not an outlier.											
118												
119	**2. Observation Value 3.58 is a Potential Outlier (Lower Tail)?**											
120												
121	Test Statistic: 0.085											
122												
123	For 10% significance level, 3.58 is not an outlier.											
124	For 5% significance level, 3.58 is not an outlier.											
125	For 1% significance level, 3.58 is not an outlier.											
126												
127												
128	**Dixon's Outlier Test for Cobalt**											
129												
130	Number of Observations = 21											
131	10% critical value: 0.391											
132	5% critical value: 0.44											
133	1% critical value: 0.524											
134												
135	**1. Observation Value 17.4 is a Potential Outlier (Upper Tail)?**											
136												
137	Test Statistic: 0.608											
138												
139	For 10% significance level, 17.4 is an outlier.											
140	For 5% significance level, 17.4 is an outlier.											
141	For 1% significance level, 17.4 is an outlier.											
142												
143	**2. Observation Value 0.372 is a Potential Outlier (Lower Tail)?**											
144												
145	Test Statistic: 0.044											
146												
147	For 10% significance level, 0.372 is not an outlier.											
148	For 5% significance level, 0.372 is not an outlier.											
149	For 1% significance level, 0.372 is not an outlier.											
150												
151												

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
152	**Dixon's Outlier Test for Copper**											
153												
154	Number of Observations = 21											
155	10% critical value: 0.391											
156	5% critical value: 0.44											
157	1% critical value: 0.524											
158												
159	**1. Observation Value 23.6 is a Potential Outlier (Upper Tail)?**											
160												
161	Test Statistic: 0.386											
162												
163	For 10% significance level, 23.6 is not an outlier.											
164	For 5% significance level, 23.6 is not an outlier.											
165	For 1% significance level, 23.6 is not an outlier.											
166												
167	**2. Observation Value 2.6 is a Potential Outlier (Lower Tail)?**											
168												
169	Test Statistic: 0.238											
170												
171	For 10% significance level, 2.6 is not an outlier.											
172	For 5% significance level, 2.6 is not an outlier.											
173	For 1% significance level, 2.6 is not an outlier.											
174												
175												
176	**Dixon's Outlier Test for Iron**											
177												
178	Number of Observations = 21											
179	10% critical value: 0.391											
180	5% critical value: 0.44											
181	1% critical value: 0.524											
182												
183	**1. Observation Value 21700 is a Potential Outlier (Upper Tail)?**											
184												
185	Test Statistic: 0.056											
186												
187	For 10% significance level, 21700 is not an outlier.											
188	For 5% significance level, 21700 is not an outlier.											
189	For 1% significance level, 21700 is not an outlier.											
190												
191	**2. Observation Value 2980 is a Potential Outlier (Lower Tail)?**											
192												
193	Test Statistic: 0.146											
194												
195	For 10% significance level, 2980 is not an outlier.											
196	For 5% significance level, 2980 is not an outlier.											
197	For 1% significance level, 2980 is not an outlier.											
198												
199												

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
200	**Dixon's Outlier Test for Lead**											
201												
202	Number of Observations = 21											
203	10% critical value: 0.391											
204	5% critical value: 0.44											
205	1% critical value: 0.524											
206												
207	**1. Observation Value 165 is a Potential Outlier (Upper Tail)?**											
208												
209	Test Statistic: 0.679											
210												
211	For 10% significance level, 165 is an outlier.											
212	For 5% significance level, 165 is an outlier.											
213	For 1% significance level, 165 is an outlier.											
214												
215	**2. Observation Value 10 is a Potential Outlier (Lower Tail)?**											
216												
217	Test Statistic: 0.030											
218												
219	For 10% significance level, 10 is not an outlier.											
220	For 5% significance level, 10 is not an outlier.											
221	For 1% significance level, 10 is not an outlier.											
222												
223												
224	**Dixon's Outlier Test for Magnesium**											
225												
226	Number of Observations = 21											
227	10% critical value: 0.391											
228	5% critical value: 0.44											
229	1% critical value: 0.524											
230												
231	**1. Observation Value 1580 is a Potential Outlier (Upper Tail)?**											
232												
233	Test Statistic: 0.151											
234												
235	For 10% significance level, 1580 is not an outlier.											
236	For 5% significance level, 1580 is not an outlier.											
237	For 1% significance level, 1580 is not an outlier.											
238												
239	**2. Observation Value 104 is a Potential Outlier (Lower Tail)?**											
240												
241	Test Statistic: 0.067											
242												
243	For 10% significance level, 104 is not an outlier.											
244	For 5% significance level, 104 is not an outlier.											
245	For 1% significance level, 104 is not an outlier.											
246												
247												

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
248	**Dixon's Outlier Test for Manganese**											
249												
250	Number of Observations = 21											
251	10% critical value: 0.391											
252	5% critical value: 0.44											
253	1% critical value: 0.524											
254												
255	**1. Observation Value 15700 is a Potential Outlier (Upper Tail)?**											
256												
257	Test Statistic: 0.976											
258												
259	For 10% significance level, 15700 is an outlier.											
260	For 5% significance level, 15700 is an outlier.											
261	For 1% significance level, 15700 is an outlier.											
262												
263	**2. Observation Value 21.9 is a Potential Outlier (Lower Tail)?**											
264												
265	Test Statistic: 0.072											
266												
267	For 10% significance level, 21.9 is not an outlier.											
268	For 5% significance level, 21.9 is not an outlier.											
269	For 1% significance level, 21.9 is not an outlier.											
270												
271												
272	**Dixon's Outlier Test for Mercury**											
273												
274	Number of Observations = 21											
275	10% critical value: 0.391											
276	5% critical value: 0.44											
277	1% critical value: 0.524											
278												
279	**1. Observation Value 0.235 is a Potential Outlier (Upper Tail)?**											
280												
281	Test Statistic: 0.743											
282												
283	For 10% significance level, 0.235 is an outlier.											
284	For 5% significance level, 0.235 is an outlier.											
285	For 1% significance level, 0.235 is an outlier.											
286												
287	**2. Observation Value 0.0226 is a Potential Outlier (Lower Tail)?**											
288												
289	Test Statistic: 0.160											
290												
291	For 10% significance level, 0.0226 is not an outlier.											
292	For 5% significance level, 0.0226 is not an outlier.											
293	For 1% significance level, 0.0226 is not an outlier.											
294												
295												

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
296	**Dixon's Outlier Test for Nickel**											
297												
298	Number of Observations = 21											
299	10% critical value: 0.391											
300	5% critical value: 0.44											
301	1% critical value: 0.524											
302												
303	**1. Observation Value 14 is a Potential Outlier (Upper Tail)?**											
304												
305	Test Statistic: 0.315											
306												
307	For 10% significance level, 14 is not an outlier.											
308	For 5% significance level, 14 is not an outlier.											
309	For 1% significance level, 14 is not an outlier.											
310												
311	**2. Observation Value 1.4 is a Potential Outlier (Lower Tail)?**											
312												
313	Test Statistic: 0.196											
314												
315	For 10% significance level, 1.4 is not an outlier.											
316	For 5% significance level, 1.4 is not an outlier.											
317	For 1% significance level, 1.4 is not an outlier.											
318												
319												
320	**Dixon's Outlier Test for Potassium**											
321												
322	Number of Observations = 21											
323	10% critical value: 0.391											
324	5% critical value: 0.44											
325	1% critical value: 0.524											
326												
327	**1. Observation Value 1270 is a Potential Outlier (Upper Tail)?**											
328												
329	Test Statistic: 0.302											
330												
331	For 10% significance level, 1270 is not an outlier.											
332	For 5% significance level, 1270 is not an outlier.											
333	For 1% significance level, 1270 is not an outlier.											
334												
335	**2. Observation Value 218 is a Potential Outlier (Lower Tail)?**											
336												
337	Test Statistic: 0.203											
338												
339	For 10% significance level, 218 is not an outlier.											
340	For 5% significance level, 218 is not an outlier.											
341	For 1% significance level, 218 is not an outlier.											
342												
343												

Table H-1. ProUCL Outputs for Constituents with No Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
344	**Dixon's Outlier Test for Vanadium**											
345												
346	Number of Observations = 21											
347	10% critical value: 0.391											
348	5% critical value: 0.44											
349	1% critical value: 0.524											
350												
351	**1. Observation Value 29.1 is a Potential Outlier (Upper Tail)?**											
352												
353	Test Statistic: 0.320											
354												
355	For 10% significance level, 29.1 is not an outlier.											
356	For 5% significance level, 29.1 is not an outlier.											
357	For 1% significance level, 29.1 is not an outlier.											
358												
359	**2. Observation Value 7.32 is a Potential Outlier (Lower Tail)?**											
360												
361	Test Statistic: 0.248											
362												
363	For 10% significance level, 7.32 is not an outlier.											
364	For 5% significance level, 7.32 is not an outlier.											
365	For 1% significance level, 7.32 is not an outlier.											
366												
367												
368	**Dixon's Outlier Test for Zinc**											
369												
370	Number of Observations = 21											
371	10% critical value: 0.391											
372	5% critical value: 0.44											
373	1% critical value: 0.524											
374												
375	**1. Observation Value 56.3 is a Potential Outlier (Upper Tail)?**											
376												
377	Test Statistic: 0.229											
378												
379	For 10% significance level, 56.3 is not an outlier.											
380	For 5% significance level, 56.3 is not an outlier.											
381	For 1% significance level, 56.3 is not an outlier.											
382												
383	**2. Observation Value 9.04 is a Potential Outlier (Lower Tail)?**											
384												
385	Test Statistic: 0.153											
386												
387	For 10% significance level, 9.04 is not an outlier.											
388	For 5% significance level, 9.04 is not an outlier.											
389	For 1% significance level, 9.04 is not an outlier.											
390												

