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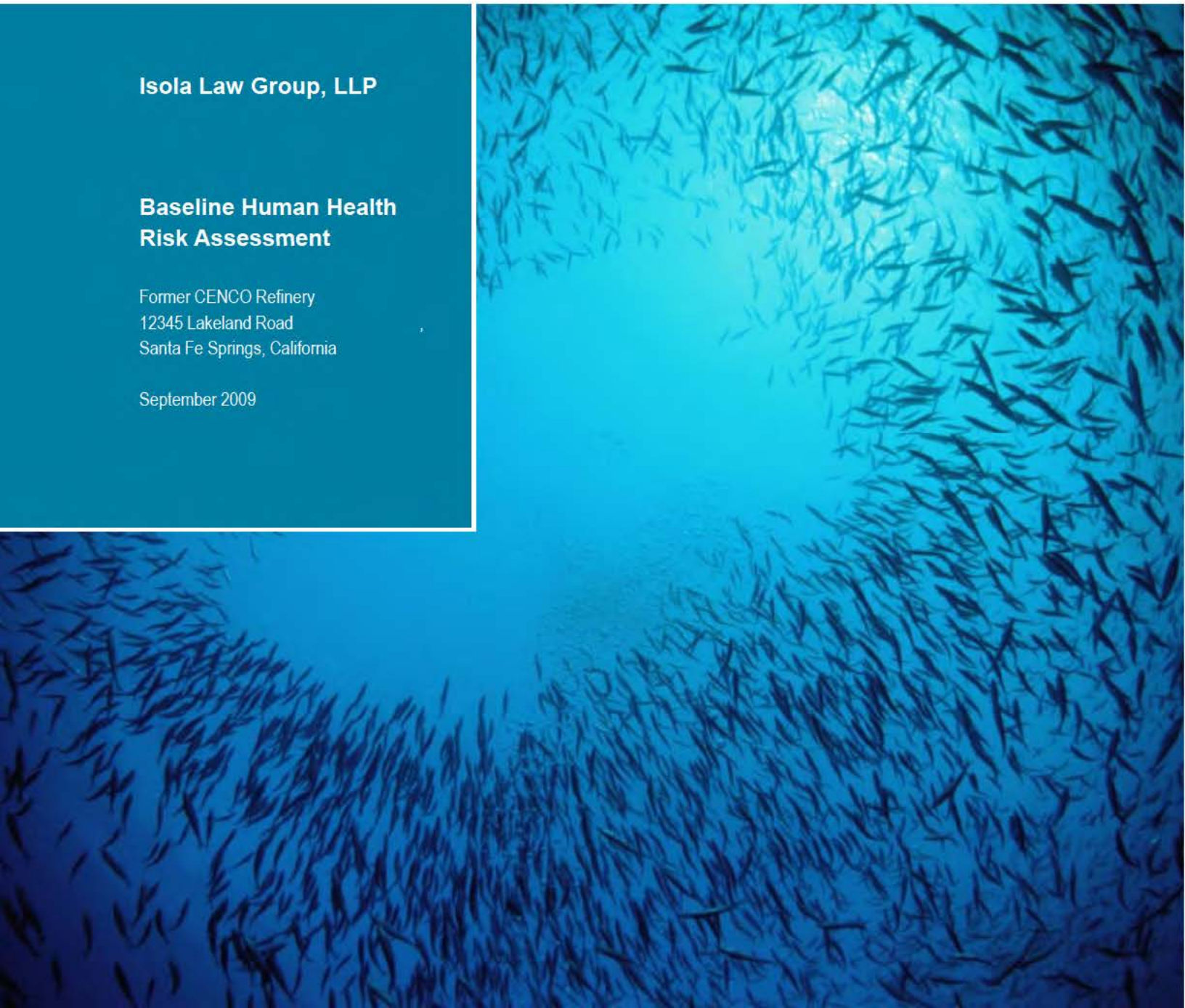
Baseline Human Health Risk Assessment

Former CENCO Refinery
12345 Lakeland Road
Santa Fe Springs, California

September 2009



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Acronyms and Abbreviations

95% UCL	95% upper confidence on the mean concentration
ABSd	dermal absorption factor
ADD	average daily dose
AF	adherence factor
ALM	Adult Lead Model
amsl	above mean sea level
AST	aboveground storage tank
AT	averaging time (days)
ATSDR	Agency for Toxic Substances and Disease Registry
BBL	Blasland, Bouck & Lee, Inc.
Bell View	Bell View Oil Syndicate
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BR	inhalation rate or breathing rate (m^3/hour)
BTEX	benzene, toluene, ethylbenzene, and xylenes
BW	body weight (kg)
C_a	COPC concentration in air (mg/m^3)
CalEPA	California Environmental Protection Agency

CAO	Cleanup and Abatement Order
Castle	Castle Energy Corporation
CCR	California Code of Regulations
CF	conversion factor
CHHSL	California Human Health Screening Level
cm^2	square centimeter(s)
COI	constituent of interest
COPC	constituent of potential concern
C_s	COPC concentration in soil (mg/kg)
CSF	cancer slope factor
CSL	cleanup screening level
CSM	conceptual site model
CTE	central tendency estimate
DAF20	dilution attenuation factor of 20
DCA	dichloroethane
DCB	dichlorobenzene
DCE	dichloroethene
DCP	dichloropropane
DDD	4,4-dichlorodiphenyldichloroethane
DDE	4,4-dichlorodiphenyldichloroethylene
DDT	4,4-dichlorodiphenyltrichloroethane
DLM	Designated Level Methodology
DTSC	(California) Department of Toxic Substances Control
DWR	Department of Water Resources
EC	exposure concentration (mg/m^3)
ED	exposure duration (years)
EF	exposure frequency (days/year)

ELCR	excess lifetime cancer risk
EMC	Energy Merchant Corporation
EPC	exposure point concentration
ET	exposure time
FI	fraction ingested
FPPH	free-phase petroleum hydrocarbon
ft	foot/feet
GSDi	geometric standard deviation on the population mean blood-lead concentration
Haley & Aldrich	Haley & Aldrich, Inc.
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
IR_s	soil ingestion rate
IRIS	Integrated Risk Information System
IT	IT Corporation
IUR	inhalation unit risk $(mg/m^3)^{-1}$
kg	kilogram(s)
kg/mg	kilogram(s) per milligram
LADD	lifetime average daily dose
LARWQCB	California Regional Water Quality Control Board, Los Angeles Region
m^3/kg	cubic meter(s) per kilogram
MCL	maximum contaminant level
m^3/day	cubic meter(s) per day
mg/cm^2-day	milligram(s) per square centimeter per day
mg/day	milligram(s) per day
mg/kg	milligram(s) per kilogram

mg/kg-day	milligram(s) per kilogram per day
mg/m^3	milligram(s) per cubic meter
MTBE	methyl tert-butyl ether
OCP	organochlorine pesticide
OEHHA	Office of Environmental Health Hazard Assessment
ORNL	Oak Ridge National Laboratory
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEF	particulate emission factor
PRG	Preliminary Remediation Goal
RAGS	Risk Assessment Guidance for Superfund
REL	Reference Exposure Level
RfC	chronic reference concentration
RfD	chronic reference dose
RME	reasonable maximum exposure
Rothschild	Rothschild Oil Company
RSL	Regional Screening Level
SA	skin surface area available for contact
site	former CENCO refinery
SSCG	site-specific cleanup goal
SSL	Soil Screening Level
TBA	tertiary butyl alcohol
TCB	trichlorobenzene
TCE	trichloroethene
TCP	trichloropropane
TMB	trimethylbenzene
TPH	total petroleum hydrocarbons

TPH-CC	TPH extended carbon chain
TPHg	TPH as gasoline
µg/dl	microgram(s) per deciliter
µg/kg	microgram(s) per kilogram
$\mu g/m^3$	microgram(s) per cubic meter
USEPA	United States Environmental Protection Agency
Versar	Versar, Inc.
VF	volatilization factor
VOC	volatile organic compound

1. Introduction

On behalf of Isola Law Group, LLP, ARCADIS conducted a baseline human health risk assessment (BHHRA) for CENCO Refining Company for its former refinery located at 12345 Lakeland Road in Santa Fe Springs, California (site; Figure 1-1). This assessment evaluated potential onsite and offsite human health under current and anticipated future conditions. The methods used to conduct the BHHRA are consistent with the ARCADIS BBL (2007) work plan predicated on standard California Department of Toxic Substances Control (DTSC) and U.S. Environmental Protection Agency (USEPA) risk assessment guidelines. This work plan was approved by the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB, 2008) on January 11, 2008.

Three properties adjacent to the site—the Former Bloomfield Property, the Former Lakeland Property, and the Former Walker Property—were owned by the refinery. However, LARWQCB has granted No Further Action regarding soil impacts on these three properties (Blasland, Bouck & Lee, Inc. [BBL], 2006). Therefore, these properties were not evaluated as part of this assessment. In addition, potential exposure to offsite groundwater was not evaluated, but will be evaluated following the collection of offsite soil gas samples as requested by LARWQCB (2007). Consistent with LARWQCB's (2007) request, the objectives of the BHHRA are to:

- Evaluate potential human health hazards and risks associated with site-related constituents of potential concern (COPCs) detected in surface soil, subsurface soil, soil gas, and groundwater

- Delineate areas of the site that will not require additional investigation or remediation

- Derive site-specific, risk-based remediation goals for specific areas of the site where COPCs exceed risk-based levels of potential concern.

The results of this BHHRA will be used to support subsequent risk management decisions and help direct future remediation activities.

The remainder of this report is organized as follows:

- **Section 2, Site Description and History.** This section provides background information on the site.

- **Section 3, Site Geology and Hydrogeology.** This section summarizes the geologic and hydrogeologic conditions of the site and the surrounding area.

- **Section 4, Environmental Site Investigations.** This section includes a description of previous investigations at the site, as well as a summary of the data collected and relevant findings.

- **Section 5, Data Evaluation.** Steps taken to evaluate the usability of the available data for risk assessment purposes are described in this section, as are the steps taken to define the scope of the dataset and prepare the dataset for risk assessment purposes.

- **Section 6, Baseline Human Health Risk Assessment.** The objectives, approach, and results of the BHHRA are presented and discussed in this section.

- **Section 7, Summary and Conclusions.** In this section, the outcome of the BHHRA is summarized and implications for the site are presented.

- **Section 8, Recommended Site-Specific Cleanup Goals.** This section presents site-specific cleanup goals for those COPCs representing the majority of the potential risks at the site.

- **Section 9, Uncertainties.** This section identifies and discusses uncertainties and key assumptions used to conduct the BHHRA.

- **Section 10, References.** This section lists the sources of information cited in this BHHRA.

Additional supporting information for the above sections is presented in the following appendices:

- **Appendix A:** Soil, Soil Gas, and Groundwater Data Used to Conduct BHHRA

- **Appendix B:** Memorandum Confirming Soil Moisture Value Used to Convert Wet Weight Data to Dry Weight

- **Appendix C:** Surface Soil Depth Interval Evaluation

- **Appendix D:** Description of ProUCL 4.0 and the ProUCL 4.0 Output Results
- **Appendix E:** Johnson & Ettinger Vapor Intrusion Models and Results
- **Appendix F:** Receptor-Specific Excess Lifetime Cancer Risk (ELCR) and Noncancer Hazard Index (HI) Calculations Related to Soil Exposure
- **Appendix G:** ELCR and Noncancer HI Calculations for the Hypothetical Future Onsite Resident Using Groundwater for Domestic Purposes
- **Appendix H:** Receptor-Specific Lead Exposure Tables

2. Site Description and History

The site is approximately 55 acres in size and is located at 12345 Lakeland Road in Santa Fe Springs, California (Figures 1-1 and 2-1). The site is located within an industrial/commercial area that is bordered to the north by Florence Avenue, to the south by Lakeland Road, to the east by Bloomfield Avenue, and to the west by a residential neighborhood (Figure 2-2). The site is divided into the following four separate subareas (Figure 2-1) for future development purposes:

- Area 1 – approximately 16.3 acres
- Area 2 – approximately 13.2 acres
- Area 3 – approximately 18.5 acres
- Area 4 – approximately 4.5 acres.

To characterize potential impacts for each of these areas, four separate risk assessments (one for each area) were conducted to evaluate potential exposure to soil. However, because groundwater is dynamic and is present beneath the entire site, data collected from all onsite wells were combined to evaluate the entire site as a single unit.

The site was operated by various entities, including the Bell View Oil Syndicate (Bell View), Powerine, Rothschild Oil Company (Rothschild), Mr. Oscar Schmidt, Castle Energy Corporation (Castle), Energy Merchant Corporation (EMC), and CENCO. Information regarding site ownership and onsite operations was obtained from the *Revised Master Work Plan,* prepared by Versar, Inc. (Versar, 2000).

A review of aerial photographs dated 1928 and 1938 indicates that the western portion of the site may have been used for agricultural purposes. Prior to construction of the refinery, the site was an oil field consisting of crude oil production wells and unlined sumps. In 1936, Rothschild purchased the refinery from Bell View. Rothschild owned and operated the Powerine Refinery at the site from 1936 to 1984, when Powerine went into bankruptcy and ceased operations. In 1986, the refinery emerged from bankruptcy under new ownership by Mr. Oscar Schmidt. Mr. Schmidt restarted the refinery and continued operations until 1992, when it was shut down again due to financial hardships. In 1993, Castle purchased Powerine and operated the refinery until

1995, when refinery operations were suspended. In 1996, EMC purchased Powerine. In August 1998, CENCO purchased the assets and liabilities of Powerine.

The site has three former main refinery operational areas identified as the East Tank Farm, the Processing Area, and the West Tank Farm. Each of these areas and associated structures is shown in Figure 2-2. The East Tank Farm is located in the southeastern portion of the site. This area contains several aboveground storage tanks (ASTs) and a storm water impounding basin in the southeast corner of the site. The ASTs were used to store various petroleum products, including crude oil, gasoline, jet fuel and intermediate refined products, propane, isobutene, and butane. The Processing Area is located in the central and northern portions of the site. The Processing Area contains an administration building, a maintenance office, a laboratory, and processing equipment including crude units, a fluid catalytic cracking unit, an alkylation unit, a coker unit, a sulfur plant, a hydrogen plant, a hydrocracker, various hydrotreating units, and a gasoline blending facility. In addition, the Processing Area contains an underground pipeline that transported fuels to a former AST area on a property located adjacent to the southeast of the site. The West Tank Farm is located along the western boundary of the site and contains several ASTs. The ASTs were used to store wastewater, vacuum residuum, gas oil, and other fuel products.