Table H-2. ProUCL Outputs for Constituents with Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables excluding nondetects**							
2				**User Selected Options**								
3			Date/Time of Computation	6/6/2016 12:38:49 PM								
4				From File	Table 4-1Z Background ProUCL_a.xls							
5				Full Precision	OFF							
6												
7												
8			**Dixon's Outlier Test for Antimony**									
9												
10	Total N = 21											
11	Number NDs = 13											
12	Number Detects = 8											
13	10% critical value: 0.479											
14	5% critical value: 0.554											
15	1% critical value: 0.683											
16	Note: NDs excluded from Outlier Test											
17												
18	**1. Data Value 2.26 is a Potential Outlier (Upper Tail)?**											
19												
20	Test Statistic: 0.764											
21												
22	For 10% significance level, 2.26 is an outlier.											
23	For 5% significance level, 2.26 is an outlier.											
24	For 1% significance level, 2.26 is an outlier.											
25												
26	**2. Data Value 0.49 is a Potential Outlier (Lower Tail)?**											
27												
28	Test Statistic: 0.124											
29												
30	For 10% significance level, 0.49 is not an outlier.											
31	For 5% significance level, 0.49 is not an outlier.											
32	For 1% significance level, 0.49 is not an outlier.											
33												
34												
35			**Dixon's Outlier Test for Beryllium**									
36												
37	Total N = 21											
38	Number NDs = 3											
39	Number Detects = 18											
40	10% critical value: 0.424											
41	5% critical value: 0.475											
42	1% critical value: 0.561											
43	Note: NDs excluded from Outlier Test											
44												
45	**1. Data Value 0.908 is a Potential Outlier (Upper Tail)?**											
46												
47	Test Statistic: 0.414											
48												
49	For 10% significance level, 0.908 is not an outlier.											
50	For 5% significance level, 0.908 is not an outlier.											
51	For 1% significance level, 0.908 is not an outlier.											
52												
53	**2. Data Value 0.148 is a Potential Outlier (Lower Tail)?**											
54												
55	Test Statistic: 0.249											
56												
57	For 10% significance level, 0.148 is not an outlier.											

Table H-2. ProUCL Outputs for Constituents with Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
58	For 5% significance level, 0.148 is not an outlier.											
59	For 1% significance level, 0.148 is not an outlier.											
60												

Table H-2. ProUCL Outputs for Constituents with Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
61												
62	**Dixon's Outlier Test for Cadmium**											
63												
64	Total N = 21											
65	Number NDs = 16											
66	Number Detects = 5											
67	10% critical value: 0.557											
68	5% critical value: 0.642											
69	1% critical value: 0.78											
70	Note: NDs excluded from Outlier Test											
71												
72	**1. Data Value 0.441 is a Potential Outlier (Upper Tail)?**											
73												
74	Test Statistic: 0.254											
75												
76	For 10% significance level, 0.441 is not an outlier.											
77	For 5% significance level, 0.441 is not an outlier.											
78	For 1% significance level, 0.441 is not an outlier.											
79												
80	**2. Data Value 0.0986 is a Potential Outlier (Lower Tail)?**											
81												
82	Test Statistic: 0.027											
83												
84	For 10% significance level, 0.0986 is not an outlier.											
85	For 5% significance level, 0.0986 is not an outlier.											
86	For 1% significance level, 0.0986 is not an outlier.											
87												
88												
89	**Dixon's Outlier Test for Selenium**											
90												
91	Total N = 21											
92	Number NDs = 10											
93	Number Detects = 11											
94	10% critical value: 0.517											
95	5% critical value: 0.576											
96	1% critical value: 0.679											
97	Note: NDs excluded from Outlier Test											
98												
99	**1. Data Value 9.32 is a Potential Outlier (Upper Tail)?**											
100												
101	Test Statistic: 0.962											
102												
103	For 10% significance level, 9.32 is an outlier.											
104	For 5% significance level, 9.32 is an outlier.											
105	For 1% significance level, 9.32 is an outlier.											
106												
107	**2. Data Value 0.764 is a Potential Outlier (Lower Tail)?**											
108												
109	Test Statistic: 0.041											
110												
111	For 10% significance level, 0.764 is not an outlier.											
112	For 5% significance level, 0.764 is not an outlier.											
113	For 1% significance level, 0.764 is not an outlier.											
114												
115												

Table H-2. ProUCL Outputs for Constituents with Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
116	**Dixon's Outlier Test for Silver**											
117												
118	Total N = 21											
119	Number NDs = 18											
120	Number Detects = 3											
121	10% critical value: 0.886											
122	5% critical value: 0.941											
123	1% critical value: 0.988											
124	Note: NDs excluded from Outlier Test											
125												
126	**1. Data Value 1.02 is a Potential Outlier (Upper Tail)?**											
127												
128	Test Statistic: 0.606											
129												
130	For 10% significance level, 1.02 is not an outlier.											
131	For 5% significance level, 1.02 is not an outlier.											
132	For 1% significance level, 1.02 is not an outlier.											
133												
134	**2. Data Value 0.512 is a Potential Outlier (Lower Tail)?**											
135												
136	Test Statistic: 0.394											
137												
138	For 10% significance level, 0.512 is not an outlier.											
139	For 5% significance level, 0.512 is not an outlier.											
140	For 1% significance level, 0.512 is not an outlier.											
141												
142												
143	**Dixon's Outlier Test for Sodium**											
144												
145	Total N = 21											
146	Number NDs = 9											
147	Number Detects = 12											
148	10% critical value: 0.49											
149	5% critical value: 0.546											
150	1% critical value: 0.642											
151	Note: NDs excluded from Outlier Test											
152												
153	**1. Data Value 75.4 is a Potential Outlier (Upper Tail)?**											
154												
155	Test Statistic: 0.568											
156												
157	For 10% significance level, 75.4 is an outlier.											
158	For 5% significance level, 75.4 is an outlier.											
159	For 1% significance level, 75.4 is not an outlier.											
160												
161	**2. Data Value 22.3 is a Potential Outlier (Lower Tail)?**											
162												
163	Test Statistic: 0.064											
164												
165	For 10% significance level, 22.3 is not an outlier.											
166	For 5% significance level, 22.3 is not an outlier.											
167	For 1% significance level, 22.3 is not an outlier.											
168												
169												

Table H-2. ProUCL Outputs for Constituents with Non-Detect Results

	A	B	C	D	E	F	G	H	I	J	K	L
170	**Dixon's Outlier Test for Thallium**											
171												
172	Total N = 21											
173	Number NDs = 10											
174	Number Detects = 11											
175	10% critical value: 0.517											
176	5% critical value: 0.576											
177	1% critical value: 0.679											
178	Note: NDs excluded from Outlier Test											
179												
180	**1. Data Value 11 is a Potential Outlier (Upper Tail)?**											
181												
182	Test Statistic: 0.973											
183												
184	For 10% significance level, 11 is an outlier.											
185	For 5% significance level, 11 is an outlier.											
186	For 1% significance level, 11 is an outlier.											
187												
188	**2. Data Value 0.826 is a Potential Outlier (Lower Tail)?**											
189												
190	Test Statistic: 0.363											
191												
192	For 10% significance level, 0.826 is not an outlier.											
193	For 5% significance level, 0.826 is not an outlier.											
194	For 1% significance level, 0.826 is not an outlier.											
195												
196												
197	**No Outlier Test for Cyanide**											

Table H-3. Results of the Statistical Comparisons of the PEA Soil Concentrations to Background

Analyte	Test Used	Shot Blast v Surface Background		Expended Waste v Surface Background		MIP1 v All Soil Background		MIP2 v All Soil Background	
		p-value	Result	p-value	Result	p-value	Result	p-value	Result
Aluminum	WS t Test	0.81	NSS	0.883	NSS	0.831	NSS	0.996	NSS
Antimony	Gehan	0.325	NSS	0.128	NSS	-	ND	-	ND
Arsenic	Student t Test	0	Greater	0.0084	Greater	0.037	Greater	0.027	Greater
Barium	WMW	0.236	NSS	0.0085	Greater	0.366	NSS	0.983	NSS
Beryllium	Gehan	0.0092	Greater	0.00095	Greater	0.0538	NSS	0.007	Greater
Calcium	WMW	0.0008	Greater	0.002	Greater	0.196	NSS	0.594	NSS
Cadmium	Gehan	0.0009	Greater	0.0008	Greater	-	ND	-	ND
Chromium	WS t Test	0.006	Greater	0.005	Greater	0.611	NSS	0.628	NSS
Cobalt	WMW	0.0004	Greater	0.0014	Greater	0.0298	Greater	0.0008	Greater
Copper	WS t Test	0.042	Greater	0.018	Greater	0.281	NSS	0.13	NSS
Iron	Student t Test	0.001	Greater	0.0085	Greater	0.116	NSS	0.001	Greater
Lead	WMW	0.339	NSS	0.0216	Greater	0.97	NSS	0.996	NSS
Magnesium	Student t Test	0	Greater	0.028	Greater	0.206	NSS	0.047	Greater
Manganese	WMW	0.0036	Greater	0.0042	Greater	0.152	NSS	0.003	Greater
Mercury	Gehan	0.999	NSS	-	ND	-	ND	-	ND
Nickel	Student t Test	0.036	Greater	0	Greater	0.0338	Greater	0	Greater
Potassium	Student t Test	0.82	NSS	0.741	NSS	0.962	NSS	0.846	NSS
Selenium	Gehan	0.964	NSS	-	ND	-	ND	-	ND
Silver	Gehan	0.12	NSS	0.0337	Greater	-	ND	-	ND
Sodium	Gehan	0.107	NSS	0.0542	NSS	-	ND	0.0129	Greater
Thallium	WMW	-	ND	-	ND	-	ND	-	ND
Vanadium	Student t Test	0.978	NSS	0.922	NSS	Not calculated	NSS	0.99	NSS
Zinc	WS t Test	0.058	NSS	0.0107	Greater	0.612	NSS	0.448	NSS
Cyanide	WMW	-	NA	-	ND	-	NA	0.256	NSS

Notes:

NSS =	Not statistically significantly different
Greater =	PEA concentration of analyte statistically significant greater than background
NA =	Not analyzed
ND =	Not detected
WMW =	Wilcoxon-Mann-Whitney Test (Nonparametric test handles data with non-detects with one detection limit - assumes two populations have comparable shapes and variability)
Student's t Test =	Student's t Test (Parametric test assumes normality and pooled variance)
WS t Test =	Welch-Satterhwaite's t Test (Parametric test assumes normality and unequal variances)
Gehan =	Gehan Test (Nonparametric test handles data sets with non-detects and multiple detection limits - assumes comparable shapes and variability)

Attachment H
SIP - Groundwater - 1,4-Dioxane

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/3/2017 4:15:24 PM
From File	Scratch_QA_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,4-Dioxane

General Statistics

Total Number of Observations	61	Number of Distinct Observations	25
Number of Detects	26	Number of Non-Detects	35
Number of Distinct Detects	22	Number of Distinct Non-Detects	4
Minimum Detect	0.5	Minimum Non-Detect	0.31
Maximum Detect	74	Maximum Non-Detect	8.4
Variance Detects	375.7	Percent Non-Detects	57.38%
Mean Detects	9.075	SD Detects	19.38
Median Detects	2.15	CV Detects	2.136
Skewness Detects	2.955	Kurtosis Detects	8.02
Mean of Logged Detects	0.998	SD of Logged Detects	1.386

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.468	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.421	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.174	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	4.064	Standard Error of Mean	1.716
SD	13.14	95% KM (BCA) UCL	7.361
95% KM (t) UCL	6.93	95% KM (Percentile Bootstrap) UCL	7.166
95% KM (z) UCL	6.886	95% KM Bootstrap t UCL	12.83
90% KM Chebyshev UCL	9.211	95% KM Chebyshev UCL	11.54
97.5% KM Chebyshev UCL	14.78	99% KM Chebyshev UCL	21.14

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.771	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.806	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.307	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.181	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.522	k star (bias corrected MLE)	0.488
Theta hat (MLE)	17.37	Theta star (bias corrected MLE)	18.61
nu hat (MLE)	27.16	nu star (bias corrected)	25.36
MLE Mean (bias corrected)	9.075	MLE Sd (bias corrected)	12.99

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0956	nu hat (KM)	11.67
Approximate Chi Square Value (11.67, α)	5.009	Adjusted Chi Square Value (11.67, β)	4.903
95% Gamma Approximate KM-UCL (use when n>=50)	9.466	95% Gamma Adjusted KM-UCL (use when n<50)	9.67

Gamma (KM) may not be used when k hat (KM) is < 0.1

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/3/2017 4:15:24 PM
From File	Scratch_QA_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.874
Maximum	74	Median	0.01
SD	13.3	CV	3.434
k hat (MLE)	0.205	k star (bias corrected MLE)	0.206
Theta hat (MLE)	18.87	Theta star (bias corrected MLE)	18.8
nu hat (MLE)	25.04	nu star (bias corrected)	25.14
MLE Mean (bias corrected)	3.874	MLE Sd (bias corrected)	8.533
		Adjusted Level of Significance (β)	0.0461
Approximate Chi Square Value (25.14, α)	14.72	Adjusted Chi Square Value (25.14, β)	14.53
95% Gamma Approximate UCL (use when n>=50)	6.616	95% Gamma Adjusted UCL (use when n<50)	6.705

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.174	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.936	Mean in Log Scale	-1.156
SD in Original Scale	13.28	SD in Log Scale	2.303
95% t UCL (assumes normality of ROS data)	6.778	95% Percentile Bootstrap UCL	6.951
95% BCA Bootstrap UCL	8.344	95% Bootstrap t UCL	11.67
95% H-UCL (Log ROS)	12.2		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.075	Mean in Log Scale	-0.42
SD in Original Scale	13.25	SD in Log Scale	1.612
95% t UCL (Assumes normality)	6.91	95% H-Stat UCL	4.195

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (BCA) UCL	7.361

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment H
MIP1 - All Soil - Trichloroethene

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/3/2017 2:37:39 PM
From File	Scratch_QA_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Trichloroethene

General Statistics

Total Number of Observations	51	Number of Distinct Observations	44
Number of Detects	46	Number of Non-Detects	5
Number of Distinct Detects	43	Number of Distinct Non-Detects	1
Minimum Detect	8.0000E-5	Minimum Non-Detect	0.006
Maximum Detect	1900	Maximum Non-Detect	0.006
Variance Detects	78344	Percent Non-Detects	9.804%
Mean Detects	43.49	SD Detects	279.9
Median Detects	0.0205	CV Detects	6.436
Skewness Detects	6.776	Kurtosis Detects	45.94
Mean of Logged Detects	-3.342	SD of Logged Detects	3.903

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.159	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.945	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.497	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.131	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	39.22	Standard Error of Mean	37.27
SD	263.2	95% KM (BCA) UCL	114.1
95% KM (t) UCL	101.7	95% KM (Percentile Bootstrap) UCL	113.7
95% KM (z) UCL	100.5	95% KM Bootstrap t UCL	2498
90% KM Chebyshev UCL	151	95% KM Chebyshev UCL	201.7
97.5% KM Chebyshev UCL	272	99% KM Chebyshev UCL	410

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	6.539	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.995	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.301	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.149	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.112	k star (bias corrected MLE)	0.12
Theta hat (MLE)	386.8	Theta star (bias corrected MLE)	363.6
nu hat (MLE)	10.34	nu star (bias corrected)	11
MLE Mean (bias corrected)	43.49	MLE Sd (bias corrected)	125.7

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0222	nu hat (KM)	2.265
Approximate Chi Square Value (2.26, α)	0.193	Adjusted Chi Square Value (2.26, β)	0.182
95% Gamma Approximate KM-UCL (use when n>=50)	460.9	95% Gamma Adjusted KM-UCL (use when n<50)	489.2

Gamma (KM) may not be used when k hat (KM) is < 0.1

Attachment H
MIP1 - All Soil - Trichloroethene

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/3/2017 2:37:39 PM
From File	Scratch_QA_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	8.0000E-5	Mean	39.22
Maximum	1900	Median	0.013
SD	265.9	CV	6.778
k hat (MLE)	0.112	k star (bias corrected MLE)	0.119
Theta hat (MLE)	349.8	Theta star (bias corrected MLE)	330.7
nu hat (MLE)	11.44	nu star (bias corrected)	12.1
MLE Mean (bias corrected)	39.22	MLE Sd (bias corrected)	113.9
		Adjusted Level of Significance (β)	0.0453
Approximate Chi Square Value (12.10, α)	5.293	Adjusted Chi Square Value (12.10, β)	5.162
95% Gamma Approximate UCL (use when n>=50)	89.67	95% Gamma Adjusted UCL (use when n<50)	91.95

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.945	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0855	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.131	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	39.22	Mean in Log Scale	-3.721
SD in Original Scale	265.9	SD in Log Scale	3.913
95% t UCL (assumes normality of ROS data)	101.6	95% Percentile Bootstrap UCL	113.7
95% BCA Bootstrap UCL	152.8	95% Bootstrap t UCL	2475
95% H-UCL (Log ROS)	1661		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.722	95% H-UCL (KM -Log)	1302
KM SD (logged)	3.869	95% Critical H Value (KM-Log)	6.229
KM Standard Error of Mean (logged)	0.553		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	39.22	Mean in Log Scale	-3.584
SD in Original Scale	265.9	SD in Log Scale	3.776
95% t UCL (Assumes normality)	101.6	95% H-Stat UCL	896.4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