Previous refining operations included processing crude oil into several grades of fuel including kerosene, leaded gasoline, aviation fuel, unleaded gasoline, jet fuel, high- and low-sulfur diesel, fuel oil, and petroleum coke. The refinery also produced non-fuel byproducts for sales, including sulfur and carbon dioxide. Additionally, the refinery produced refinery gas and hydrogen for internal refinery consumption.

In general, constituents of interest (COIs) at the site are total petroleum hydrocarbons (TPH) as various mixtures, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and petroleum product additives and processing chemicals (including metals and other VOCs). Furthermore, polychlorinated biphenyls (PCBs) are also COIs, as onsite electrical equipment may have contained fluids with these compounds.

3. Geology and Hydrogeology

Regional and site-specific geology and hydrogeology are discussed in the following sections. Information on geology and hydrogeology was obtained from historical site investigations, including the recent investigation conducted by ARCADIS (2009).

3.1 Regional Geology

The site is located within the Santa Fe Springs Plain Subgeomorphic Province of the Los Angeles Coastal Plain at an elevation of approximately 130 to 140 feet (ft) above mean sea level (amsl). This plain is a slightly rolling topographic feature sloping gently to the northeast in the vicinity of the site due to the northwest trending Santa Fe Springs-Coyote Hills Anticlinal System. The site is positioned above the southern limb of the Santa Fe Springs Anticline. Petroleum accumulation associated with this anticlinal structure has resulted in substantial oil production in the Santa Fe Springs area. Prominent topographic features in the area include the Puente and Coyote Hills to the northeast, east, and southeast. The San Gabriel River is located approximately 1.75 miles west of the site and flows from north-northeast to south-southwest (Haley & Aldrich, Inc. [Haley & Aldrich], 2005; Versar, 2000).

The Los Angeles Coastal Plain area is a large structural basin that has accumulated thousands of feet of sediments since Miocene time and has been tectonically active. The Los Angeles Coastal Plain generally consists of alluvial materials deposited by the Los Angeles, San Gabriel, and Santa Ana Rivers. The Santa Fe Springs Plain is comprised of the Upper Pleistocene age Lakewood Formation (California Division of Mines and Geology, 1999). The Lakewood Formation and the underlying San Pedro Formation are folded over the anticlinal dome structure (Haley & Aldrich, 2005; Versar, 2000).

3.2 Local Geology

In the site vicinity, the Santa Fe Springs Plain consists of the late Pleistocene alluvium of the Lakewood Formation. The Lakewood Formation unconformably overlies the lower Pleistocene San Pedro Formation and the Pliocene Pico Formation. The Lakewood Formation consists of interbedded clays, silts, silty sands, and sands representative of stream-type alluvial and floodplain deposits (Versar, 2000). Both previous (Haley & Aldrich, 2005) and recent (ARCADIS, 2009) subsurface investigations conducted at the site confirm that the lithology is a vertically and laterally heterogeneous mélange of such alluvial deposits. Underlying a surficial veneer of fill

and roadbase materials at the site are interbedded alluvial sediments ranging in texture from poorly graded sands through fat clays. In general, the eastern portion of the site contains more coarser-grained sediments (sand and gravel) than the western portion of the site.

3.3 Regional Hydrogeology

Several regional water-bearing units have been identified within the older alluvial fan and valley deposits of the Lakewood Formation and underlying San Pedro Formation. In the site area, the Lakewood Formation begins at ground surface, ranges from 100 to 180 ft thick, and is composed of three hydrostratigraphic units: 1) the Bellflower Aquiclude (upper unit), 2) the Exposition Aquifer, and 3) the Gage Aquifer. The Exposition and Gage aquifers consist predominantly of sands and fine gravels with discontinuous, thinly bedded silts and clays. These aquifers have an approximate combined thickness of 100 to 150 ft, approximately half of which is saturated (Versar, 2000).

Within the site vicinity, the Bellflower Aquiclude consists of a heterogeneous mixture of clays, silty clays, silts, and extensive interbedded lenses of sandy or gravelly silts and clays and has an estimated thickness between 20 and 40 ft. The major water-bearing unit of interest for this investigation is the Exposition Aquifer (otherwise known as the Artesia Aquifer), the upper water bearing unit of the Lakewood Formation. The Exposition Aquifer is composed of coarse gravel, coarse to fine sand, and interbedded silts and clays with a general southwesterly dip and thickness between 40 and 80 ft. The Exposition Aquifer is separated from the Gage Aquifer by an unnamed aquiclude. Information for the site area in Santa Fe Springs indicates that the depth to first-encountered groundwater within the Exposition Aquifer ranges from 75 to 90 ft below ground surface (bgs). The Gage Aquifer consists predominantly of sands and fine gravels with an estimated thickness between 30 and 50 feet (Department of Water Resources [DWR], 1961; Haley & Aldrich, 2005; Versar, 2000).

Based on available information, the site is located at the southern end of the Montebello Forebay Area of the Central Groundwater Basin situated within Downey Plain. The primary water-producing aquifers for the Central Basin Pressure Area are the Silverado and Sunnyside Aquifers within the San Pedro Formation at depths greater than 165 ft bgs (DWR, 1961; 2001).

3.4 Local Hydrogeology

In January 2009, first-encountered groundwater was present beneath the site at elevations ranging between approximately 36 and 52 feet amsl (approximately 90 to 95 feet bgs). Groundwater flow was to the southwest under an average horizontal hydraulic gradient of 0.008 ft per foot (Figure 3-1; ARCADIS, 2009).

Aquifer testing performed at the Site by IT Corporation (IT, 1986) resulted in calculated transmissivities between 124 and 13,613 gallons per day per foot within shallow groundwater. IT interpreted the results as an indication of a highly heterogeneous water-bearing zone containing significant boundary effects.

4. Environmental Site Investigations

Site investigation activities were performed by IT (1985), Trihydro Corporation (1997), Versar (2000), BBL (2006), and ARCADIS (2009) in response to two Cleanup and Abatement Orders (CAOs) issued for the site by LARWQCB (1985; 1997) (BBL, 2006). The CAO issued in 1985 (CAO No. 85-17) required a "subsurface investigation of the Powerine Refinery to detect and assess any ground-water pollution which may be present," and CAO No. 97-118, issued on August 25, 1997, directed Powerine (now CENCO) to conduct additional investigations into onsite and offsite soil and groundwater impacts originating from the site and related interconnecting pipelines. On March 24, 2004, the Superior Court of California for the County of Los Angeles issued a preliminary injunction requiring the remediation and removal of released hazardous substances at the site (BBL, 2006). Site characterization activities conducted by BBL in 2005–06 and ARCADIS in 2008–09 are summarized in the following sections.

4.1 Screening Levels Used for Site Characterization

Soil, soil vapor, and groundwater data collected during these activities were compared to screening values to delineate the extent of the subsurface impacts and to guide additional sampling and analysis efforts. Screening values protective of human health and the environment found in guidance developed by various regulatory agencies were reviewed:

- LARWQCB (1996) Interim Site Assessment and Cleanup Guidebook
- USEPA (2004b) Region 9 Preliminary Remediation Goals (PRGs)
- USEPA (2008c) Regional Screening Levels (RSLs)[1]
- USEPA (2002) Region 9 Soil Screening Levels (SSLs) based on a dilution attenuation factor of 20 (DAF20)

[1]In October 2008, the USEPA (2004b) Region 9 PRGs were rescinded and replaced with national RSLs (USEPA, 2008c).

- Designated Level Methodology (DLM) for Waste Classification and Cleanup Level Determination for Metals (California Regional Water Quality Control Board, Central Valley Region, 1989)

- California Human Health Screening Levels (CHHSLs) (California Environmental Protection Agency [CalEPA], 2005b).

The lowest screening value available for a constituent from the various references was selected. In this BHHRA, these are referred to as cleanup screening levels (CSLs).

4.2 Additional Site Investigation (BBL, 2005–06)

BBL conducted a site investigation between November 8, 2005, and February 8, 2006, in accordance with the Haley & Aldrich (2005) *Additional Site Investigation Work Plan* as approved by LARWQCB (2005), which included collection and analysis of soil (from ground surface to approximately 50 ft bgs), soil vapor, and groundwater samples. Results are presented in the *Additional Site Investigation Report* (BBL, 2006). Data from this investigation are included in Appendix A to this BHHRA.

4.2.1 Soil Results

A total of 220 soil borings were advanced at the site along an approximate 100- by 100-ft grid. Soil samples were collected at depths of 2, 5, 10, 15, 20, 30, 40, and 50 ft bgs. No soil samples were collected above 2 ft bgs. Initially, all 2-, 5-, and 10-ft-bgs samples were analyzed for VOCs, PAHs, and TPH reported as specific carbon chain ranges. Metals, PCBs, organochlorine pesticides (OCPs), pH, and hexavalent chromium were analyzed for selected 2- and 5-ft-bgs samples. Deeper samples were selected for analysis based on comparison of concentrations in 5-ft-bgs samples to CSLs. Constituents exceeding CSLs included various VOCs, PAHs, TPH, metals, and PCBs. OCP and hexavalent chromium concentrations did not exceed CSLs (BBL, 2006).

Selected soil samples were analyzed for California Code of Regulations (CCR) Title 22 metals. All but silver and thallium were detected in at least one soil sample. CSLs were exceeded in at least one sample for the following metals: antimony, arsenic, barium, chromium, cobalt, copper, lead, and selenium. Selected soil samples (a total of 29) were also analyzed for hexavalent chromium, which was detected in all but one of these samples. Hexavalent chromium concentrations ranged from 10 to 266 micrograms per kilogram (µg/kg), well below all CSLs (BBL, 2006).

TPH extended carbon chain (TPH-CC) analysis reports petroleum hydrocarbons as carbon chain ranges C_6 to C_{10}, C_{10} to C_{22}, and C_{22} to C_{36}. At the 2-, 5-, and 10-ft depths, TPH was most frequently detected in the C_{22} to C_{36} carbon range. At the 15-, 20-, and 30-ft depths, TPH was most frequently detected in the C_{10} to C_{22} carbon range. The maximum concentrations of TPH for each depth were also found in the C_{10} to C_{22} and C_{22} to C_{36} carbon ranges, indicative of predominantly heavier hydrocarbons. CSLs were exceeded in one or more samples for each of the three carbon chain ranges (BBL, 2006).

Samples were collected from 2, 5, and 10 ft bgs at all of the borings for VOC analysis, as well as at deeper depths (up to 50 ft bgs) based on results of the upper samples. VOCs detected most frequently included 1,2,4-trimethylbenzene (1,2,4-TMB), benzene, and total xylenes. CSLs were exceeded in at least one sample for the following VOCs: 1,2,4-TMB; 1,3,5-TMB; 1,2,4-trichlorobenzene (1,2,4-TCB); benzene, toluene, ethylbenzene, and total xylenes (BTEX); methyl tertiary-butyl ether (MTBE); tertiary butyl alcohol (TBA); n-butylbenzene; n-propylbenzene; sec-butylbenzene; isopropylbenzene; tetrachloroethylene (PCE); 1,1,1,2-tetrachloroethane; and naphthalene (BBL, 2006).

Samples were collected from 2, 5, and 10 ft bgs at all of the borings for PAH analysis, as well as at deeper depths (up to 40 ft bgs) based on results of the upper samples. Each of the 16 PAHs quantified were detected in at least one soil sample. The most often detected PAHs at the site were phenanthrene, naphthalene, pyrene, and chrysene. CSLs were exceeded in at least one sample for the following PAHs: naphthalene, anthracene, benzo(a)anthracene, benzo(a)pyrene [B(a)P], benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, chrysene, fluorene, and phenanthrene (BBL, 2006).

PCBs (Aroclor® 1254 and Aroclor 1260, also referred to in this document as PCB-1254 and PCB-1260 to be consistent with historical data) were detected in only a few samples at the site. CSLs were exceeded in at least one sample for Aroclor 1254 and Aroclor 1260. In samples analyzed for OCPs, only chlordane, 4,4-dichlorodiphenyldichloroethane (4,4-DDD), 4,4-dichlorodiphenyldichloroethylene (4,4-DDE), and 4,4-dichlorodiphenyltrichloroethane (4,4-DDT) were detected, in one sample at 2 ft bgs (at location B178). CSLs were not exceeded for any detected OCPs in this sample (BBL, 2006).

4.2.2 Soil Gas Results

In conjunction with the soil investigation, an active soil-gas survey was conducted on an approximately100-ft by 100-ft grid spacing across the site. Soil vapor samples were analyzed from 5 and 10 ft bgs. BTEX were the most frequently detected VOCs, with xylenes detected at concentrations up to 4,800 µg/L (V049) and 5,000 µg/L (V158) at 5 and 10 ft bgs, respectively. The highest benzene concentrations at 5 and 10 ft bgs were 490 µg/L (V123) and 1,400 µg/L (V123), respectively. Chlorinated VOCs (cis-1,2-dichloroethene [cis-1,2-DCE], trichloroethene [TCE], PCE, chloroform, and vinyl chloride) were detected in only a few locations at each depth (BBL, 2006).

The CSLs used for comparison to soil gas results were residential CHHSLs. In the 5-ft-bgs vapor samples, CSLs for BTEX, TCE, and PCE were exceeded in at least one sample. In the 10-ft-bgs vapor samples, CSLs for BTEX, vinyl chloride, cis-1,2-DCE, TCE, and PCE were exceeded in at least one sample (BBL, 2006).

4.2.3 Groundwater Results

Onsite groundwater monitoring results from 2005–06 were generally consistent with historical results. The number of wells in which free-phase petroleum hydrocarbons (FPPH) was observed decreased from six in June 2004, to four in October 2005, to only two in February 2006, with a sheen on the other two wells which had FPPH the previous quarter. TPH as gasoline (TPHg) concentrations declined in several of the sampled wells, namely MW-105, MW-201, MW-204, MW-205, MW-607, W-1, and W-8. Increased TPHg and MTBE concentrations were observed in well MW-502. Benzene levels decreased in wells MW-201, MW-204, MW-205, MW-503B, and W-1. In general, the leading/downgradient edge of the plume showed a decrease in TPHg concentrations on the southern and southeastern edges of the plume (wells MW-606, MW-607, and W-3A). The southwestern edge of the plume showed an increase in TPHg (wells MW-603 and MW-605). The leading edge of the plume showed the same or lower benzene concentrations and similar MTBE concentrations on the southern (MW-606), southeastern (MW-607 and W-3A), and southwestern edges (MW-603 and MW-605) of the plume. Hexavalent chromium concentrations were generally below detection limits, and in all cases were below California maximum contaminant levels (MCLs) during the February 2006 sampling event (BBL, 2006).