99% KM (Chebyshev) UCL	410

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment H
Shot Blast v Surface Background of Aluminum

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:50:13 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Aluminum(shotblast)

Sample 2 Data: Aluminum(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	3860	1890
Maximum	8400	11600
Mean	5304	6430
Median	4980	6235
SD	1549	3588
SE of Mean	490	1135

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	-0.911	1.734	0.813
Welch-Satterthwaite (Unequal Varian	12.2	-0.911	1.782	0.810

Pooled SD 2763.659

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	2400849
Variance of Sample 2	12874778

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	5.363	0.020

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Shot Blast vs Surfacebackground of Antimony

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 4:29:42 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Antimony(shotblast)

Sample 2 Data: Antimony(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	10
Number of Non-Detects	8	8
Number of Detect Data	2	2
Minimum Non-Detect	1.3	0.503
Maximum Non-Detect	1.4	1.55
Percent Non-detects	80.00%	80.00%
Minimum Detect	1.3	0.49
Maximum Detect	2.2	2.26
Mean of Detects	1.75	1.375
Median of Detects	1.75	1.375
SD of Detects	0.636	1.252

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.454
Critical z (0.05)	1.645
P-Value	0.325

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment
Shot Blast v Surface Background of Arsenic

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:51:06 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Arsenic(shotblast)

Sample 2 Data: Arsenic(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	8	10
Minimum	4.5	2.8
Maximum	8.2	7.38
Mean	6.06	3.862
Median	5.7	3.4
SD	1.042	1.394
SE of Mean	0.329	0.441

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	3.995	1.734	0.000
Welch-Satterthwaite (Unequal Varian	16.7	3.995	1.740	0.000

Pooled SD 1.230

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	1.085
Variance of Sample 2	1.943

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	1.791	0.398

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
Shot Blast vs Surface Background of Barium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 4:30:46 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium(shotblast)

Sample 2 Data: Barium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	9	10
Minimum	20.5	17.7
Maximum	162	67.8
Mean	56.85	36.31
Median	34.6	34.35
SD	50.54	16.84
SE of Mean	15.98	5.325

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	115
WMW U-Stat	60
Mean (U)	50
SD(U) - Adj ties	13.23
WMW U-Stat Critical Value (0.05)	72
Standardized WMW U-Stat	0.718
Approximate P-Value	0.236

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
Shot Blast vs Surface Background of Beryllium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 4:32:33 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Beryllium(shotblast)

Sample 2 Data: Beryllium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	10
Number of Non-Detects	0	3
Number of Detect Data	10	7
Minimum Non-Detect	N/A	0.124
Maximum Non-Detect	N/A	0.315
Percent Non-detects	0.00%	30.00%
Minimum Detect	0.33	0.148
Maximum Detect	3.4	0.645
Mean of Detects	0.927	0.357
Median of Detects	0.45	0.356
SD of Detects	0.986	0.174

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.358
Critical z (0.05)	1.645
P-Value	0.0092

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Attachment H
Shot Blast vs Surfacebackground of Calcium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 4:35:58 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Calcium(shotblast)

Sample 2 Data: Calcium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	689	51.9
Maximum	14900	2270
Mean	5341	479.7
Median	5220	175
SD	4819	738.4
SE of Mean	1524	233.5

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	147
WMW U-Stat	92
Mean (U)	50
SD(U) - Adj ties	13.23
WMW U-Stat Critical Value (0.05)	72
Standardized WMW U-Stat	3.137
Approximate P-Value	0.00085

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Shot Blast vs Surfacebackground of Cadmium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 4:34:41 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cadmium(shotblast)

Sample 2 Data: Cadmium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	10
Number of Non-Detects	1	6
Number of Detect Data	9	4
Minimum Non-Detect	0.16	0.0422
Maximum Non-Detect	0.16	0.0635
Percent Non-detects	10.00%	60.00%
Minimum Detect	0.26	0.0986
Maximum Detect	3.3	0.441
Mean of Detects	0.872	0.25
Median of Detects	0.62	0.231
SD of Detects	0.927	0.174

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.108
Critical z (0.05)	1.645
P-Value	0.0009

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Attachment H
Shot Blast vs Surfacebackground of Chromium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:52:24 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Chromium(shotblast)

Sample 2 Data: Chromium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	8	3.58
Maximum	84.2	13.2
Mean	36.32	8.577
Median	36.7	9.585
SD	27.68	3.775
SE of Mean	8.753	1.194

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	3.141	1.734	0.003
Welch-Satterthwaite (Unequal Varian	9.3	3.141	1.833	0.006

Pooled SD 19.752

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	766.1
Variance of Sample 2	14.25

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	53.753	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Shot Blast vs Surfacebackground of Cobalt

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 4:56:33 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt(shotblast)

Sample 2 Data: Cobalt(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	4.7	0.372
Maximum	42.6	7.52
Mean	13.11	2.612
Median	8.05	1.685
SD	12.24	2.282
SE of Mean	3.87	0.722

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	150
WMW U-Stat	95
Mean (U)	50
SD(U) - Adj ties	13.23
WMW U-Stat Critical Value (0.05)	72
Standardized WMW U-Stat	3.364
Approximate P-Value	0.0004

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Shot Blast vs Surfacebackground of Copper

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:53:53 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Copper(shotblast)

Sample 2 Data: Copper(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	9.6	2.86
Maximum	469	21.3
Mean	102.7	10.08
Median	43.95	7.905
SD	150.8	5.672
SE of Mean	47.69	1.794

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	1.941	1.734	0.034
Welch-Satterthwaite (Unequal Varian	9.0	1.941	1.833	0.042

Pooled SD 106.718

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	22745
Variance of Sample 2	32.17

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	707.091	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Shot Blast vs Surfacebackground of Iron

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:54:37 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Iron(shotblast)

Sample 2 Data: Iron(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	12000	2980
Maximum	33400	20800
Mean	20160	10311
Median	18650	9525
SD	6182	5971
SE of Mean	1955	1888

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	3.624	1.734	0.001
Welch-Satterthwaite (Unequal Varian	18.0	3.624	1.734	0.001

Pooled SD 6076.969

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	38211556
Variance of Sample 2	35647543

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	1.072	0.919

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
Shot Blast vs Surfacebackground of Lead

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 4:59:36 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead(shotblast)

Sample 2 Data: Lead(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	9.6	15.5
Maximum	419	165
Mean	103.9	44.79
Median	30.85	25.1
SD	132	45.81
SE of Mean	41.74	14.49

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	111
WMW U-Stat	56
Mean (U)	50
SD(U) - Adj ties	13.23
WMW U-Stat Critical Value (0.05)	72
Standardized WMW U-Stat	0.416
Approximate P-Value	0.339

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
Shot Blast vs Surfacebackground of Magnesium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 5:01:41 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Magnesium(shotblast)

Sample 2 Data: Magnesium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	836	104
Maximum	2280	1370
Mean	1556	597.1
Median	1700	388.5
SD	511.3	486.4
SE of Mean	161.7	153.8

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	145.5
WMW U-Stat	90.5
Mean (U)	50
SD(U) - Adj ties	13.23
WMW U-Stat Critical Value (0.05)	72
Standardized WMW U-Stat	3.025
Approximate P-Value	0.00124

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Shot Blast vs Surfacebackground of Mangasese

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 5:02:37 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Manganese(shotblast)

Sample 2 Data: Manganese(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	294	21.9
Maximum	695	420
Mean	408.5	156.9
Median	358	110
SD	135.7	143.1
SE of Mean	42.92	45.26

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	141
WMW U-Stat	86
Mean (U)	50
SD(U) - Adj ties	13.23
WMW U-Stat Critical Value (0.05)	72
Standardized WMW U-Stat	2.684
Approximate P-Value	0.00364

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Shot Blast vs Surfacebackground of Mercury

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 5:03:34 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury(shotblast)

Sample 2 Data: Mercury(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	10
Number of Non-Detects	9	0
Number of Detect Data	1	10
Minimum Non-Detect	0.023	N/A
Maximum Non-Detect	0.025	N/A
Percent Non-detects	90.00%	0.00%
Minimum Detect	0.14	0.0347
Maximum Detect	0.14	0.235
Mean of Detects	0.14	0.076
Median of Detects	0.14	0.061
SD of Detects	N/A	0.0577

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-3.249
Critical z (0.05)	1.645
P-Value	0.999

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Shot Blast vs Surfacebackground of Nickel

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:56:12 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Nickel(shotblast)

Sample 2 Data: Nickel(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	9.5	1.4
Maximum	301	14
Mean	69.75	5.951
Median	30.45	5.03
SD	98.99	3.959
SE of Mean	31.3	1.252

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	2.036	1.734	0.028
Welch-Satterthwaite (Unequal Varian	9.0	2.036	1.833	0.036

Pooled SD 70.055

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	9800
Variance of Sample 2	15.67

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	625.288	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Shot Blast vs Surfacebackground of Potassium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:56:57 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Potassium(shotblast)

Sample 2 Data: Potassium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	308	218
Maximum	889	856
Mean	469	560.5
Median	384	551.5
SD	197.8	235.4
SE of Mean	62.54	74.44

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	-0.941	1.734	0.820
Welch-Satterthwaite (Unequal Varian	17.5	-0.941	1.740	0.820

Pooled SD 217.402

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	39108
Variance of Sample 2	55419

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	1.417	0.612

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
Shot Blast vs Surfacebackground of Selenium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 5:07:03 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Selenium(shotblast)

Sample 2 Data: Selenium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	10
Number of Non-Detects	9	3
Number of Detect Data	1	7
Minimum Non-Detect	0.51	1.35
Maximum Non-Detect	1.5	1.45
Percent Non-detects	90.00%	30.00%
Minimum Detect	1.5	0.838
Maximum Detect	1.5	2.58
Mean of Detects	1.5	1.237
Median of Detects	1.5	1.1
SD of Detects	N/A	0.606

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.804
Critical z (0.05)	1.645
P-Value	0.964

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Shot Blast v Surface Background of Silver

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 5:08:05 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Silver(shotblast)

Sample 2 Data: Silver(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	10
Number of Non-Detects	6	9
Number of Detect Data	4	1
Minimum Non-Detect	0.2	0.155
Maximum Non-Detect	0.22	0.515
Percent Non-detects	60.00%	90.00%
Minimum Detect	0.22	0.512
Maximum Detect	0.71	0.512
Mean of Detects	0.455	0.512
Median of Detects	0.445	0.512
SD of Detects	0.2	N/A

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.176
Critical z (0.05)	1.645
P-Value	0.12

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Shot Blast vs Surfacebackground of Sodium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 5:10:15 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Sodium(shotblast)

Sample 2 Data: Sodium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	10	10
Number of Non-Detects	8	5
Number of Detect Data	2	5
Minimum Non-Detect	161	26.9
Maximum Non-Detect	177	31
Percent Non-detects	80.00%	50.00%
Minimum Detect	265	24
Maximum Detect	353	75.4
Mean of Detects	309	43.42
Median of Detects	309	40.5
SD of Detects	62.23	19.23

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.244
Critical z (0.05)	1.645
P-Value	0.107

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Shot Blast vs Surfacebackground of Vanadium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:57:43 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Vanadium(shotblast)

Sample 2 Data: Vanadium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	6	7.32
Maximum	16.1	20.7
Mean	9.77	13.54
Median	9	13.05
SD	3.282	4.403
SE of Mean	1.038	1.392

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	-2.172	1.734	0.978
Welch-Satterthwaite (Unequal Varian	16.6	-2.172	1.740	0.978

Pooled SD 3.883

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	10.77
Variance of Sample 2	19.39

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	1.800	0.394

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
Shot Blast vs Surfacebackground of Zinc

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:58:25 PM
From File	ShotBlast v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Zinc(shotblast)

Sample 2 Data: Zinc(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	10	10
Number of Distinct Observations	10	10
Minimum	29	9.04
Maximum	2210	56.3
Mean	415.9	25.38
Median	93.75	21.95
SD	712	14.7
SE of Mean	225.2	4.65

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	18	1.734	1.734	0.050
Welch-Satterthwaite (Unequal Varian	9.0	1.734	1.833	0.058

Pooled SD 503.598

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	507005
Variance of Sample 2	216.2

Numerator DF	Denominator DF	F-Test Value	P-Value
9	9	2344.681	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Expended Waste vs Surface Background of Aluminum

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:22:21 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Aluminum(exwaste)

Sample 2 Data: Aluminum(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	3210	1890
Maximum	6260	11600
Mean	4876	6430
Median	4910	6235
SD	1119	3588
SE of Mean	500.6	1135

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	-0.930	1.771	0.815
Welch-Satterthwaite (Unequal Variance	11.8	-1.253	1.782	0.883

Pooled SD 3049.397

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	1252930
Variance of Sample 2	12874778

Numerator DF	Denominator DF	F-Test Value	P-Value
9	4	10.276	0.039

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Expended Waste vs Surface Background of Antimony

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 6:34:53 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Antimony(exwaste)

Sample 2 Data: Antimony(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	3	8
Number of Detect Data	2	2
Minimum Non-Detect	1.3	0.503
Maximum Non-Detect	1.4	1.55
Percent Non-detects	60.00%	80.00%
Minimum Detect	1.9	0.49
Maximum Detect	2.2	2.26
Mean of Detects	2.05	1.375
Median of Detects	2.05	1.375
SD of Detects	0.212	1.252

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.138
Critical z (0.05)	1.645
P-Value	0.128

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Arsenic

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 6:36:33 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Arsenic(exwaste)

Sample 2 Data: Arsenic(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	4	10
Minimum	4.4	2.8
Maximum	8.6	7.38
Mean	6.58	3.862
Median	5.7	3.4
SD	1.914	1.394
SE of Mean	0.856	0.441

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	60
WMW U-Stat	45
Mean (U)	25
SD(U) - Adj ties	8.165
WMW U-Stat Critical Value (0.05)	38
Standardized WMW U-Stat	2.39
Approximate P-Value	0.00842

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Expended Waste vs Surface Background of Barium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 6:37:43 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium(exwaste)

Sample 2 Data: Barium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	48.8	17.7
Maximum	125	67.8
Mean	76.78	36.31
Median	59.8	34.35
SD	32.97	16.84
SE of Mean	14.74	5.325

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	60
WMW U-Stat	45
Mean (U)	25
SD(U) - Adj ties	8.165
WMW U-Stat Critical Value (0.05)	38
Standardized WMW U-Stat	2.388
Approximate P-Value	0.00846

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Expended Waste vs Surface Background of Beryllium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 6:38:40 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Beryllium(exwaste)

Sample 2 Data: Beryllium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	0	3
Number of Detect Data	5	7
Minimum Non-Detect	N/A	0.124
Maximum Non-Detect	N/A	0.315
Percent Non-detects	0.00%	30.00%
Minimum Detect	0.98	0.148
Maximum Detect	4.1	0.645
Mean of Detects	2.156	0.357
Median of Detects	1.6	0.356
SD of Detects	1.286	0.174

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.107
Critical z (0.05)	1.645
P-Value	9.4638E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Calcium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 6:40:04 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Calcium(exwaste)

Sample 2 Data: Calcium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	1780	51.9
Maximum	12200	2270
Mean	6508	479.7
Median	5290	175
SD	4725	738.4
SE of Mean	2113	233.5

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	64
WMW U-Stat	49
Mean (U)	25
SD(U) - Adj ties	8.165
WMW U-Stat Critical Value (0.05)	38
Standardized WMW U-Stat	2.878
Approximate P-Value	0.002

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Expended Waste vs Surface Background of Cadmium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 6:41:26 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cadmium(exwaste)

Sample 2 Data: Cadmium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	0	6
Number of Detect Data	5	4
Minimum Non-Detect	N/A	0.0422
Maximum Non-Detect	N/A	0.0635
Percent Non-detects	0.00%	60.00%
Minimum Detect	1	0.0986
Maximum Detect	4.4	0.441
Mean of Detects	2.52	0.25
Median of Detects	2.3	0.231
SD of Detects	1.545	0.174

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	3.162
Critical z (0.05)	1.645
P-Value	7.8270E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Chromium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:25:43 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Chromium(exwaste)

Sample 2 Data: Chromium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	22.5	3.58
Maximum	64.3	13.2
Mean	47.68	8.577
Median	56.8	9.585
SD	18.96	3.775
SE of Mean	8.478	1.194

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	6.505	1.771	0.000
Welch-Satterthwaite (Unequal Varian	4.2	4.567	2.132	0.005

Pooled SD 10.975

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	359.4
Variance of Sample 2	14.25

Numerator DF	Denominator DF	F-Test Value	P-Value
4	9	25.218	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Expended Waste vs Surface Background of Cobalt

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 6:46:02 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt(exwaste)

Sample 2 Data: Cobalt(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	13.8	0.372
Maximum	37.3	7.52
Mean	23.78	2.612
Median	20.5	1.685
SD	10.73	2.282
SE of Mean	4.799	0.722

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	65
WMW U-Stat	50
Mean (U)	25
SD(U) - Adj ties	8.165
WMW U-Stat Critical Value (0.05)	38
Standardized WMW U-Stat	3.001
Approximate P-Value	0.00135

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Expended Waste vs Surface Background of Copper

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:27:22 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Copper(exwaste)

Sample 2 Data: Copper(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	47.8	2.86
Maximum	358	21.3
Mean	197.6	10.08
Median	135	7.905
SD	136	5.672
SE of Mean	60.84	1.794

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	4.527	1.771	0.000
Welch-Satterthwaite (Unequal Varian	4.0	3.080	2.132	0.018

Pooled SD 75.612

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	18508
Variance of Sample 2	32.17

Numerator DF	Denominator DF	F-Test Value	P-Value
4	9	575.377	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Expended Waste vs Surface Background of Iron