4.3 Supplemental Soil Investigation (ARCADIS, 2008–09)

The *Supplemental Soil Investigation* was conducted by ARCADIS in 2008–09 and included extensive sampling of surface soil, deep soil, and soil located under specific structures based on the results of the BBL 2006 investigation (ARCADIS, 2009). Surface soil samples were collected to assess the nature and extent of constituents in the upper 2 ft at the site. Surface soil samples (0 to 0.5 ft bgs) were collected at 294 locations and deeper samples (1 to 2 ft bgs) were collected at 73 of these locations based on field observations. In addition, 20 soil borings were advanced to groundwater (approximately 90 ft bgs) at locations where COIs had been detected and had potential for impacts at depth. The deep soil borings were intended to assess the vertical and lateral extent of COIs identified in the *Additional Site Investigation Report* (BBL, 2006). A total of 10 samples per boring were analyzed at approximate depths of 5, 10, 20, 30, 40, 50, 60, 70, 80, and 90 ft bgs (ARCADIS, 2009).

The investigation under refinery structures was conducted to characterize soil beneath ASTs and process units. This phase of the investigation included 76 soil borings (56 borings completed to 40 ft bgs and 20 borings completed to groundwater, approximately 90 ft bgs). In addition, soil samples were collected between 0 and 2 ft bgs at three locations at the former tetraethyl lead storage building (ARCADIS, 2009).

All surface soil samples were analyzed for metals, TPH-CC, VOCs, and PAHs. Selected surface soil samples were also analyzed for PCBs, OCPs, and/or hexavalent chromium. All deep soil samples were analyzed for TPH-CC, VOCs, and PAHs. Selected 5-ft-bgs samples were analyzed for metals, PCBs, OCPs, and/or hexavalent chromium. All samples collected under structures were analyzed for TPH-CC, VOCs, and PAHs. Selected samples collected under structures were also analyzed for metals, PCBs, OCPs, and/or hexavalent chromium (ARCADIS, 2009). Data from this investigation are included in Appendix A to this BHHRA.

4.3.1 Surface Soil Results

CSLs were exceeded in at least one sample for the following metals: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, selenium, vanadium, and zinc. Nine soil samples collected from seven locations near former cooling towers were submitted for hexavalent chromium analysis. All nine soil samples contained hexavalent chromium at concentrations between 130 and 2,800 µg/kg. The CSL for hexavalent chromium was exceeded in samples collected from five locations (S123, S144, S159, S227, and S237) (ARCADIS, 2009).

In the 0- to 1-ft-bgs sample interval, TPH in the C_6 to C_{10} carbon range was detected in approximately 17 percent of samples, TPH in the C_{10} to C_{22} carbon range was detected in approximately 98 percent of samples, and TPH in the C_{22} to C_{36} carbon range was detected in 97 percent of samples. In samples from the 1- to 2-ft-bgs interval, TPH in the C_6 to C_{10} carbon range was detected in approximately 47 percent of samples, TPH in the C_{10} to C_{22} carbon range was detected in 93 percent of samples, and TPH in the C_{22} to C_{36} carbon range was detected in approximately 95 percent of samples. Results indicate that TPH in site soil are predominantly the heavier carbon chain ranges. TPH CSLs were exceeded in at least one sample (ARCADIS, 2009).

VOCs were detected in many of the soil samples collected at depths of 0 to 0.5 ft bgs as well as between 1 and 2 ft bgs. Acetone was the most frequently detected VOC, but is a common laboratory contaminant and may not be site-related. The second most frequently detected VOC was 2-butanone, present in 35 percent of the samples. 1,2,4-TMB was the VOC detected at the highest concentration at the site. CSLs were exceeded in at least one sample for the following VOCs: 1,2,3-trichloropropane (1,2,3-TCP), 1,2,4-TCB, 1,2,4-TMB, 1,2-dichlorobenzene (1,2-DCB), 1,2-dichloropropane (1,2-DCP), 1,3,5-TMB, acetone, benzene, bromodichloromethane, chloroform, ethylbenzene, methylene chloride, MTBE, naphthalene, TBA, toluene, o-xylene, and p/m-xylenes (ARCADIS, 2009).

The most often detected PAHs in surface and near-surface soil samples were pyrene (48 percent), chrysene (47 percent), and phenanthrene (37 percent). Other PAHs detected were 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, B(a)P, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, fluorene, and indeno(1,2,3-cd)pyrene. CSLs were exceeded in at least one sample for the following PAHs: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, anthracene, benzo(a)anthracene, B(a)P, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, and phenanthrene (ARCADIS, 2009).

A total of 10 soil samples, collected at locations near former transformers, were analyzed for PCBs. PCB-1254 was detected in five of the soil samples collected at locations S018, S047, S103, and S113 with concentrations ranging from 56 to 1,900 µg/kg. The CSL for PCB-1254 was exceeded in samples collected at locations S018 and S047. Soil samples collected from 42 locations were submitted for OCP analysis. OCPs were detected in samples from only three locations (S108, S185, and S262) at 0

to 0.5 ft bgs. CSLs were exceeded in at least one sample for aldrin, chlordane, and dieldrin (ARCADIS, 2009).

4.3.2 Deep and Under-Structure Soil Results

Three soil samples, collected from 5 ft bgs in borings B228, B229, and B235, were analyzed for CCR Title 22 metals. CSLs were exceeded in at least one sample for the following metals: chromium, lead, and vanadium. Soil samples collected from 5 ft bgs in borings B234 and B238 were analyzed for hexavalent chromium, which was detected at concentrations of 740 and 300 µg/kg, respectively. The CSL for hexavalent chromium (530 µg/kg) was exceeded in the sample collected from boring B238.

TPH-CC analysis was conducted to determine the presence of compounds in the C_6 to C_{36} carbon range. A total of 136 soil samples, collected from 20 soil borings, were analyzed for TPH-CC. TPH in the C_6 to C_{10} carbon range was detected in 63 samples, TPH in the C_{10} to C_{22} carbon range was detected in 101 samples, and TPH in the C_{22} to C_{36} carbon range was detected in 89 samples. At the 5-ft depth, TPH was most frequently detected in the C_{10} to C_{22} and C_22 to C_{36} carbon ranges. In samples collected from 10, 30, 40, 50, 70, and 90 ft bgs, TPH in the C_{10} to C_{22} range was most frequently detected. The highest TPH concentrations were in the C_{10} to C_{22} and C_{22} to C_{36} carbon ranges, indicative of predominantly heavier hydrocarbon impacts. CSLs were exceeded in one or more samples for each of the three carbon chain lengths, C_6 to C_{10}, C_{10} to C_{22}, and C_{22} to C_{36} (ARCADIS, 2009).

A total of 136 samples were analyzed for VOCs. Benzene was the VOC most frequently detected (in about 60 percent of samples). Other frequently detected VOCs were ethylbenzene, n-propylbenzene, toluene, and xylenes, all of which are components of petroleum fuel mixtures. Xylenes and toluene were detected at the highest concentrations and were found at the maximum concentrations in the same boring. CSLs were exceeded in at least one sample for the following VOCs: 1,2,4-TMB, 1,2-dichloroethane (1,2-DCA), 1,3,5-TMB, benzene, chloroform, ethylbenzene, isopropylbenzene, MTBE, naphthalene, TBA, toluene, and xylenes.

A total of 136 samples were analyzed for PAHs. The most often detected PAHs were 2-methylnaphthalene (49 percent), naphthalene (46 percent), and 1-methylnaphthalene (45 percent). Other PAHs present included acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, chrysene, fluorene, phenanthrene, and pyrene. CSLs were exceeded in at least one sample for the following PAHs:

1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, benzo(a)anthracene, fluorene, naphthalene, and phenanthrene.

Three soil samples, collected from 5 ft bgs in borings B234, B238, and B242, were analyzed for PCBs. No PCBs were detected. Two soil samples, collected from 5 ft bgs in borings B224 and B237, were analyzed for OCPs. No OCPs were detected.

Twelve under-structure soil samples collected from 5 ft bgs were analyzed for CCR Title 22 metals. Six additional samples were collected near the soil surface and at 2 ft bgs from three borings and analyzed for CCR Title 22 metals. CSLs were exceeded in at least one sample for the following metals: chromium, copper, lead, mercury, molybdenum, thallium, and vanadium. A soil sample was collected from 5 ft bgs in each of 10 borings and analyzed for hexavalent chromium. Hexavalent chromium was detected in all of these samples at concentrations ranging from 160 µg/kg (B308) to 1,700 µg/kg (B306). The CSL for hexavalent chromium (530 µg/kg) was exceeded in the soil samples collected from borings B306 (1,700 µg/kg) and B309 (560 µg/kg).

TPH-CC analysis was conducted on a total of 475 under-structure soil samples, collected from 79 soil borings. TPH in the C_6 to C_{10} carbon range was detected in about 24 percent of the samples, and TPH in the C_{10} to C_{22} and C_{22} to C_{36} carbon ranges were detected in almost half the samples. In the deeper samples, TPH was most frequently detected in the C_{10} to C_{22} and C_{22} to C_{36} carbon ranges, and the maximum concentrations were also found in the C_{10} to C_{22} and C_{22} to C_{36} carbon ranges, indicative of predominantly heavier hydrocarbon impacts. CSLs were exceeded in one or more samples for each of the three carbon chain lengths, C_6 to C_{10}, C_{10} to C_{22}, and C_{22} to C_{36}.

A total of 477 under-structure soil samples were analyzed for VOCs. Benzene was the most frequently detected and was present in about 41 percent of the samples. Other frequently detected VOCs include ethylbenzene and 1,2,4-TMB. Xylenes and 1,2,4-TMB were detected at the highest concentrations. CSLs were exceeded in at least one sample for the following VOCs: 1,2,4-TMB, 1,2-DCA, 1,2-DCP, 1,3,5-TMB, benzene, chloroform, ethylbenzene, isopropylbenzene, MTBE, naphthalene, TBA, toluene, o-xylene, and p/m-xylenes.

A total of 475 under-structure soil samples were analyzed for PAHs. The most frequently detected PAHs were 2-methylnaphthalene, 1-methylnaphthalene, naphthalene, and phenanthrene. The other 14 PAHs tested were present in at least one sample. CSLs were exceeded in at least one sample for the following PAHs: 1-

methylnaphthalene, 2-methylnaphthalene, anthracene, benzo(a)anthracene, B(a)P, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, and phenanthrene.

An under-structure soil sample was collected from 5 ft bgs in each of eight borings and analyzed for PCBs. Only PCB-1254 was detected and in only one sample (at 240 µg/kg from boring B294), exceeding the CSL (89 µg/kg). Also, a soil sample was collected from 5 ft bgs in each of nine borings and analyzed for OCPs. No OCPs were detected.

5. Data Evaluation

Extensive characterization of soil, soil gas, and groundwater at the site has been conducted since 2005, providing data sufficient to support a risk assessment. These data more accurately reflect current site conditions than data collected during earlier investigations. In addition, data collected at the site prior to 2005 are 12 years to more than 20 years old and may be of lower quality due to less sensitive analytical methods in use at the time, resulting in varying and likely higher laboratory detection limits. For these reasons, only data collected by BBL and ARCADIS since 2005 were used for the BHHRA.

It is necessary to define potentially complete exposure pathways for hypothetical current and future receptors at the site (i.e., construct a conceptual site model [CSM]) before conducting the BHHRA (see Section 6.2 for more information). Based on the characteristics of detected chemicals and the potentially complete exposure pathways, exposure media are defined. The rationale used in selecting data of various media (soil, soil vapor, and groundwater) and the steps used to verify and prepare data for use in the risk assessment are described in the following sections.

5.1 Soil

Human receptors may be exposed to chemicals present in site soil through incidental ingestion, inhalation of dust, and dermal contact. The soil dataset for the BHHRA was developed using validated data that met data quality objectives defined in the *Baseline Risk Assessment Workplan* (ARCADIS BBL, 2007). During the data evaluation for the risk assessment, it was noted that soil results were not consistently reported as wet weight or dry weight. Some of the data collected in 2005–06 were reported as wet weight, but percent moisture data were not available for each sample to convert the results to dry weight, as needed for use in the risk assessment. ARCADIS (2008) submitted a memorandum describing the affected data and the solution to LARWQCB on March 12, 2008 (Appendix B). Soil data reported as wet weight were converted to dry weight assuming a moisture content of 25%, which is the highest percent moisture measured in samples collected at the site for which moisture data are available. Using the highest percent moisture for this conversion is conservative, as the higher the percent moisture is, the higher the dry weight concentration will be.

Two separate soil data sets were developed to evaluate potential exposures—one for current site conditions and one for future site conditions. The site is currently inactive and there are no soil excavation or construction activities in progress. Thus, current

exposure to COIs in soil is limited to surface soil. Surface soil is typically defined as the top 0.5 ft of soil, but it is possible that soil to a depth of 2 ft could contribute to exposure. As a conservative measure, two separate surface soil datasets for each of the four areas were compiled using data from the 0- to 0.5-ft-bgs and 0- to 2-ft-bgs intervals. Each dataset was then evaluated under a conservative ratio-based toxicity screening analysis using USEPA (2008c) RSLs. The depth interval showing the highest total "risk" was selected as the surface soil dataset for that area. The results of this toxicity screen are presented in Appendix C and indicate that the 0- to 2-ft-bgs surface soil data set for Areas 1, 2, and 3 and the 0- to 0.5-ft-bgs dataset for Area 4 should be used to be conservative.

As noted previously, the site will be redeveloped, which will entail construction activities that may include excavation and redistribution of subsurface soil across the site. Consistent with CalEPA recommendations, datasets consisting of soil samples collected from 0 to 10 ft bgs in each area were developed to address potential exposures related to future site conditions following possible excavation and redistribution of subsurface soils to the surface.

Soil datasets included only samples collected within the site boundary with maximum end depth of either 0.5 or 2 ft bgs (for the 0- to 0.5-ft or 0- to 2-ft datasets) or a maximum end depth less than or equal to 10 ft bgs (for the 0- to 10-ft datasets). No other soil datasets were used to conduct this BHHRA.

5.2 Soil Gas

The CSM indicates that hypothetical current and future onsite receptors may be exposed to VOCs in indoor air if VOCs are present in soil gas. Risks from indoor air VOC concentrations are calculated using soil gas data. As described in Section 4, soil gas samples were collected across the site on a grid at depths of 5 and 10 feet bgs. These data were compiled for each area. Samples analyzed during purge tests (procedure used to determine the purge volume to evacuate before collecting a soil gas sample at each location) were not included in the soil gas dataset. Soil gas data from 5 ft bgs were selected for use in the risk assessment because they are considered more representative of concentrations that could impact indoor air than the 10-ft-bgs data.

5.3 Groundwater

Groundwater is first encountered beneath the site at approximately 90 ft bgs and does not discharge to the surface on or near the site. Although unlikely, potential domestic use of groundwater by a hypothetical resident living on the site was evaluated as part of this risk assessment. Use of groundwater offsite is also considered unlikely and was not evaluated as part of the BHHRA, but it may be evaluated in the future following the collection of additional offsite data as required by LARWQCB. In order to capture actual site conditions (including potential seasonal variations and attenuation of chemical concentrations resulting from ongoing groundwater remediation activities), only data collected from the onsite wells during the previous two-year period (data from first quarter 2007 through first quarter 2009, inclusive) were used to develop the groundwater database. Figure 5-3 depicts all currently sampled on- and offsite groundwater monitoring wells.

5.4 Data Usability

The resulting datasets were further evaluated and modified according to the following:

- Rejected (R-qualified) data were excluded from the quantitative risk assessment.
- Analytical results from duplicate samples collected from the same sampling location during the same sampling event were considered appropriate for risk assessment use and treated as follows:
  - When a chemical was detected in both the original sample and the duplicate sample, the results were averaged.
  - When one sample result showed no detectable concentration and a duplicate sample showed a detected concentration, only the detected concentration was included in the dataset.
  - If a chemical was not detected in either the original sample or the duplicate sample, the sample was considered a non-detect and the average reporting limit from the two samples was included in the dataset.
- When a constituent was reported by more than one method in the same sample, the method that provides the most analytically accurate result was used. For example, for VOC results, USEPA Method 8260B was selected rather than USEPA Method 8270C, and for PAHs, USEPA Method 8270C-SIM was selected rather than USEPA Method 8270C.
- Analytes with elevated reporting limits were included in the dataset.

Data for each area were compiled by sample medium, except groundwater. For Area 1, soil data are summarized in Tables 5-1 (0 to 2 ft bgs) and 5-2 (0 to 10 ft bgs), and soil gas data are summarized in Table 5-3. For Area 2, soil data are summarized in Tables 5-4 (0 to 2 ft bgs) and 5-5 (0 to 10 ft bgs), and soil gas data are summarized in Table 5-6. For Area 3, soil data are summarized in Tables 5-7 (0 to 2 ft bgs) and 5-8 (0 to 10 ft bgs), and soil gas data are summarized in Table 5-9. For Area 4, soil data are summarized in Tables 5-10 (0 to 0.5 ft bgs) and 5-11 (0 to 10 ft bgs), and soil gas data are summarized in Table 5-12. Groundwater data are summarized for the site as a whole in Table 5-13.

6. Baseline Human Health Risk Assessment

This section presents the methods used to conduct the BHHRA, including the results of this evaluation and recommended site-specific cleanup goals.

6.1 Guidance Used

The BHHRA was prepared using methods consistent with the following DTSC and USEPA documents:

- Recommended DTSC Default Exposure Factors for Use in Risk Assessment in California Military Facilities (CalEPA, 2005c)
- Risk Assessment Guidance for Superfund (RAGS), Volume 1: Human Health Evaluation Manual (USEPA, 1989)
- RAGS Volume 1: Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals (USEPA, 2004b)
- RAGS Volume 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Interim (USEPA, 2004a)
- RAGS, Volume 1: Human Health Evaluation Manual, Part F, Supplemental Guidance for Inhalation Risk Assessment (USEPA 2009a)
- Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (USEPA, 2002)
- ProUCL Version 4.0. User Guidelines (USEPA, 2007a)
- Guidelines for Exposure Assessment (USEPA, 1992a,b)
- Exposure Factors Handbook (USEPA, 1997a)
- Guidelines for Carcinogen Risk Assessment (USEPA, 2005)
- Human Health Toxicity Values in Superfund Risk Assessments (USEPA, 2003e)

- Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites (USEPA, 2003d)

- Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites (USEPA, 2002).

6.2 Conceptual Site Model for Hypothetical Human Receptors

The CSM describes the relationship between chemical sources, migration pathways, exposure routes, and possible exposure pathways for hypothetical human receptors potentially present on and near the site under current and future use conditions. The development of the CSM to evaluate impacts to a hypothetical human receptor was based on the information provided in the following sections and is illustrated in Figure 6-1.

6.3 Potential Sources of Chemicals

COIs (possible site-related chemicals) were initially identified during site investigations based on historical activities, visible cues present onsite, and findings during the progression of the investigations. The primary sources of site related COIs are associated with previous refinery-related operations, accidental releases, storage, and delivery of petroleum-related chemicals.

6.3.1 Chemicals of Interest

Because the site was an oil refinery, petroleum hydrocarbons (e.g., PAHs, BTEX, and other VOCs) were the most predominantly used COIs at the site. However, all chemicals detected from anywhere on the site were initially considered in this assessment.

6.3.2 Fate and Transport Mechanisms

The primary potential migration pathways were related to historical direct releases to surface and subsurface soil, followed by subsequent leaching to groundwater. Chemicals present in surface soils may migrate through wind-blown dust transport and surface runoff. Significant rainfall events may provide a driving force to move chemicals from surface soil to the subsurface soil and groundwater through leaching.

6.3.3 Receptors

The hypothetical human receptors likely to be present either now or in the future are described in this section. As noted earlier in Section 5.1, to account for potential exposures to COIs under current site conditions (exposure to surface soil [i.e., 0 to 0.5 or 2 ft bgs]) both a hypothetical current onsite commercial/industrial worker and a hypothetical current offsite resident living near the site were evaluated. Future construction activities at the site may involve the development of commercial buildings and the redistribution of soils down to 10 ft bgs across the surface. To address exposures under this scenario, ARCADIS evaluated a hypothetical future onsite construction worker, a hypothetical future onsite utility/trench worker, a hypothetical future onsite commercial/industrial worker, and a hypothetical future offsite resident. A hypothetical future onsite resident was also evaluated in the unlikely event housing units are developed on the site.

6.3.4 Exposure Pathway Analysis

Complete and potentially significant exposure pathways for the selected hypothetical current and future human receptors are discussed in this section. An exposure pathway is a mechanism by which receptors may contact site related chemicals. USEPA (1989) describes a complete exposure pathway in terms of four components:

- A source and mechanism of chemical release (e.g., accidental release of pesticides during formulation or in preparation for transport)
- A retention or transport medium (e.g., soil)
- A receptor at a point of potential exposure to a contaminated medium (e.g., commercial worker)
- An exposure route at the exposure point (e.g., inhalation exposure).

If any of these four components is not present, then a potential exposure pathway is considered incomplete and is not evaluated further in a risk assessment. If all four components are present, a pathway is considered potentially complete. Some pathways, although potentially complete may be considered insignificant if they are likely to contribute only a small fraction of the total exposure/dose.

6.3.5 Human Exposure Pathways

Any of the potential current and future onsite receptors (i.e., construction worker, utility/trench worker, commercial/industrial worker, and resident) may be directly exposed to chemicals in soil through the following exposure pathways:

- Incidental soil ingestion
- Dermal contact with soil
- Inhalation of airborne soil particulates
- Inhalation of vapors while working in a trench
- Inhalation of vapors emanating into a building (home or office)
- Ingestion of groundwater used for domestic purposes (hypothetical future onsite resident receptor only).

The hypothetical current and future offsite resident may also be exposed to site-related chemicals solely through inhaling soil particulates generated by wind-blown dusts. Potential impacts related to vapor intrusion and the domestic use of groundwater for the hypothetical future offsite resident may represent complete and significant exposure pathways and will be evaluated at a later date following the collection of offsite soil vapor data.

Therefore, the potentially complete exposure pathways that will be quantitatively evaluated in this BHHRA for all onsite receptors include incidental soil ingestion, dermal contact with soil, and inhalation of airborne particulates. In addition, inhalation of vapors by trench workers and ingestion of groundwater by hypothetical future onsite residents are considered potentially complete exposure pathways. For current and future offsite residents, potential exposure to airborne particulates is also considered a potentially complete exposure pathway that will be evaluated quantitatively in this BHHRA.

6.4 Selection of Constituents of Potential Concern

A risk-based screening assessment is provided to determine environmental media, chemicals, and pathways of exposure that warrant more detailed, site-specific

assessment. Prior to comparison to risk-based screening values, the following criteria were used to exclude chemicals in soil, soil gas, and groundwater as COPCs:

- Inorganic compounds considered essential nutrients (sodium, magnesium, potassium, and calcium) are excluded from COPC selection.

- Chemicals considered common laboratory contaminants (e.g., acetone, 2-butanone, methylene chloride, and phthalates) are excluded as COPCs based on review of the data from the analytical laboratory (USEPA, 1989).

Chemicals detected below background levels and (with additional spatial analyses) with a frequency of detection below 5 percent are typically excluded as COPCs. However, as a conservative measure neither of these criteria was used to select COPCs. In the event a metal(s) accounts for a significant portion of the estimated hazard or risk at the site, it is discussed in the results and uncertainties sections. The results of the COPC selection for all areas are presented as follows:

- For Area 1: Table 6-1 (surface soil), Table 6-2 (subsurface soil), Table 6-3 (soil gas)

- For Area 2: Table 6-4 (surface soil), Table 6-5 (subsurface soil); Table 6-6 (soil gas)

- For Area 3: Table 6-7 (surface soil); Table 6-8 (subsurface soil); Table 6-9 (soil gas)

- For Area 4: Table 6-10 (surface soil); Table 6-11 (subsurface soil); Table 6-12 (soil gas)

- For onsite groundwater: Table 6-13.

6.5 Exposure Assessment

Exposure assessment is the process of estimating the magnitude of exposure to human receptors potentially exposed to environmental contaminants. It includes information regarding the development of media-specific exposure point concentrations (EPCs), as well as the parameters and models necessary to estimate human exposure through dermal absorption, ingestion, and inhalation. Consistent with USEPA (1989)

guidance, each receptor was evaluated under a reasonable maximum exposure (RME) scenario only.

6.5.1 Exposure Point Concentrations

The EPC is the representative concentration of a COPC in an environmental medium that is potentially contacted by a receptor. For long-term (chronic and subchronic) exposures, the average COPC concentration is considered most representative of potential site exposures. To account for uncertainty in the estimate of the average concentration, the 95% upper confidence on the mean concentration (95% UCL) is used as an estimate of the EPC (USEPA, 2006). EPCs were estimated using USEPA's ProUCL 4.0 (version 4.00.02) (USEPA, 2007a) software program. Based on the results of the ProUCL analyses, either the 95% UCL or the maximum detected concentration of a COPC was selected as the EPC. The ProUCL output results are presented in Appendix D. A discussion of EPCs used to quantify direct exposure to soil and groundwater (e.g., dermal contact, incidental ingestion of soil, or domestic use of groundwater) is presented in Section 6.5.1.1. EPCs related to inhalation are presented in Section 6.5.1.2.

6.5.1.1 Soil and Groundwater Exposure Point Concentrations

The EPCs for surface soil (0 to 0.5 or 0 to 2 ft bgs), subsurface soil (0 to 10 ft bgs), and groundwater were calculated and are presented in Tables 6-14 (Area 1), 6-15 (Area 2), 6-16 (Area 3), 6-17 (Area 4), and 6-18 (onsite groundwater). The soil and groundwater datasets used to calculate EPCs are presented in Appendix A. These EPCs were used in the route-specific intake equations described in Section 6.5.2 for exposures related to soil exposures (e.g., incidental soil ingestion and dermal contact) or exposure related to the domestic use of groundwater (hypothetical future onsite resident only).

6.5.1.2 Air Exposure Point Concentrations

This subsection describes the methods used to estimate EPCs related to vapor intrusion, ambient air related to construction and utility/trench working, and dust emissions.

6.5.1.2.1 Vapor Intrusion

Following CalEPA (2004) vapor intrusion guidance, the EPCs for vapor intrusion are based on EPCs calculated from soil gas data input into the CalEPA (2005a) version of

the Johnson and Ettinger vapor intrusion model to estimate indoor air EPCs, which are presented in Tables 6-14 through 6-18. The soil gas dataset used in the EPC calculations is presented in Appendix A. The Johnson and Ettinger model results are presented in Appendix E. The indoor air EPCs were used in the route-specific intake equations described in Section 6.5.2 for exposures associated with the inhalation of vapors migrating into a building.

6.5.1.2.2 Ambient Air Related to Hypothetical Future Onsite Construction and Utility/Trench Worker Receptor Scenarios

Potential exposure to chemical vapors may occur through the migration (volatilization) of VOCs from soil into ambient air or into a trench. The EPCs to evaluate the inhalation of vapors under these conditions were estimated by dividing the soil EPC by chemical-specific volatilization factors (VFs), which are presented in Table 6-19.

6.5.1.2.3 Dust Emissions

Potential exposure to chemicals adsorbed to soil particles and released to air from wind erosion or during soil invasive activities was evaluated using particulate emission factors (PEFs). The following CalEPA (2005c) PEFs were used in this assessment:

- A PEF of 1×10^6 cubic meters per kilogram (m^3/kg) was used to evaluate the hypothetical future onsite construction and hypothetical future onsite utility/trench worker receptors.

- A PEF of 1.32×10^9 m^3/kg was used to evaluate the hypothetical current onsite commercial/industrial worker, the hypothetical current offsite resident, and the hypothetical future offsite resident.

6.5.2 Dose (Intake) Estimation

When evaluating exposure to noncarcinogens, doses are estimated as average daily doses (ADDs), calculated as the average exposure over the time the receptor is assumed to be exposed to the COPC. When evaluating exposure to potential carcinogens, lifetime ADDs (LADDs) are calculated by averaging exposure over a 70-year timeframe. Exposures were calculated using the dose equations recommended by USEPA (1989, 2004a) for the potentially complete exposure pathways identified in Section 6.3.5.

Soil and air EPCs and applicable receptor-specific exposure parameters were used to estimate exposures consistent with the USEPA's (1989) definition of the RME dose for each exposure pathway.

Exposure parameters were obtained/developed from two primary sets of sources:

- CalEPA (1994, 2005b) risk assessment guidance
- USEPA (1989, 1991, 1997a, 2002, 2004a,b, 2008c) risk assessment guidance.

CalEPA (1994, 2005b) default exposure parameters were generally used to estimate ADDs and LADDs. However, for specific exposure parameters, CalEPA recommends using more current USEPA guidance, specifically USEPA (2009a) guidance, for assessing inhalation exposures. Table 6-20 summarizes the exposure parameters, and Table 6-21 summarizes the dermal absorption factors used for all receptors evaluated in this assessment.

The following are the primary equations used for dose calculations.