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 6:48:47 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Iron(exwaste)

Sample 2 Data: Iron(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	13300	2980
Maximum	28100	20800
Mean	22540	10311
Median	25400	9525
SD	5915	5971
SE of Mean	2645	1888

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	60
WMW U-Stat	45
Mean (U)	25
SD(U) - Adj ties	8.165
WMW U-Stat Critical Value (0.05)	38
Standardized WMW U-Stat	2.388
Approximate P-Value	0.00846

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Expended Waste vs Surface Background of Lead

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 6:49:56 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead(exwaste)

Sample 2 Data: Lead(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	20.6	15.5
Maximum	241	165
Mean	129.5	44.79
Median	92.4	25.1
SD	90.29	45.81
SE of Mean	40.38	14.49

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	57
WMW U-Stat	42
Mean (U)	25
SD(U) - Adj ties	8.165
WMW U-Stat Critical Value (0.05)	38
Standardized WMW U-Stat	2.021
Approximate P-Value	0.0216

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Expended Waste vs Surface Background of Magnesium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:28:41 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Magnesium(exwaste)

Sample 2 Data: Magnesium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	718	104
Maximum	1760	1370
Mean	1149	597.1
Median	976	388.5
SD	466.2	486.4
SE of Mean	208.5	153.8

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	2.098	1.771	0.028
Welch-Satterthwaite (Unequal Varian	8.4	2.130	1.860	0.032

Pooled SD 480.257

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	217384
Variance of Sample 2	236541

Numerator DF	Denominator DF	F-Test Value	P-Value
9	4	1.088	1.013

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
Expended Waste vs Surface Background of Manganese

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 6:57:38 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Manganese(exwaste)

Sample 2 Data: Manganese(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	300	21.9
Maximum	1100	420
Mean	557.4	156.9
Median	482	110
SD	316	143.1
SE of Mean	141.3	45.26

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	62
WMW U-Stat	47
Mean (U)	25
SD(U) - Adj ties	8.165
WMW U-Stat Critical Value (0.05)	38
Standardized WMW U-Stat	2.633
Approximate P-Value	0.00423

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
Expended Waste vs Surface Background of Mercury

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 6:58:44 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury(exwaste)

Sample 2 Data: Mercury(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	5	0
Number of Detect Data	0	10
Minimum Non-Detect	0.022	N/A
Maximum Non-Detect	0.026	N/A
Percent Non-detects	100.00%	0.00%
Minimum Detect	N/A	0.0347
Maximum Detect	N/A	0.235
Mean of Detects	N/A	0.076
Median of Detects	N/A	0.061
SD of Detects	N/A	0.0577

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-3.118
Critical z (0.05)	1.645
P-Value	0.999

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Nickel

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:36:28 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Nickel(exwaste)

Sample 2 Data: Nickel(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	26.5	1.4
Maximum	219	14
Mean	115.8	5.951
Median	85.2	5.03
SD	78.55	3.959
SE of Mean	35.13	1.252

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	4.589	1.771	0.000
Welch-Satterthwaite (Unequal Varian	4.0	3.125	2.132	0.018

Pooled SD 43.695

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	6170
Variance of Sample 2	15.67

Numerator DF	Denominator DF	F-Test Value	P-Value
4	9	393.673	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
Expended Waste vs Surface Background of Potassium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:41:19 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Potassium(exwaste)

Sample 2 Data: Potassium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	375	218
Maximum	579	856
Mean	487.4	560.5
Median	470	551.5
SD	79.59	235.4
SE of Mean	35.59	74.44

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	-0.665	1.771	0.741
Welch-Satterthwaite (Unequal Varian	12.2	-0.886	1.782	0.804

Pooled SD 200.789

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	6334
Variance of Sample 2	55419

Numerator DF	Denominator DF	F-Test Value	P-Value
9	4	8.749	0.052

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
Expended Waste vs Surface Background of Selenium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 7:01:30 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Selenium(exwaste)

Sample 2 Data: Selenium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	5	3
Number of Detect Data	0	7
Minimum Non-Detect	1.3	1.35
Maximum Non-Detect	1.6	1.45
Percent Non-detects	100.00%	30.00%
Minimum Detect	N/A	0.838
Maximum Detect	N/A	2.58
Mean of Detects	N/A	1.237
Median of Detects	N/A	1.1
SD of Detects	N/A	0.606

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.612
Critical z (0.05)	1.645
P-Value	0.73

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Silver

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 7:02:15 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Silver(exwaste)

Sample 2 Data: Silver(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	2	9
Number of Detect Data	3	1
Minimum Non-Detect	0.21	0.155
Maximum Non-Detect	0.24	0.515
Percent Non-detects	40.00%	90.00%
Minimum Detect	0.35	0.512
Maximum Detect	0.56	0.512
Mean of Detects	0.45	0.512
Median of Detects	0.44	0.512
SD of Detects	0.105	N/A

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.829
Critical z (0.05)	1.645
P-Value	0.0337

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Sodium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 7:03:30 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Sodium(exwaste)

Sample 2 Data: Sodium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	3	5
Number of Detect Data	2	5
Minimum Non-Detect	165	26.9
Maximum Non-Detect	187	31
Percent Non-detects	60.00%	50.00%
Minimum Detect	197	24
Maximum Detect	228	75.4
Mean of Detects	212.5	43.42
Median of Detects	212.5	40.5
SD of Detects	21.92	19.23

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.605
Critical z (0.05)	1.645
P-Value	0.0542

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Thallium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 7:04:30 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Thallium(exwaste)

Sample 2 Data: Thallium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	10
Number of Non-Detects	5	8
Number of Detect Data	0	2
Minimum Non-Detect	1.1	0.698
Maximum Non-Detect	1.3	2.15
Percent Non-detects	100.00%	80.00%
Minimum Detect	N/A	0.952
Maximum Detect	N/A	1.22
Mean of Detects	N/A	1.086
Median of Detects	N/A	1.086
SD of Detects	N/A	0.19

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.483
Critical z (0.05)	1.645
P-Value	0.685

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
Expended Waste vs Surface Background of Vanadium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:42:31 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Vanadium(exwaste)

Sample 2 Data: Vanadium(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	4	10
Minimum	8.3	7.32
Maximum	14.3	20.7
Mean	10.34	13.54
Median	9.8	13.05
SD	2.298	4.403
SE of Mean	1.028	1.392

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	-1.507	1.771	0.922
Welch-Satterthwaite (Unequal Varian	12.9	-1.850	1.771	0.956

Pooled SD 3.879

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	5.283
Variance of Sample 2	19.39

Numerator DF	Denominator DF	F-Test Value	P-Value
9	4	3.670	0.223

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
Expended Waste vs Surface Background of Zinc

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 3:43:20 PM
From File	ExWaste v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Zinc(exwaste)

Sample 2 Data: Zinc(surface)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	10
Number of Distinct Observations	5	10
Minimum	170	9.04
Maximum	2260	56.3
Mean	1175	25.38
Median	907	21.95
SD	805.8	14.7
SE of Mean	360.4	4.65

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	13	4.696	1.771	0.000
Welch-Satterthwaite (Unequal Varian	4.0	3.191	2.132	0.017

Pooled SD 447.134

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	649281
Variance of Sample 2	216.2

Numerator DF	Denominator DF	F-Test Value	P-Value
4	9	3002.644	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP1 vs Soil Background of Aluminum

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:18:45 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Aluminum(mip1)

Sample 2 Data: Aluminum(al soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	6060	1890
Maximum	6350	21000
Mean	6205	9934
Median	6205	10005
SD	205.1	5248
SE of Mean	145	1173

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	20	-0.983	1.725	0.831
Welch-Satterthwaite (Unequal Varian	19.5	-3.153	1.729	0.997

Pooled SD 5115.229

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	42050
Variance of Sample 2	27540487

Numerator DF	Denominator DF	F-Test Value	P-Value
19	1	654.946	0.062

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP1 vs Soil Background of Arsenic

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:20:02 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Arsenic(mip1)

Sample 2 Data: Arsenic(al soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	5.7	1.14
Maximum	7.1	7.39
Mean	6.4	4.213
Median	6.4	3.835
SD	0.99	1.589
SE of Mean	0.7	0.355

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	20	1.886	1.725	0.037
Welch-Satterthwaite (Unequal Varian	1.6	2.787	2.920	0.070

Pooled SD 1.564

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	0.98
Variance of Sample 2	2.524

Numerator DF	Denominator DF	F-Test Value	P-Value
19	1	2.575	0.919

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP1 vs Soil Background of Barium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:17:04 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium(mip1)

Sample 2 Data: Barium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	36.4	17.7
Maximum	37	79
Mean	36.7	38.38
Median	36.7	34.6
SD	0.424	15.9
SE of Mean	0.3	3.556

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	26.5
WMW U-Stat	23.5
Mean (U)	20
SD(U) - Adj ties	8.756
WMW U-Stat Critical Value (0.05)	35
Standardized WMW U-Stat	0.343
Approximate P-Value	0.366

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP1 vs Soil Background of Beryllium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 7:19:06 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Beryllium(mip1)