6.5.2.1 Incidental Ingestion of Soil

The doses of constituents associated with incidental ingestion of soil were calculated as follows:

Equation 6-1:

$$Dose = \frac{C_S * IR_S * CF * FI * EF * ED}{BW * AT}$$

Where:

Dose = ADD or LADD (milligrams per kilogram per day [mg/kg-day])

C_S = COPC concentration in soil (mg/kg)

IR_S = soil ingestion rate (milligrams per day [mg/day])

CF = conversion factor (1×10^{-6} kilograms per milligram [kg/mg])

FI = fraction ingested from contaminated source (unitless)

EF = exposure frequency (days/year)

ED = exposure duration (years)

BW = body weight (kg)

AT = averaging time (days)

6.5.2.2 Dermal Contact with Soil

Absorbed doses of constituents associated with dermal contact with soil were calculated as follows:

Equation 6-2:

$$Dose = \frac{C_S * CF * SA * AF * ABS_d * EF * ED}{BW * AT}$$

Where:

Dose = ADD or LADD (mg/kg-day)

C_S = COPC concentration in soil or sediment (mg/kg)

CF = conversion factor (1×10^{-6} kg/mg)

SA = skin surface area available for contact (square centimeters [cm^2])

AF = soil- or sediment-to-skin adherence factor (milligrams per square centimeter per day [mg/cm^2-day])

ABS_d = dermal absorption factor (unitless) (Table 5-8)

EF = exposure frequency (days/year)

ED = exposure duration (years)

BW = body weight (kg)

AT = averaging time (days)

6.5.2.3 Inhalation of Vapors or Fugitive Dust Particles

Consistent with USEPA (2009a) RAGS Part F, exposure concentrations (in place of doses) were calculated for inhalation exposure pathways as follows:

Equation 6-3:

$$EC = \frac{C_a * ET * EF * ED * CF}{BW * AT}$$

And:

$$C_a = \frac{C_s}{(VF \text{ or } PEF)}$$

Where:

EC = exposure concentration (milligrams per cubic meter [mg/m^3])

C_a = COPC concentration in air (mg/m^3)

ET = exposure time (hours/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)

CF = conversion factor (1/24 days/hour)

BW = body weight (kg)

AT = averaging time (days)

C_s = COPC concentration in soil (mg/kg)

VF = volatilization factor for volatile chemicals (m^3/kg)

PEF = particulate emission factor for dust particles (m^3/kg)

6.5.3 Lead Exposure

DTSC's LeadSpread model (CalEPA, 1999) and the USEPA's Adult Lead Methodology (ALM; USEPA, 2003b,c; 2008) were used to evaluate the potential exposure to lead. The LeadSpread model calculates upper percentile blood-lead concentrations for adults and children, specifically, the median, 90th, 95th, 98th, and 99th percentile blood-lead concentrations. LeadSpread was used to evaluate the hypothetical current offsite child and adult resident and the hypothetical future onsite and offsite child and adult resident receptor using CalEPA (1999) default exposure assumptions.

USEPA's (2003b,c; 2008) ALM model was used to assess exposure to the hypothetical future onsite construction worker, the hypothetical current and future onsite commercial/industrial workers, and the hypothetical current and future onsite adult resident by relating soil-lead intake in women of child-bearing age to blood-lead concentrations in a developing fetus (USEPA, 2003b,c; 2008). Default estimates were used for the statistical measures of blood lead, including the target 95th percentile blood-lead concentration in fetus, fetal/maternal blood-lead ratio ($R_{fetal/maternal}$), biokinetic slope factor, geometric standard deviation on the population mean blood-lead concentration (GSDi), and baseline blood-lead concentration. Default values were also used for exposure parameters such as the lead absorption fraction and the averaging time.

The ALM calculates 95th percentile blood-lead concentrations by applying a geometric standard deviation to a central tendency exposure (CTE) calculated from the user-specified input parameters. Therefore, all exposure parameters for ALM (and LeadSpread) were set to the CTE values (in contrast to upper bound RME estimates). A 50 mg/kg soil ingestion rate was used to evaluate the hypothetical current and future commercial/industrial worker receptor (USEPA, 2008). USEPA (2008) recommends 100 mg/day as the CTE soil ingestion rate for the hypothetical future onsite construction worker. This soil ingestion rate was also used for the hypothetical future onsite utility/trench worker. Because the inhalation of dusts from the site is the only complete exposure pathway for the hypothetical current and future offsite adult resident, no soil ingestion rate was used for this receptor.

Calculations were conducted using GSDi of exposed individuals estimates, for both 1) a homogeneous (i.e., similar socioeconomic and ethnic characteristics and living within a small geographic area); and 2) a heterogeneous (i.e., varied socioeconomic, ethnic, and geographic characteristics) population. Documentation for the ALM cites three separate sets of default values for these two GSDi estimates (USEPA, 2003b,c). The most conservative set of input values (i.e., GSDi = hom = 2.1 and GSDi = het = 2.3) were used for estimating exposure.

The ALM provides two equations for estimating exposure. One equation is based on an ingestion rate of soil that includes soil and indoor dust (IR_s). For scenarios in which the proportion of soil to dust is known, a second equation is provided that uses a total ingestion rate of outdoor soil and indoor dust (IR_{s+d}) and weights the fraction of the ingestion rate that is from outdoor soil.

6.6 Toxicity Assessment

Both CalEPA (2009a,b) and USEPA (2008a,b,c) have derived numerical toxicity values for use in risk assessment. Because the risks associated with exposure to carcinogens are assessed differently than the hazards associated with exposure to noncarcinogens, the toxicity values were derived using different assumptions and methods. The toxicity values used to assess potential carcinogenic risk are described in Section 6.6.1. The toxicity values used to assess potential hazard for noncarcinogens are described in Section 6.6.2. This section also addresses the basis for dermal cancer slope factors and reference doses (Section 6.6.3), and the treatment of chemicals for which toxicity data were inadequate for the derivation of toxicity values by regulatory agencies (Section 6.6.4).

The assessment of potential hazard associated with lead exposure is a special case that is evaluated separately, as described previously in Section 6.5.3.

6.6.1 Toxicity Values for Carcinogenic Health Effects

Cancer slope factors (CSFs) are used in the risk characterization to estimate potential cancer risk and represent the upper-bound probability of carcinogenic response per unit daily intake of a substance over a lifetime. CSFs were used in this BHHRA to assess excess lifetime cancer risk for all receptors. CSFs were selected from the following sources in order of priority:

- CalEPA's (2009a) Office of Environmental Health Hazard Assessment (OEHHA) Online Toxicity Criteria Database

- USEPA's (2009b) Integrated Risk Information System (IRIS) online database

The toxicity values for carcinogenic health effects are presented in Tables 6-22 (oral and dermal) and 6-23 (inhalation).

6.6.2 Toxicity Values for Noncarcinogenic Health Effects

Following USEPA (1989) guidance, chronic reference doses (RfDs) were used in the risk characterization to assess potential noncarcinogenic hazard to receptors with exposure durations greater than 7 years (hypothetical future residents and hypothetical future onsite commercial/industrial workers). Subchronic RfDs were used in the risk characterization to assess potential noncarcinogenic hazard to hypothetical future onsite construction workers with exposure durations less than 7 years. Whenever a subchronic RfD was unavailable, the chronic RfD was used. Chronic and subchronic noncarcinogenic RfDs were obtained from the following sources in order of priority:

- CalEPA's (2009b) Chronic Reference Exposure Levels (RELs) and the OEHHA Online Toxicity Criteria Database (CalEPA, 2009a). RELs were converted from a concentration (micrograms per cubic meter [µg/m^3]) to a chronic reference concentration (RfC) using standard default exposure assumptions for adult body weight (70 kg) and adult inhalation rate (20 cubic meters per day [m^3/day], which assumes a 24-hour-per-day exposure).

- USEPA's (2009b) IRIS online database for RfDs.

- USEPA's (2008b) Provisional Peer Reviewed Toxicity Value Database; this source was consulted when RfDs, RELs, and RfCs were not available from OEHHA, IRIS, or Health Effects Assessment Summary Tables (HEAST).

- USEPA's (1997b) HEAST where chronic oral RfDs were not available in IRIS (HEAST is the primary source of subchronic RfDs).

- The Agency for Toxic Substances and Disease Registry (ATSDR, 2008) Minimal Risk Levels were consulted for intermediate (i.e., subchronic) values.

For the inhalation exposure route, the most conservative of the CalEPA Chronic REL or the USEPA RfC was used for the inhalation exposure route, if both were available and the RfC was based on inhalation studies. For any organic COPC for which IRIS or OEHHA did not provide an RfC/REL, the oral RfD was used to assess potential noncancer hazard associated with the inhalation exposure route. Consistent with USEPA's (2008c) approach for developing RSLs, oral RfDs were not used to assess toxicity of inorganic chemicals (metals) via the inhalation exposure route. The toxicity values for noncarcinogenic health effects are presented in Tables 6-24 (oral and dermal) and 6-25 (inhalation).

6.6.3 Dermal Cancer Slope Factors and Reference Doses

When dermal toxicity values were not available, dermal CSFs and RfDs were derived only for those COPCs that meet the USEPA (2004a) criteria for adjustment. The following oral-to-dermal adjustment factor (oral absorption efficiency) was used to calculate the dermal CSF or RfD values:

$$\text{RfD (dermal)} = \text{RfD (oral)} \times \text{Adjustment Factor (oral absorption efficiency)}$$

$$\text{CSF (dermal)} = \text{CSF (oral)} / \text{Adjustment Factor (oral absorption efficiency)}$$

USEPA (2008c) was used as the primary source of oral-to-dermal adjustment factors for COPCs identified in this BHHRA. The Oak Ridge National Laboratory (ORNL, 2008) Risk Assessment Information System was used as the secondary source. For chemicals without adjustment factors, oral RfDs with an adjustment factor of 1 were used in the risk characterization to assess hazards associated with dermal exposure.

Oral-to-dermal adjustment factors and toxicity values for carcinogenic and noncarcinogenic health effects are presented in Tables 6-22 and 6-24.

6.6.4 Contaminants Without Toxicity Values

Toxicity values were not available from USEPA, CalEPA, or ATSDR for several chemicals: 1,2,3-TCB, ethanol, 2-hexanone, methane, acenaphthalyne, phenanthrene, idiomethane, and benzo(g,h,i)perylene. Neither CalEPA nor USEPA have identified appropriate surrogate toxicity values for these chemicals for the derivation of screening levels (e.g., RSLs, CHHSLs). Therefore, these COPCs were not quantitatively evaluated in this BHHRA. The potential uncertainties associated with the exclusion of

these chemicals from the risk assessment are discussed in the uncertainties section (Section 9).

6.7 Risk Characterization

Risk characterization integrates the exposure assessment and the toxicity assessment to provide quantitative estimates of potential human health hazards and risks specific to the site. The cancer risk and/or noncancer hazard was calculated for each COPC and for each media and potentially complete exposure pathway for which applicable toxicity values were available. The ELCR is calculated for compounds identified by CalEPA or USEPA as probable human carcinogens. The cancer risk is defined by CalEPA (1994) as "the risk, or theoretical probability of developing cancer from that chemical upon exposure to that medium." Methods used to estimate ELCRs and hazard indices (HIs) related to dermal/ingestion and inhalation exposures are presented in Sections 6.7.1 and 6.7.2, respectively.

6.7.1 Dermal and Ingestion Exposures

For all dermal and ingestion related exposures, ELCRs were estimated by multiplying the LADD by the chemical-specific CSF as shown in the following equation:

Equation 6-4:

$$ELCR = CSF \times LADD$$

Where:

ELCR = excess lifetime cancer risk (unitless)

CSF = cancer slope factor ($[mg/kg\text{-}day]^{-1}$)

LADD = lifetime average daily dose (mg/kg-day)

The total (or cumulative) ELCR at the site was calculated by summing the risk for each carcinogen over all exposure media and exposure pathways.

A hazard quotient (HQ) was calculated for all COPCs with available noncarcinogenic toxicity values. The HQ is the ratio of the estimated dose from exposure to a

compound in a particular medium to the dose that is not expected to result in adverse health effects, other than cancer.

Equation 6-5:

$$HQ = \frac{ADD}{RfD}$$

Where:

HQ = hazard quotient (unitless)

RfD = reference dose (mg/kg-day)

ADD = average daily dose (mg/kg-day)

If the HQ exceeds the target value of one, there is potential that a noncarcinogenic hazard exists. However, the HQ is not a mathematical prediction of the severity or incidence of the effects, but rather is an indication that a hazard may exist. CalEPA (1994) and USEPA (1989) recommend that the total HI (i.e., the sum of the HQs for all chemicals) not exceed a value of 1. If the resulting total HI is greater than 1, it may be recalculated summing only HQs for chemicals with a similar mechanism of action or toxic endpoints (USEPA, 1989).

6.7.2 Inhalation Exposures

Consistent with recent USEPA (2009a) RAGS Part F guidelines, potential impacts related to inhalation exposures were estimated differently than for dermal and ingestion exposures as noted below:

Excess Lifetime Cancer Risks:

Equation 6-8:

$$ELCR = EC_{ca} \times IUR$$

Where:

ELCR = excess lifetime cancer risk (unitless)

EC_{ca} = cancer exposure concentration (mg/m^3)

IUR = inhalation unit risk $(mg/m^3)^{-1}$

Hazard Quotients:

Equation 6-7:

$$HQ = \frac{ECnc}{RfD}$$

Where:

HQ = hazard quotient (unitless)

EC_{nc} = exposure concentration (mg/m^3)

RfC = Reference concentration (mg/m^3)

6.7.3 ELCR and HI Results

This section presents the results of the BHHRA, which are summarized by receptor and media in Table 6-26 (ELCRs and HIs). Chemical-specific ELCRs and HQs/HIs are presented in Appendices E, F, and G. The results of the lead exposure assessment are also discussed as part of this section and are summarized in Table 6-27. Total estimated ELCRs for all receptors were compared against CalEPA's (1994) threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range of 1×10^{-4} to 1×10^{-6} for cancer effects and the target HI of 1 for noncancer effects. Estimated blood-lead levels were compared against the CDC (1991) blood-lead threshold of 10 micrograms per deciliter (µg/dl).

Results are presented separately by area in the following subsections.

6.7.3.1 Area 1

This subsection presents the results associated with current (Section 6.7.3.1.1) and future (Section 6.7.3.1.2) conditions. The results of the lead exposure evaluation are summarized in Section 6.7.3.1.3.