Sample 2 Data: Beryllium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	2	20
Number of Non-Detects	0	3
Number of Detect Data	2	17
Minimum Non-Detect	N/A	0.124
Maximum Non-Detect	N/A	0.315
Percent Non-detects	0.00%	15.00%
Minimum Detect	0.49	0.148
Maximum Detect	0.57	0.908
Mean of Detects	0.53	0.408
Median of Detects	0.53	0.392
SD of Detects	0.0566	0.174

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.609
Critical z (0.05)	1.645
P-Value	0.0538

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Attachment H
MIP1 vs Soil Background of Calcium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:20:00 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Calcium(mip1)

Sample 2 Data: Calcium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	328	23.3
Maximum	532	3860
Mean	430	549.1
Median	430	124.5
SD	144.2	967.5
SE of Mean	102	216.3

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	31
WMW U-Stat	28
Mean (U)	20
SD(U) - Adj ties	8.756
WMW U-Stat Critical Value (0.05)	35
Standardized WMW U-Stat	0.857
Approximate P-Value	0.196

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP1 vs Soil Background of Chromium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:20:56 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Chromium(mip1)

Sample 2 Data: Chromium(al soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	19
Minimum	9.9	3.58
Maximum	10.2	15.7
Mean	10.05	10.81
Median	10.05	11.5
SD	0.212	3.699
SE of Mean	0.15	0.827

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	20	-0.286	1.725	0.611
Welch-Satterthwaite (Unequal Varian	19.9	-0.908	1.725	0.813

Pooled SD 3.605

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	0.045
Variance of Sample 2	13.68

Numerator DF	Denominator DF	F-Test Value	P-Value
19	1	303.987	0.090

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP1 vs Soil Background of Cobalt

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:21:58 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt(mip1)

Sample 2 Data: Cobalt(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	6.7	0.372
Maximum	8.5	7.52
Mean	7.6	3.493
Median	7.6	3.33
SD	1.273	2.195
SE of Mean	0.9	0.491

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	40
WMW U-Stat	37
Mean (U)	20
SD(U) - Adj ties	8.756
WMW U-Stat Critical Value (0.05)	35
Standardized WMW U-Stat	1.884
Approximate P-Value	0.0298

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
MIP1 vs Soil Background of Copper

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:21:47 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Copper(mip1)

Sample 2 Data: Copper(al soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	11.5	2.6
Maximum	12.7	21.3
Mean	12.1	10.03
Median	12.1	8.965
SD	0.849	4.868
SE of Mean	0.6	1.088

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	20	0.589	1.725	0.281
Welch-Satterthwaite (Unequal Varian	11.7	1.668	1.782	0.061

Pooled SD 4.748

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	0.72
Variance of Sample 2	23.69

Numerator DF	Denominator DF	F-Test Value	P-Value
19	1	32.907	0.273

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP1 vs Soil Background of Iron

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:22:47 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Iron(mip1)

Sample 2 Data: Iron(al soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	19
Minimum	18400	2980
Maximum	20500	21700
Mean	19450	13760
Median	19450	15250
SD	1485	6370
SE of Mean	1050	1424

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	20	1.234	1.725	0.116
Welch-Satterthwaite (Unequal Varian	6.8	3.215	1.895	0.008

Pooled SD 6217.661

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	2205000
Variance of Sample 2	40577958

Numerator DF	Denominator DF	F-Test Value	P-Value
19	1	18.403	0.364

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP1 vs Soil Background of Lead

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:24:15 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead(mip1)

Sample 2 Data: Lead(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	19
Minimum	10.1	10
Maximum	11.9	165
Mean	11	30.16
Median	11	19.75
SD	1.273	35.09
SE of Mean	0.9	7.845

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	7
WMW U-Stat	4
Mean (U)	20
SD(U) - Adj ties	8.756
WMW U-Stat Critical Value (0.05)	35
Standardized WMW U-Stat	-1.885
Approximate P-Value	0.97

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP1 vs Soil Background of Magnesium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:23:47 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Magnesium(mip1)

Sample 2 Data: Magnesium(al soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	1070	104
Maximum	1140	1580
Mean	1105	817.5
Median	1105	839
SD	49.5	474.6
SE of Mean	35	106.1

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	20	0.838	1.725	0.206
Welch-Satterthwaite (Unequal Varian	19.1	2.573	1.729	0.009

Pooled SD 462.736

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	2450
Variance of Sample 2	225265

Numerator DF	Denominator DF	F-Test Value	P-Value
19	1	91.945	0.164

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP1 vs Soil Background of Manganese

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:25:44 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Manganese(mip1)

Sample 2 Data: Manganese(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	207	21.9
Maximum	420	538
Mean	313.5	188.9
Median	313.5	123
SD	150.6	154.8
SE of Mean	106.5	34.61

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	32.5
WMW U-Stat	29.5
Mean (U)	20
SD(U) - Adj ties	8.756
WMW U-Stat Critical Value (0.05)	35
Standardized WMW U-Stat	1.028
Approximate P-Value	0.152

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP1 vs Soil Background of Nickel

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:26:28 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Nickel(mip1)

Sample 2 Data: Nickel(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	10.3	1.4
Maximum	10.6	14
Mean	10.45	6.92
Median	10.45	7.21
SD	0.212	3.124
SE of Mean	0.15	0.699

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	39.5
WMW U-Stat	36.5
Mean (U)	20
SD(U) - Adj ties	8.756
WMW U-Stat Critical Value (0.05)	35
Standardized WMW U-Stat	1.828
Approximate P-Value	0.0338

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
MIP1 vs Soil Background of Potassium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:25:22 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Potassium(mip1)

Sample 2 Data: Potassium(al soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	573	218
Maximum	581	1050
Mean	577	678.3
Median	577	720
SD	5.657	241.4
SE of Mean	4	53.99

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	20	-0.580	1.725	0.716
Welch-Satterthwaite (Unequal Varian	19.2	-1.870	1.729	0.962

Pooled SD 235.332

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	32
Variance of Sample 2	58294

Numerator DF	Denominator DF	F-Test Value	P-Value
19	1	1821.690	0.037

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP1 vs Soil Background of Zinc

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:29:11 PM
From File	MIP1 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Zinc(mip1)

Sample 2 Data: Zinc(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	2	20
Number of Distinct Observations	2	20
Minimum	25.8	9.04
Maximum	28.1	56.3
Mean	26.95	28.38
Median	26.95	27.05
SD	1.626	12.31
SE of Mean	1.15	2.752

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	21
WMW U-Stat	18
Mean (U)	20
SD(U) - Adj ties	8.756
WMW U-Stat Critical Value (0.05)	35
Standardized WMW U-Stat	-0.286
Approximate P-Value	0.612

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP2 vs Soil Background of Aluminum

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:30:25 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Aluminum(mip2)

Sample 2 Data: Aluminum(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	5850	1890
Maximum	6840	21000
Mean	6400	9934
Median	6400	10005
SD	370.9	5248
SE of Mean	165.9	1173

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	-1.481	1.714	0.924
Welch-Satterthwaite (Unequal Varian	19.7	-2.982	1.725	0.996

Pooled SD 4772.291

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	137550
Variance of Sample 2	27540487

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	200.222	0.000

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP2 vs Soil Background of Arsenic

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:35:23 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Arsenic(mip2)

Sample 2 Data: Arsenic(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	4	20
Minimum	5.3	1.14
Maximum	6.7	7.39
Mean	5.7	4.213
Median	5.5	3.835
SD	0.583	1.589
SE of Mean	0.261	0.355

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	2.032	1.714	0.027
Welch-Satterthwaite (Unequal Varian	18.9	3.376	1.729	0.002

Pooled SD 1.464

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	0.34
Variance of Sample 2	2.524

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	7.423	0.065

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP2 vs Soil Background of Barium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:36:13 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium(mip2)

Sample 2 Data: Barium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	38.1	17.7
Maximum	47.9	79
Mean	42.14	38.38
Median	40.8	34.6
SD	3.921	15.9
SE of Mean	1.753	3.556

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	84.5
WMW U-Stat	69.5
Mean (U)	50
SD(U) - Adj ties	14.72
WMW U-Stat Critical Value (0.05)	74
Standardized WMW U-Stat	1.291
Approximate P-Value	0.0983

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP2 vs Soil Background of Beryllium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 7:37:28 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Beryllium(mip2)

Sample 2 Data: Beryllium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	20
Number of Non-Detects	0	3
Number of Detect Data	5	17
Minimum Non-Detect	N/A	0.124
Maximum Non-Detect	N/A	0.315
Percent Non-detects	0.00%	15.00%
Minimum Detect	0.46	0.148
Maximum Detect	0.59	0.908
Mean of Detects	0.52	0.408
Median of Detects	0.52	0.392
SD of Detects	0.0524	0.174

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.456
Critical z (0.05)	1.645
P-Value	0.00702

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Attachment H
MIP2 vs Soil Background of Calcium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:38:37 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Calcium(mip2)

Sample 2 Data: Calcium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	27.9	23.3
Maximum	347	3860
Mean	179.4	549.1
Median	122	124.5
SD	140.8	967.5
SE of Mean	62.98	216.3

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	62
WMW U-Stat	47
Mean (U)	50
SD(U) - Adj ties	14.72
WMW U-Stat Critical Value (0.05)	74
Standardized WMW U-Stat	-0.238
Approximate P-Value	0.594

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP2 vs Soil Background of Chromium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:32:55 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Chromium(mip2)

Sample 2 Data: Chromium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	19
Minimum	9.2	3.58
Maximum	11.9	15.7
Mean	10.5	10.81
Median	10.3	11.5
SD	1.037	3.699
SE of Mean	0.464	0.827

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	-0.185	1.714	0.573
Welch-Satterthwaite (Unequal Varian	22.3	-0.331	1.717	0.628

Pooled SD 3.389

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	1.075
Variance of Sample 2	13.68

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	12.725	0.024

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP2 vs Soil Background of Cobalt

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:40:17 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt(mip2)

Sample 2 Data: Cobalt(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	4	20
Minimum	6.6	0.372
Maximum	11.9	7.52
Mean	9	3.493
Median	8.9	3.33
SD	1.889	2.195
SE of Mean	0.845	0.491

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	112
WMW U-Stat	97
Mean (U)	50
SD(U) - Adj ties	14.72
WMW U-Stat Critical Value (0.05)	74
Standardized WMW U-Stat	3.16
Approximate P-Value	7.8977E-4

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
MIP2 vs Soil Background of Copper

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:33:41 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Copper(mip2)

Sample 2 Data: Copper(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	10.8	2.6
Maximum	15.3	21.3
Mean	12.62	10.03
Median	12.6	8.965
SD	1.741	4.868
SE of Mean	0.779	1.088

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	1.157	1.714	0.130
Welch-Satterthwaite (Unequal Varian	19.3	1.937	1.729	0.034

Pooled SD 4.483

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	3.032
Variance of Sample 2	23.69

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	7.814	0.059

Conclusion with Alpha = 0.05

Two variances appear to be equal

Attachment H
MIP2 vs Soil Background of Iron

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:34:32 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Iron(mip2)

Sample 2 Data: Iron(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	19
Minimum	17700	2980
Maximum	21600	21700
Mean	19720	13760
Median	19300	15250
SD	1610	6370
SE of Mean	720	1424

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	2.045	1.714	0.026
Welch-Satterthwaite (Unequal Varian	22.9	3.734	1.714	0.001

Pooled SD 5828.525

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	2592000
Variance of Sample 2	40577958

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	15.655	0.016

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP2 vs Soil Background of Lead

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:42:35 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead(mip2)

Sample 2 Data: Lead(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	19
Minimum	10.1	10
Maximum	12.3	165
Mean	11.2	30.16
Median	11.1	19.75
SD	0.872	35.09
SE of Mean	0.39	7.845

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	26
WMW U-Stat	11
Mean (U)	50
SD(U) - Adj ties	14.72
WMW U-Stat Critical Value (0.05)	74
Standardized WMW U-Stat	-2.684
Approximate P-Value	0.996

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP2 vs Soil Background of Magnesium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:35:20 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Magnesium(mip2)

Sample 2 Data: Magnesium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	930	104
Maximum	1250	1580
Mean	1034	817.5
Median	943	839
SD	142.2	474.6
SE of Mean	63.62	106.1

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	0.995	1.714	0.165
Welch-Satterthwaite (Unequal Varian	21.8	1.750	1.717	0.047

Pooled SD 435.440

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	20235
Variance of Sample 2	225265

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	11.133	0.031

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP2 vs Soil Background of Manganese

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:44:02 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Manganese(mip2)

Sample 2 Data: Manganese(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	196	21.9
Maximum	657	538
Mean	523.4	188.9
Median	595	123
SD	189.6	154.8
SE of Mean	84.79	34.61

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	106
WMW U-Stat	91
Mean (U)	50
SD(U) - Adj ties	14.72
WMW U-Stat Critical Value (0.05)	74
Standardized WMW U-Stat	2.751
Approximate P-Value	0.00297

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

Attachment H
MIP2 vs Soil Background of Nickel

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:37:22 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Nickel(mip2)

Sample 2 Data: Nickel(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	10.3	1.4
Maximum	12.3	14
Mean	11.22	6.92
Median	11.1	7.21
SD	0.867	3.124
SE of Mean	0.388	0.699

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	3.004	1.714	0.003
Welch-Satterthwaite (Unequal Varian	22.4	5.381	1.717	0.000

Pooled SD 2.863

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2

Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2

Test of Equality of Variances

Variance of Sample 1	0.752
Variance of Sample 2	9.762

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	12.982	0.023

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP2 vs Soil Background of Potassium

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:38:17 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Potassium(mip2)

Sample 2 Data: Potassium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	527	218
Maximum	717	1050
Mean	611	678.3
Median	582	720
SD	78.2	241.4
SE of Mean	34.97	53.99

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	-0.606	1.714	0.725
Welch-Satterthwaite (Unequal Varian	20.9	-1.045	1.721	0.846

Pooled SD 221.855

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	6116
Variance of Sample 2	58294

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	9.532	0.041

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP2 vs Soil Background of Sodium

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 7:47:46 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Sodium(mip2)

Sample 2 Data: Sodium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	20
Number of Non-Detects	2	9
Number of Detect Data	3	11
Minimum Non-Detect	63.2	20.7
Maximum Non-Detect	64.5	31
Percent Non-detects	40.00%	45.00%
Minimum Detect	69.4	22.3
Maximum Detect	127	75.4
Mean of Detects	102.5	37.69
Median of Detects	111	35.3
SD of Detects	29.73	15.1

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.231
Critical z (0.05)	1.645
P-Value	0.0129

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Attachment H
MIP2 vs Soil Background of Vanadium

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Uncensor Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/2/2016 7:48:50 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Vanadium(mip2)

Sample 2 Data: Vanadium(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	10	7.32
Maximum	12.8	29.1
Mean	11.22	16.95
Median	10.5	16.5
SD	1.322	5.83
SE of Mean	0.591	1.304

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	31
WMW U-Stat	16
Mean (U)	50
SD(U) - Adj ties	14.72
WMW U-Stat Critical Value (0.05)	74
Standardized WMW U-Stat	-2.344
Approximate P-Value	0.99

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

Attachment H
MIP2 vs Soil Background of Zinc

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs

User Selected Options	
Date/Time of Computation	6/15/2016 4:40:02 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0.000
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean

Sample 1 Data: Zinc(mip2)

Sample 2 Data: Zinc(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Observations	5	20
Number of Distinct Observations	5	20
Minimum	25.8	9.04
Maximum	32.7	56.3
Mean	28.78	28.38
Median	28.8	27.05
SD	2.731	12.31
SE of Mean	1.221	2.752

Sample 1 vs Sample 2 Two-Sample t-Test

H0: Mean of Sample 1 - Mean of Sample 2 <= 0

Method	DF	t-Test Value	Critical t (0.05)	P-Value
Pooled (Equal Variance)	23	0.071	1.714	0.472
Welch-Satterthwaite (Unequal Varian	23.0	0.132	1.714	0.448

Pooled SD 11.242

Conclusion with Alpha = 0.050

Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2

Test of Equality of Variances

Variance of Sample 1	7.457
Variance of Sample 2	151.4

Numerator DF	Denominator DF	F-Test Value	P-Value
19	4	20.305	0.010

Conclusion with Alpha = 0.05

Two variances are not equal

Attachment H
MIP2 vs Soil Background of Cyanide

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/2/2016 8:02:07 PM
From File	MIP2 v Background Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cyanide(mip2)

Sample 2 Data: Cyanide(all soil)

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	5	20
Number of Non-Detects	3	18
Number of Detect Data	2	2
Minimum Non-Detect	0.12	0.21
Maximum Non-Detect	0.13	0.52
Percent Non-detects	60.00%	90.00%
Minimum Detect	0.2	0.27
Maximum Detect	0.29	0.28
Mean of Detects	0.245	0.275
Median of Detects	0.245	0.275
SD of Detects	0.0636	0.00707

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.655
Critical z (0.05)	1.645
P-Value	0.256

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

ATTACHMENT I

OUTLIER TESTS PERFORMED TO DETERMINE WHETHER THE 110 UG/L DETECTION OF TCE IS AN OUTLIER

Attachment I. Outlier Tests Performed to Determine
Whether the 110 ug/L Detection of TCE Is An Outlier

Q-Test		
	RMW-09S-1	RMW-09S-2
x1	0.09	61
x2	0.26	81
x3	0.27	83
x4	0.47	84
x5	110	86
x5-x1	**109.91**	**25**
Q1-2	0.00154672	0.8
Q2-3	9.09835E-05	0.08
Q3-4	0.001819671	0.04
Q4-5	0.996542626	0.08
Critical Q-value for n=5 and CL=99%		
0.821		

Grubbs' Test (online at "graphpad.com/quickcalcs/grubbs2")		
	Z	
0.09	0.4509	
0.26	0.4475	
0.27	0.4473	
0.47	0.4432	
110	1.7888	**Significant outlier at P<.01**