6.7.3.1.1 Current Site Conditions

6.7.3.1.1.1 Hypothetical Current Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 2×10^{-5} and 0.06, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable cancer risk range (1×10^{-4} to 1×10^{-6}). The HI is below the target HI of 1 for noncancer effects. Arsenic (79 percent) and B(a)P (11 percent) in soil account for 90 percent of the total estimated ELCR. The ELCR related to vapor intrusion accounts for only 4 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-1 through E-4 of Appendix E (soil gas/vapor intrusion) and Table F-1 of Appendix F (soil exposure).

6.7.3.1.1.2 Hypothetical Current Offsite Resident Receptor

The ELCR and HI for this receptor are 1×10^{-7} and 0.002, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable cancer risk range (1×10^{-4} to 1×10^{-6}) for cancer effects, and the HI is below the target HI of 1 for noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-2 (child) and Table F-3 (adult) of Appendix F.

6.7.3.1.2 Future Site Conditions

6.7.3.1.2.1 Hypothetical Future Onsite Construction Worker Receptor

The ELCR and HI for this receptor are 3×10^{-6} and 1, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is equal to the target HI of 1 for noncancer effects. Arsenic (69 percent), cobalt (12 percent), and hexavalent chromium (10 percent) account for 91 percent of the total estimated ELCR. Arsenic (12 percent), cobalt (61 percent), and nickel (10 percent) account for 83 percent of the total estimated HI. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-4 of Appendix F.

6.7.3.1.2.2 Hypothetical Future Onsite Utility/Trench Worker Receptor

The ELCR and HI for this receptor are 2×10^{-6} and 0.09, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is

within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Arsenic (69 percent), cobalt (12 percent), and hexavalent chromium (11 percent) account for 92 percent of the total estimated ELCR. Arsenic (12 percent), cobalt (61 percent), and nickel (9 percent) account for 82 percent of the total estimated HI. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-5 of Appendix F.

6.7.3.1.2.3 Hypothetical Future Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 1×10^{-5} and 0.1, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Arsenic (76 percent) and B(a)P (6 percent) in soil and benzene related to vapor intrusion (7 percent) account for 89 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-1 through E-4 of Appendix E (soil gas/vapor intrusion) and Table F-6 of Appendix F (soil exposure).

6.7.3.1.2.4 Hypothetical Future Onsite Resident Receptor

The ELCR and HI for this receptor are 3×10^{-3} and 11, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is above the target HI of 1 for noncancer effects.

Exposure to benzene in the unlikely event groundwater is used for domestic purposes accounts for approximately 98 percent of the total estimated ELCR (3×10^{-3}) and 92 percent of the total estimated HI (10). Arsenic (ELCR = 4×10^{-5}) in soil accounts for only 2 percent of the total estimated ELCR. However, if groundwater is excluded as a potential drinking water source, arsenic accounts for 79 percent of the total estimated ELCR. Benzene in groundwater (HI = 9.3) is the only COPC with an HI exceeding 1. All vapor intrusion ELCRs and HIs are below agency thresholds for cancer and noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-5 through E-8 of Appendix E (soil gas/vapor intrusion), Table F-7 (child) and Table F-8 (adult) of Appendix F (soil exposure), and Tables G-1 (child) and G-2 of Appendix G (groundwater exposure).

6.7.3.1.3 Hypothetical Future Offsite Resident Receptor

The ELCR and HI for this receptor are 8×10^{-8} and 0.003, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Tables F-9 (child) and F-10 (adult) of Appendix F.

6.7.3.1.3.1 Lead Exposure

This section and Table 6-27 summarize the results of the lead exposure evaluation. The lead evaluation spreadsheets used for each receptor are presented in Tables H-1 through H-7 of Appendix H. All estimated blood-lead levels for Areas 1 were below the CDC (1991) blood-lead threshold of 10 µg/dl, ranging from 1.7 µg/dl (hypothetical future onsite utility/trench worker) to 7.5 µg/dl (fetus of hypothetical future onsite construction worker receptor).

6.7.3.2 Area 2

This subsection presents the results associated with current (Section 6.7.3.2.1) and future (Section 6.7.3.2.2) conditions. The results of the lead exposure evaluation are summarized in Section 6.7.3.2.3.

6.7.3.2.1 Current Site Conditions

6.7.3.2.1.1 Hypothetical Current Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 3×10^{-5} and 0.2, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Arsenic (58 percent) and B(a)P (5 percent) in soil account for 63 percent of the total estimated ELCR. The ELCR related to vapor intrusion accounts for only 0.5 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-9 Table E-12 of Appendix E (soil gas/vapor intrusion) and Table F-11 of Appendix F (soil exposure).

6.7.3.2.1.2 Hypothetical Current Offsite Resident Receptor

The ELCR and HI for this receptor are 8×10^{-8} and 0.007, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Tables F-12 (child) and F-13 (adult) of Appendix F.

6.7.3.2.2 Future Exposures

6.7.3.2.2.1 Hypothetical Future Onsite Construction Worker Receptor

The ELCR and HI for this receptor are 5×10^{-6} and 2, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is above the target HI of 1 for noncancer effects. Arsenic (68 percent), B(a)P (5 percent), cobalt (9 percent), and PCB-1254 (6 percent) account for 88 percent of the total estimated ELCR. Arsenic (8 percent), cobalt (33 percent), nickel (42 percent), and PCB-1254 (9 percent) account for 92 percent of the total estimated HI. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-14 of Appendix F.

6.7.3.2.2.2 Hypothetical Future Onsite Utility/Trench Worker Receptor

The ELCR and HI for this receptor are 3×10^{-6} and 0.2, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Arsenic (68 percent), B(a)P (5 percent), cobalt (9 percent), and PCB-1254 (6 percent) account for 88 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-9 through E-12 of Appendix E (soil gas/vapor intrusion) and Table F-15 of Appendix F (soil exposure).

6.7.3.2.2.3 Hypothetical Future Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 3×10^{-5} and 0.3, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Arsenic (66 percent), benzene (14 percent), and B(a)P (7 percent) in soil account for 87 percent of the total estimated

ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-16 of Appendix F.

6.7.3.2.2.4 Hypothetical Future Onsite Resident Receptor

The ELCR and HI for this receptor are 3×10^{-3} and 12, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is above the target HI of 1 for noncancer effects.

Exposure to benzene in the unlikely event groundwater is used for domestic purposes accounts for approximately 95 percent of the total estimated ELCR (3×10^{-3}). Benzene (77 percent) and PCB-1254 (11 percent) account for 88 percent of the total estimated HI.

Arsenic (ELCR = 6×10^{-5}) in soil accounts for only 3 percent of the total estimated ELCR. However, if groundwater is excluded as a potential drinking water source, arsenic accounts for 66 percent of the total estimated ELCR. PCB-1254 in soil (HI = 1.3) and benzene in groundwater (HI = 9.3) are the only COPCs with HIs exceeding 1. All vapor intrusion ELCRs and HIs are below agency thresholds for cancer and noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-13 through E-16 of Appendix E (vapor intrusion), Tables F-17 (child) and F-18 (adult) of Appendix F (soil), and Tables G-1 (child) and G-2 (adult) of Appendix G (groundwater exposure).

6.7.3.2.2.5 Hypothetical Future Offsite Resident Receptor

The ELCR and the HI for this receptor are 9×10^{-8} and 0.06, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Chemical-specific ELCRs and HIs for this hypothetical future offsite resident receptor are presented in Tables F-19 (child) and F-20 (adult) of Appendix F.

6.7.3.2.2.6 Lead Exposure

This section summarizes the results of the lead exposure evaluation. The results are summarized in Table 6-27. The lead evaluation spreadsheets used for each receptor are presented in Tables H-8 through H-14 in Appendix H. All estimated blood-lead

levels for Area 2 were below the CDC (1991) blood-lead threshold of 10 µg/dl (CDC, 1991) ranging from 1.7 µg/dl (hypothetical future onsite utility/trench worker receptor) to 7.0 µg/dl (fetus of the hypothetical future onsite construction worker receptor).

6.7.3.3 Area 3

This subsection presents the results associated with current (Section 6.7.3.3.1) and future (Section 6.7.3.3.2) conditions. The results of the lead exposure evaluation are summarized in Section 6.7.3.3.3.

6.7.3.3.1 Current Site Conditions

6.7.3.3.1.1 Hypothetical Current Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 3×10^{-5} and 0.2, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Arsenic (65 percent), B(a)P (7 percent), and PCB-1254 (7 percent) account for 79 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-17 through E-20 of Appendix E (soil gas/vapor intrusion) and Table F-21 of Appendix F (soil exposure).

6.7.3.3.1.2 Hypothetical Current Offsite Resident Receptor

The ELCR and HI for this receptor are 2×10^{-7} and 0.003, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the target HI of 1 for noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Tables F-22 (child) and F-23 (adult) of Appendix F.

6.7.3.3.2 Future Exposures

6.7.3.3.2.1 Hypothetical Future Onsite Construction Worker Receptor

The ELCR and HI for this receptor are 5×10^{-6} and 1, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is equal to the HI target of 1 for noncancer effects. Arsenic (56 percent), cobalt

(9 percent), and hexavalent chromium (12 percent) account for 77 percent of the total estimated ELCR. Arsenic (11 percent), cobalt (51 percent), and PCB-1254 (14 percent) account for 76 percent of the total estimated HI. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-24 of Appendix F.

6.7.3.3.2.2 Hypothetical Future Onsite Utility/Trench Worker Receptor

The ELCR and HI for this receptor are 3×10^{-6} and 0.1, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Arsenic (56 percent), cobalt (9 percent), and hexavalent chromium (12 percent) account for 77 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-25 of Appendix F.

6.7.3.3.2.3 Hypothetical Future Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 2×10^{-5} and 0.2, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Arsenic (62 percent) and PCB-1254 (9 percent) account for 71 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-17 through E-20 (soil gas/vapor intrusion) and Table F-26 of Appendix F (soil exposure).

6.7.3.3.2.4 Hypothetical Future Onsite Resident Receptor

The ELCR and HI for this receptor are 3×10^{-3} and 12, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is above the HI target of 1 for noncancer effects.

Exposure to benzene in the unlikely event groundwater is used for domestic purposes accounts for approximately 97 percent of the total estimated ELCR and 83 percent of the total estimated HI.

The inhalation of benzene vapors (vapor intrusion) accounts for less than 1 percent of total estimated ELCR or HI. Arsenic (ELCR = 5×10^{-5}) in soil accounts for only 2 percent of the total estimated ELCR. However, if groundwater is excluded as a

potential drinking water source, arsenic accounts for 64 percent of the total estimated ELCR. All vapor intrusion ELCRs and HIs are below agency thresholds for cancer and noncancer effects. PCB-1254 in soil (HI = 1.1) and benzene in groundwater (HI = 9.3) are the only COPCs with HIs exceeding 1. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-21 through E-24 of Appendix E (soil gas/vapor intrusion), Tables F-27 (child) and F-28 (adult) of Appendix F (soil exposure), and Tables G-1 (child) and G-2 (adult) of Appendix G (groundwater exposure).

6.7.3.3.2.5 Hypothetical Future Offsite Resident Receptor

The ELCR and HI for this receptor are 1×10^{-7} and 0.003, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Chemical-specific ELCRs and HIs for this hypothetical future offsite resident receptor are presented in Tables F-29 (child) and F-30 (adult) of Appendix F.

6.7.3.3.2.6 Lead Exposure

This section summarizes the results of the lead exposure evaluation. The results are summarized in Table 6-27. The lead evaluation spreadsheets used for each receptor are presented in Tables H-15 through H-21 of Appendix H. With the exception of one hypothetical receptor, estimated blood-lead levels for Area 3 were below the agency threshold blood-lead level of 10 µg/dl (CDC, 1991) ranging from 1.8 µg/dl (hypothetical future onsite utility/trench worker receptor) to 10.6 µg/dl (fetus of the hypothetical current onsite commercial/industrial worker receptor). Only the estimated blood-lead level of 10.6 µg/dl for the fetus of the hypothetical future onsite construction worker receptor exceeded the CDC (1991) blood-lead threshold of 10 µg/dl.

6.7.3.4 Area 4

This subsection presents the results associated with current (Section 6.7.3.4.1) and future (Section 6.7.3.4.2) conditions. The results of the lead exposure evaluation are summarized in Section 6.7.3.4.3.

6.7.3.4.1 Current Site Conditions

6.7.3.4.1.1 Hypothetical Current Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 2×10^{-5} and 0.2, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Arsenic (74 percent) and B(a)P (6 percent) account for 80 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-25 through E-28 of Appendix E (soil gas/vapor intrusion) and Table F-31 of Appendix F (soil exposure).

6.7.3.4.1.2 Hypothetical Current Offsite Resident Receptor

The ELCR and HI for this receptor are 5×10^{-7} and 0.003, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Tables F-32 (child) and F-33 (adult) of Appendix F.

6.7.3.4.2 Future Exposures

6.7.3.4.2.1 Hypothetical Future Onsite Construction Worker Receptor

The ELCR and HI for this receptor are 4×10^{-6} and 1, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is equal to the HI target of 1 for noncancer effects. Arsenic (71 percent), cobalt (11 percent), and hexavalent chromium (9 percent) account for 91 percent of the total estimated ELCR. Arsenic (11 percent) and cobalt (50 percent) account for 61 percent of the total estimated HI. Chemical-specific ELCRs and HIs for this receptor are presented in Table F-34 of Appendix F.

6.7.3.4.2.2 Hypothetical Future Onsite Utility/Trench Worker Receptor

The ELCR and HI for this receptor are 2×10^{-6} and 0.1, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Arsenic (71 percent), cobalt

(11 percent), and hexavalent chromium (9 percent) account for 91 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs are presented in Table F-35 of Appendix F.

6.7.3.4.2.3 Hypothetical Future Onsite Commercial/Industrial Worker Receptor

The ELCR and HI for this receptor are 2×10^{-5} and 0.2, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6}, but is within USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Arsenic (74 percent) and benzene (7 percent) account for 81 percent of the total estimated ELCR. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-25 through E-28 of Appendix E (soil gas/vapor intrusion) and Table F-32 of Appendix F (soil exposure).

6.7.3.4.2.4 Hypothetical Future Onsite Resident Receptor

The ELCR and HI for this receptor are 3×10^{-3} and 12, respectively. The cancer risk estimate exceeds CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is above the HI target of 1 for noncancer effects.

Exposure to benzene in the unlikely event groundwater is used for domestic purposes accounts for 98 percent of the total estimated ELCR and 77 percent of the total estimated HI. No other COPCs contribute significantly to the elevated ELCR and HI.

Arsenic (ELCR = 5×10^{-5}) in soil accounts for only 2 percent of the total estimated ELCR. However, if groundwater is excluded as a potential drinking water source, arsenic accounts for 76 percent of the total estimated ELCR. Benzene in groundwater (HI = 9.3) is the only COPC with an HI exceeding 1. The inhalation of benzene vapors (vapor intrusion) accounts for less than 1 percent of total estimated ELCR or HI. All vapor intrusion HIs are below agency thresholds for cancer and noncancer effects. Chemical-specific ELCRs and HIs for this receptor are presented in Tables E-29 through E-32 of Appendix E (soil gas/vapor intrusion), Tables F-37 (child) and F-38 (adult) of Appendix F (soil), and Tables G-1 (child) and G-2 (adult) of Appendix G (groundwater).

6.7.3.4.2.5 Hypothetical Future Offsite Resident Receptor

The ELCR and HI for this receptor are 8×10^{-8} and 0.003, respectively. The cancer risk estimate is below CalEPA's (1994) acceptable cancer risk threshold of 1×10^{-6} and USEPA's (2003a) acceptable risk range (1×10^{-4} to 1×10^{-6}) for cancer effects. The HI is below the HI target of 1 for noncancer effects. Chemical-specific ELCRs and HIs are presented in Tables F-39 (child) and F-40 (adult) of Appendix F.

6.7.3.4.2.6 Lead Exposure

This section summarizes the results of the lead exposure evaluation. The results are summarized in Table 6-27. The lead evaluation spreadsheets used for each receptor are presented in Tables H-22 through H-28 of Appendix H. All estimated blood-lead levels for Area 4 were below the CDC (1991) blood-lead threshold of 10 µg/dl (CDC, 1991), ranging from 1.7 µg/dl (hypothetical future onsite utility/trench worker receptor) to 7.7 µg/dl (fetus of the hypothetical future onsite construction worker receptor).

7. Summary and Conclusions

The BHHRA presented herein found that potential cancer risks associated with soil media ranged from 2×10^{-8} to 5×10^{-5} and HIs were less than or equal to the target HI of 1. The primary COPC contributing to elevated ELCRs in soil within all four areas was arsenic. Secondarily, B(a)P, cobalt, hexavalent chromium, and PCB-1254 also contributed to elevated ELCRs in one or more areas but to a much lesser extent than arsenic. Although arsenic was found to pose the most significant soil-related risk to all possible current and future onsite receptors in all four areas, the average arsenic concentrations (5.5 to 8.4 mg/kg in surface soil and 4.8 to 7.4 mg/kg in subsurface soil, estimated as the 95% UCL) are less than 13 mg/kg, which had previously been accepted by LARWQCB as a background concentration for the Bloomfield property, located adjacent to the site (ARCADIS, 2003). In the absence of arsenic, total estimated ELCRs for all four areas ranged from 1×10^{-8} to 2×10^{-5}. It is unlikely the site would ever be developed for residential use in the future. In the absence of arsenic, total estimated ELCRs associated with non-residential exposures range up to 4×10^{-6}, 9×10^{-6}, 6×10^{-5}, and 5×10^{-5}, in Areas 1, 2, 3, and 4, respectively.

For the vapor intrusion to indoor air exposure pathway, total estimated ELCRs were equal to or less than 1×10^{-6} for all receptors in all four areas except for Area 4 where the ELCR was 2×10^{-6}. HIs for the vapor intrusion to indoor air exposure pathway were well below the target HI of 1 in all four areas.

Site-wide groundwater risks ranged up to 3×10^{-3} and HIs ranged up to 10, almost entirely due to elevated concentrations of benzene in groundwater. However, groundwater is not currently used as a potable source of drinking water, and it is unlikely that the site will ever be developed for residential use in the future.

In conclusion, under a future residential land-use scenario, several soil contaminants (e.g., B(a)P, cobalt, and hexavalent chromium) pose a potential health risk should the site be redeveloped for such use. However, the site is currently a commercial/industrial site and will likely remain as such into the foreseeable future. Similarly, contaminants in groundwater would only pose a potential health risk should it be used for domestic purposes, and volatile contaminants in groundwater were shown to not pose a significant health risk. Therefore, under the current and anticipated future commercial/industrial land use, the site poses a minimal risk to human health.

8. Recommended Site-Specific Cleanup Goals

Site-specific cleanup goals (SSCGs) were derived for individual COPCs that exceeded an ELCR of 1×10^{-6} or the target HQ of 1. COPCs in soil gas did not result in elevated ELCRs or HQs through the vapor intrusion exposure pathway for any of the hypothetical human receptors evaluated at the site. For this reason no cleanup goals for COPCs in soil gas were estimated. In groundwater, only benzene exposures resulted in risk/HI estimates exceeding agency threshold levels of concern. The California MCL for benzene of 1 µg/L (CCR Title 17 and Title 22; http://ww2.cdph.ca.gov/certlic/drinkingwater/Documents/Lawbook/dwregulations-01-01-2009.pdf) will be used as the cleanup goal for benzene in groundwater.

In soil, seven COPCs exceeded an ELCR of 1×10^{-6} or an HI of 1. Both cancer-based and noncancer-based SSCGs were derived for each of these chemicals. The lower of these two values was then identified as an appropriate SSCG for the site. Specifically, SSCGs were estimated for the following COPCs under the following scenarios:

- Benzene, B(a)P, and PCB-1254 to address commercial/industrial worker exposures for soil at 0 to 2 ft bgs; and

- 1,2,3-TCP, 1,2-DCP, benzene, B(a)P, aldrin, chlordane, and PCB-1254 for address hypothetical future onsite residential exposures for soil at 0 to 10 ft bgs.

SSCGs were estimated using the following equation:

Equation 8-1:

$$SSCG = (TR \ or \ THI) \frac{EPC}{(ELCRr \ or \ HIr)}$$

Where:

SSCG = Site-specific cleanup goal (mg/kg)

TR = Target cancer risk (1×10^{-6})

THI = Target hazard index (1)

EPC = Exposure point concentration (mg/kg)

ELCRr = Receptor-specific excess lifetime cancer risk (unitless)

HIr = Receptor-specific hazard index (unitless)

SSCGs for all COPCs listed above are presented in Table 8-1.

9. Uncertainties

This section discusses the uncertainties associated with the BHHRA. The goal of the BHHRA was to evaluate the potential for unacceptable health effects. To this end, the assumptions used in this BHHRA reflect estimates based on an upper-bound exposure (RME) estimate. Because generic assumptions for the receptors were used, the ELCRs and HIs calculated in this assessment are not absolute. Below is a brief discussion that addresses the key uncertainties associated with conducting the BHHRA for the site and the potential impacts on the outcome.

9.1 Data Evaluation

Data were collected and analyzed as early as 1995. However, only the data collected during the two most recent site characterization activities by BBL in 2005 and 2006 and ARCADIS in 2008 and 2009 were used to conduct the BHHRA. If the most recent sampling events adequately reflect current site conditions, the exclusion of other data does not significantly impact the results of this BHHRA. In addition, a high number of soil gas sample reporting limits exceeded health-based screening levels (i.e., RSLs). This uncertainty may have resulted in an underestimate of ELCRs or HIs.

9.2 Receptors and Exposure Pathways

A comprehensive assessment of potential human receptors that are likely to be present at and near the site was conducted and resulted in the selection of the commercial/industrial worker, the offsite resident, the construction worker, the utility/trench worker, and the onsite resident. Based on expected use scenarios and future development plans for the site, no other receptors are expected to be more (potentially) exposed to site-related chemicals at the site than those evaluated in the BHHRA. Exposure pathways considered complete and significant were evaluated for these receptors.

9.3 Exposure Assessment

The exposure assessment relied on a number of different exposure intake assumptions, many of which were based on statistical analyses of human populations. As noted earlier, an RME assessment is the “highest exposure that is reasonably expected to occur at the site” (USEPA, 1989) and was conducted as part of this evaluation. In some cases EPCs were based on maximum detected concentrations,

which will result in an overestimate of health impacts at the site. The uncertainty associated with this approach is considered moderate and protective of human health.

9.4 Lead Exposure

Lead exposure was evaluated using both the LeadSpread exposure model for children and adult residents and the USEPA's ALM for the adult commercial/industrial worker, the construction worker, and the utility/trench worker. Key assumptions associated with each model are discussed below.

Unlike the ALM model, LeadSpread utilizes an "applied" dose (versus absorbed); this assumption is also likely to result in overestimates of blood-lead levels.

The ALM model may not be appropriate for evaluating lead exposure to individuals that have intermittent exposures of less than 90 days. Assumed exposures for the construction worker receptor may not constitute sufficient lengths of time for blood-lead levels to reach a steady state. Exposure estimates generated by the ALM model may be conservative and, therefore, may contribute to overestimates of health impacts at the site.

The ALM model relates soil lead intake in women of child-bearing age to blood-lead concentrations in a developing fetus, and pregnant women are not likely to be assigned heavy construction work. Thus, this model may contribute to an overestimate of health impacts for the construction worker.

9.5 Toxicity Assessment

Route-to-route extrapolations were used to evaluate noncarcinogenic effects resulting from potential exposure to organic constituents. There is considerable uncertainty associated with the absorption of constituents via different routes of exposure. This uncertainty may contribute to an overestimate or underestimate of risk.

Toxicity values were not available for 1,2,3-trichlorobenzene, ethanol, 2-hexanone, methyl butyl ketone, methane, acenaphthalyne, phenanthrene, idiomethane and benzo(g,h,i)perylene. In the absence of sufficient toxicity data for these chemicals, neither CalEPA nor the USEPA have attempted to develop toxicity values for these chemicals. As a result, neither ELCRs nor HIs could be estimated for these chemicals. The uncertainty associated with not quantitatively assessing risk for these COPCs is considered small.

Arsenic and other COPCs were assumed to be 100 percent bioavailable. In the case of arsenic, studies have shown that arsenic seldom has a bioavailability of more than 40 percent, and bioavailability could be as low as less than 1 percent (Ruby et al., 1996; Yang et al., 2003). Therefore, risks due to exposure to arsenic would likely be substantially lower than those calculated in this BHHRA.

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Tables

Table 5-1
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Volatile Organic Compounds (VOCs)						
1,1,2,2-Tetrachloroethane	1 - 115	1	0.012 - 0.012	0.0008 - 1.1	S201-0"	0.012 m
1,1,2-Trichloroethane	2 - 115	2	0.0037 - 0.0077	0.0004 - 0.56	S201-0"	0.0077 m
1,2,3-Trichlorobenzene	1 - 115	1	0.009 - 0.009	0.0008 - 1.1	S229-0"	0.009 m
1,2,4-Trimethylbenzene	17 - 115	15	0.003 - 27	0.0008 - 0.24	S196-18"	2.162
1,2-Dichloropropane	1 - 115	1	0.0021 - 0.0021	0.0004 - 0.56	S201-0"	0.0021 m
1,3,5-Trimethylbenzene	18 - 115	16	0.0015 - 9.3	0.0008 - 0.24	S196-18"	0.7494
2-Butanone	47 - 115	41	0.011 - 0.091	0.008 - 11	S137-0"	0.02143
2-Chlorotoluene	1 - 115	1	0.0028 - 0.0028	0.0004 - 0.56	S201-0"	0.0028 m
4-Chlorotoluene	1 - 115	1	0.0021 - 0.0021	0.0004 - 0.56	S201-0"	0.0021 m
4-Methyl-2-Pentanone	1 - 115	1	0.012 - 0.012	0.008 - 11	S164-0"	0.012 m
Acetone	57 - 115	50	0.022 - 0.18	0.02 - 28	S194-0"	0.07997
Benzene	25 - 115	22	0.00061 - 0.28	0.00042 - 0.56	S150-12"	0.01774
Carbon Disulfide	4 - 115	3	0.0091 - 0.034	0.004 - 5.6	S227-0"	0.034 m
Ethanol	1 - 115	1	1.6 - 1.6	0.2 - 280	S213-0"	1.6 m
Ethylbenzene	20 - 115	17	0.0011 - 1.1	0.0004 - 0.12	S138-18",S196-0"	0.1446
Isopropylbenzene	14 - 115	12	0.00053 - 5.4	0.0004 - 0.17	S196-18"	0.3548
Methyl-t-Butyl Ether (MTBE)	7 - 115	6	0.0019 - 0.32	0.0008 - 1.1	S140-12"	0.01029
n-Butylbenzene	15 - 115	13	0.00068 - 3.5	0.0004 - 0.12	S136-0",S196-18"	0.399
n-Propy benzene	17 - 115	15	0.00056 - 8.6	0.0004 - 0.24	S196-18"	0.5772
o-Xylene	20 - 115	17	0.0013 - 2.3	0.0004 - 0.56	S215-0"	0.2022
p/m-Xylene	22 - 115	19	0.0012 - 4.7	0.0008 - 1.1	S215-0"	0.4963
p-Isopropyltoluene	11 - 115	10	0.00068 - 2.6	0.0004 - 0.17	S136-0"	0.09387
sec-Buty benzene	13 - 115	11	0.00066 - 2.8	0.0004 - 0.17	S196-18"	0.2021
Tert-Butyl Alcohol (TBA)	6 - 115	5	0.012 - 0.044	0.008 - 11	S140-12"	0.01367
Toluene	30 - 115	26	0.00094 - 0.92	0.00042 - 0.56	S150-12"	0.09518
Xylenes, total	23 - 115	20	0.0012 - 7	0.0008 - 1.1	S215-0"	0.682
Semivolatile Organic Compounds (SVOCs)						
1-Methylnaphthalene	37 - 115	32	0.024 - 270	0.02 - 1.1	S138-18"	19.043
2-Methylnaphthalene	42 - 115	37	0.022 - 350	0.02 - 2.2	S138-18"	23.979
Acenaphthene	16 - 115	14	0.043 - 26	0.02 - 1.1	S138-18"	2.504
Acenaphthylene	6 - 115	5	0.038 - 3.4	0.02 - 23	S136-0"	0.1272
Anthracene	17 - 115	15	0.026 - 4	0.02 - 23	S133B-0"	0.2259
Benzo(a)anthracene	41 - 115	36	0.021 - 7.2	0.021 - 23	S149-12"	0.7265
Benzo(a)pyrene	43 - 115	37	0.026 - 5.2	0.02 - 23	S149-12"	0.3124
Benzo(b)fluoranthene	31 - 115	27	0.021 - 2.9	0.02 - 23	S149-12"	0.2004
Benzo(ghi)perylene	45 - 115	39	0.022 - 1.4	0.02 - 23	S208-0"	0.1564
Benzo(k)fluoranthene	18 - 115	16	0.027 - 2	0.02 - 23	S208-0"	0.1247

Table 5-1
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Chrysene	75 - 115	65	0.023 - 20	0.021 - 23	S149-12"	1.922
D benzo(a,h)anthracene	10 - 115	9	0.051 - 0.53	0.02 - 23	S208-0"	0.08396
Fluoranthene	40 - 115	35	0.022 - 4.2	0.02 - 23	S149-12"	0.3207
Fluorene	25 - 115	22	0.022 - 42	0.02 - 1.1	S138-18"	2.588
Indeno(1,2,3-cd)pyrene	17 - 115	15	0.024 - 1.4	0.02 - 23	S208-0",S271-0"	0.09275
Naphthalene	22 - 115	19	0.015 - 7.5	0.0042 - 1.2	S196-18"	1.032
Phenanthrene	55 - 115	48	0.022 - 110	0.02 - 1.1	S138-18"	6.504
Pyrene	70 - 115	61	0.03 - 31	0.021 - 1.1	S138-18"	3.867
Inorganic Compounds						
Antimony	12 - 115	10	0.974 - 4.96	0.762 - 0.905	S166-0"	1.292
Arsenic	105 - 115	91	1.07 - 13.5	0.762 - 0.872	S165-0"	5.483
Barium	115 - 115	100	31.9 - 566	– - –	S148-0"	202.6
Beryllium	109 - 115	95	0.274 - 1.13	0.26 - 0.277	S233-0"	0.577
Cadmium	14 - 115	12	0.6 - 1.97	0.508 - 0.603	S148-0"	0.752
Chromium	115 - 115	100	6.52 - 415	– - –	S165-0"	71.61
Chromium, Hexavalent	3 - 3	100	0.68 - 1.2	– - –	S123-0"	1.2 m
Cobalt	115 - 115	100	3.76 - 28.7	– - –	S224-0"	11.77
Copper	115 - 115	100	6.22 - 1640	– - –	S233-0"	136.4
Lead [d]	115 - 115	100	3.01 - 4240	– - –	S148-0"	217
Mercury	60 - 115	52	0.0948 - 2.51	0.0849 - 0.101	S152-0"	0.246
Molybdenum	61 - 115	53	0.271 - 112	0.254 - 0.302	S228-0"	8.637
Nickel	115 - 115	100	5.47 - 42.4	– - –	S233-0"	19.52
Selenium	14 - 115	12	0.863 - 6.82	0.762 - 0.905	S139-12"	1.084
Vanadium	115 - 115	100	12.8 - 103	– - –	S233-0"	40.75
Zinc	115 - 115	100	20.8 - 1240	– - –	S124-0"	251.3

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
FOD = frequency of detection
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-2
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Volatile Organic Compounds (VOCs)						
1,1,2,2-Tetrachloroethane	1 - 295	0.339	0.012 - 0.012	0.0008 - 24.0625	S201-0"	0.012 m
1,1,2-Trichloroethane	2 - 295	0.678	0.0037 - 0.0077	0.0004 - 24.0625	S201-0"	0.0077 m
1,2,3-Trichlorobenzene	1 - 295	0.339	0.009 - 0.009	0.0008 - 24.0625	S229-0"	0.009 m
1,2,4-Trichlorobenzene	1 - 295	0.339	0.004625 - 0.004625	0.0008 - 24.0625	B015-2	0.004625 m
1,2,4-Trimethylbenzene	54 - 295	18.3	0.001375 - 486.25	0.0008 - 1.2625	B023-2	15.426
1,2-Dichloropropane	1 - 295	0.339	0.0021 - 0.0021	0.0004 - 24.0625	S201-0"	0.0021 m
1,3,5-Trimethylbenzene	44 - 295	14.9	0.0015 - 212.5	0.0008 - 1.2625	B023-2	6.511
2-Butanone	50 - 295	16.9	0.011 - 0.091	0.008 - 481.25	S137-0"	0.01948
2-Chlorotoluene	1 - 295	0.339	0.0028 - 0.0028	0.0004 - 24.0625	S201-0"	0.0028 m
2-Hexanone	1 - 295	0.339	0.003125 - 0.003125	0.00625 - 26	B039-2	0.003125 m
4-Chlorotoluene	1 - 295	0.339	0.0021 - 0.0021	0.0004 - 24.0625	S201-0"	0.0021 m
4-Methyl-2-Pentanone	3 - 295	1.02	0.001875 - 0.012	0.00625 - 26	S164-0"	0.012 m
Acetone	80 - 295	27.1	0.022 - 0.21	0.02 - 240.625	S139-24"	0.05684
Benzene	59 - 295	20	0.00061 - 15.75	0.00042 - 24.0625	B045-2	0.4702
Carbon Disulfide	5 - 295	1.69	0.0091 - 0.034	0.004 - 24.0625	S227-0"	0.009448
Chloroethane	1 - 295	0.339	0.0065 - 0.0065	0.0008 - 24.0625	B046-5	0.0065 m
Chloromethane	1 - 295	0.339	0.002125 - 0.002125	0.00625 - 26	B067-2	0.002125 m
Ethanol	2 - 155	1.29	0.64 - 1.6	0.2 - 650	S213-0"	1.6 m
Ethylbenzene	49 - 295	16.6	0.0011 - 79.125	0.0004 - 6.25	B023-2	3.32
Iodomethane	4 - 140	2.86	0.001875 - 0.01375	0.00625 - 24.0625	B039-2	0.01375 m
Isopropylbenzene	39 - 295	13.2	0.00053 - 7.9375	0.0004 - 6.25	B023-2	0.3129
Methyl-t-Butyl Ether (MTBE)	22 - 295	7.46	0.0019 - 0.32	0.0008 - 24.0625	S140-12"	0.006736
n-Butylbenzene	34 - 295	11.5	0.00068 - 34	0.0004 - 6.25	B249-05	1.32
n-Propylbenzene	47 - 295	15.9	0.00056 - 52.375	0.0004 - 6.25	B023-2	1.913
o-Xylene	44 - 295	14.9	0.001 - 238.75	0.0004 - 6.25	B023-2	7.696
p/m-Xylene	58 - 295	19.7	0.0012 - 386.25	0.0008 - 1.2625	B023-2	15.001
p-Isopropyltoluene	28 - 295	9.49	0.00068 - 2.6	0.0004 - 24.0625	S136-0"	0.06985
sec-Butylbenzene	33 - 295	11.2	0.00066 - 2.8	0.0004 - 24.0625	S196-18"	0.1477
Tert-Butyl Alcohol (TBA)	22 - 295	7.46	0.012 - 0.95	0.008 - 240.625	B046-5	0.04303
tert-Butylbenzene	2 - 295	0.678	0.00081 - 0.14625	0.0004 - 24.0625	B056-5	0.14625 m
Toluene	59 - 295	20	0.00094 - 97	0.00042 - 6.25	B249-05	3.464
Xylenes, total	59 - 295	20	0.0012 - 625	0.0008 - 1.2625	B023-2	22.567

Table 5-2
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Semivolatile Organic Compounds (SVOCs)						
1-Methylnaphthalene	50 - 155	32.3	0.024 - 270	0.02 - 1.1	S138-18"	22.206
2-Methylnaphthalene	56 - 155	36.1	0.022 - 550	0.02 - 2.2	B249-05	37.234
Acenaphthene	31 - 293	10.6	0.00375 - 26	0.0125 - 11	S138-18"	1.241
Acenaphthylene	7 - 293	2.39	0.033 - 3.4	0.0125 - 23	S136-0"	0.1021
Anthracene	40 - 293	13.7	0.00375 - 4	0.0125 - 23	S133B-0"	0.1494
Benzo(a)anthracene	67 - 293	22.9	0.003125 - 7.2	0.0125 - 23	S149-12"	0.3035
Benzo(a)pyrene	75 - 293	25.6	0.003125 - 5.2	0.0125 - 23	S149-12"	0.1443
Benzo(b)fluoranthene	56 - 293	19.1	0.00625 - 2.9	0.0125 - 23	S149-12"	0.094
Benzo(ghi)perylene	89 - 293	30.4	0.003125 - 1.4	0.0125 - 23	S208-0"	0.08151
Benzo(k)fluoranthene	40 - 293	13.7	0.004375 - 2	0.0125 - 23	S208-0"	0.06028
Chrysene	128 - 293	43.7	0.00375 - 20	0.0125 - 23	S149-12"	0.6534
Dibenzo(a,h)anthracene	18 - 293	6.14	0.051 - 0.53	0.0125 - 23	S208-0"	0.06696
Fluoranthene	63 - 293	21.5	0.004375 - 4.2	0.0125 - 23	B080-5,S149-12'	0.2374
Fluorene	51 - 293	17.4	0.00625 - 42	0.0125 - 11	S138-18"	1.803
Indeno(1,2,3-cd)pyrene	32 - 293	10.9	0.01125 - 1.4	0.0125 - 23	S208-0",S271-0'	0.05032
Naphthalene	50 - 295	16.9	0.0074 - 100	0.0042 - 1.26875	B249-05	5.055
Phenanthrene	117 - 295	39.7	0.003125 - 110	0.0125 - 11	S138-18"	4.467
Pyrene	124 - 294	42.2	0.003125 - 31	0.0125 - 11	S138-18"	1.319
Polychlorinated Biphenyls (PCBs)						
PCB-1254	2 - 11	18.2	0.0475 - 0.05	0.0375 - 0.057	B029-2	0.05 m
PCB-1260	1 - 11	9.09	0.04 - 0.04	0.0375 - 0.057	B029-2	0.04 m
Total PCBs	2 - 11	18.2	0.0475 - 0.09	– - –	B029-2	0.09 m
Inorganic Compounds						
Antimony	58 - 185	31.4	0.8125 - 9.675	0.762 - 3.75	B040-2	2.287
Arsenic	157 - 185	84.9	0.45 - 13.5	0.762 - 1.25	S165-0"	4.746
Barium	185 - 185	100	31.9 - 566	– - –	S148-0"	193.2
Beryllium	178 - 185	96.2	0.274 - 1.75	0.26 - 0.625	B014-5	0.796
Cadmium	69 - 185	37.3	0.08375 - 1.97	0.508 - 0.625	S148-0"	0.496
Chromium	185 - 185	100	6.52 - 415	– - –	S165-0"	59.07
Chromium, Hexavalent	9 - 9	100	0.015 - 1.2	– - –	S123-0"	0.7279
Cobalt	185 - 185	100	3.76 - 28.7	– - –	S224-0"	13.5
Copper	183 - 185	98.9	6.22 - 1640	1.25 - 1.25	S233-0"	73.31

Table 5-2
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b]			Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
	Number of Detects / Number of Samples			FOD %	Minimum (mg/kg)	Maximum (mg/kg)	Minimum (mg/kg)		Maximum (mg/kg)		(mg/kg)
Lead [d]	185	-	185	100	3.01	4240	–	-	–	S148-0"	145
Mercury	108	-	185	58.4	0.025	2.51	0.0849	-	0.175	S152-0"	0.178
Molybdenum	88	-	185	47.6	0.11625	112	0.254	-	1.25	S228-0"	3.519
Nickel	185	-	185	100	5.47	42.4	–	-	–	S233-0"	21.41
Selenium	19	-	185	10.3	0.863	6.82	0.762	-	1.25	S139-12"	1.056
Vanadium	185	-	185	100	12.8	103	–	-	–	S233-0"	49.18
Zinc	185	-	185	100	20.8	1240	–	-	–	S124-0"	188.5

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
FOD = frequency of detection
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-3
Statistical Summary of Soil Gas (at 5 ft) Dataset Used in the BHHRA
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	CAS No.	Frequency of Detection (FOD) [b]			Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
		Number of Detects / Number of Samples			FOD %	Minimum - Maximum µg/m^3		Minimum - Maximum µg/m^3				µg/m^3
Benzene	71-43-2	13	-	76	17.1	1000	- 460000	1000	-	1000	V055	73160
Ethylbenzene	100-41-4	13	-	76	17.1	1900	- 1200000	1000	-	1000	V049	153900
o-Xylene	95-47-6	13	-	76	17.1	1200	- 1600000	1000	-	1000	V049	199000
p/m-Xylene	-	29	-	76	38.2	1000	- 4800000	1000	-	1000	V049	562100
Toluene	108-88-3	15	-	76	19.7	1100	- 3100000	1000	-	1000	V049	353300
Xylenes	1330-20-7	29	-	76	38.2	1000	- 6400000	1000	-	1000	V049	755600

Notes:

– = not detected, not analyzed, or not applicable
CAS No. = Chemical Abstract Service number
EPC = exposure point concentration
FOD = frequency of detection
µg/m^3 = micrograms per cubic meter
ND = non-detects
UCL = upper confidence level on the mean

[a] All constituents analyzed for are presented.
For duplicate samples, the highest detected value or the lowest detection limit were used.
For constituents analyzed in two methods, the result of the more precise method was used
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.

Table 5-4
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum (mg/kg)	Detects Maximum (mg/kg)	Detection Limits Minimum (mg/kg)	Detection Limits Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Volatile Organic Compounds (VOCs)								
1,2,4-Trimethylbenzene	13 - 65	20	0.015	410	0.0011	1.2	S111-12"	24.884
1,3,5-Trimethylbenzene	11 - 65	16.9	0.0051	120	0.0011	2.2	S111-12"	8.223
2-Butanone	12 - 65	18.5	0.023	0.16	0.011	48	S105-0"	0.03463
Acetone	24 - 65	36.9	0.048	0.25	0.028	120	S279-12"	0.09159
Benzene	15 - 65	23.1	0.00096	100	0.00057	2.4	S113-12"	11.698
Carbon Disulfide	3 - 65	4.62	0.025	0.045	0.0057	24	S256-0"	0.045 m
Chloroform	1 - 65	1.54	0.06	0.06	0.00057	2.4	S120-0"	0.06 m
Ethanol	1 - 65	1.54	2.6	2.6	0.28	1200	S105-0"	2.6 m
Ethylbenzene	15 - 65	23.1	0.0012	55	0.00057	0.051	S111-0"	5.405
Isopropy benzene	10 - 65	15.4	0.0025	8.4	0.00057	0.23	S111-12"	0.9125
Methylene Chloride	1 - 65	1.54	0.47	0.47	0.0057	24	S121-0"	0.47 m
Methyl-t-Butyl Ether (MTBE)	1 - 65	1.54	0.0026	0.0026	0.0011	4.8	S117-0"	0.0026 m
n-Butylbenzene	10 - 65	15.4	0.0017	38	0.00057	0.6	S111-12"	2.18
n-Propylbenzene	11 - 65	16.9	0.008	47	0.00057	0.23	S111-12"	3.51
o-Xylene	9 - 65	13.8	0.0043	34	0.00057	1.1	S111-0"	1.816
p/m-Xylene	10 - 65	15.4	0.0049	150	0.0011	2.2	111-0",S111-12	12.654
p-Isopropyltoluene	10 - 65	15.4	0.006	6.7	0.00057	2.4	S119-12"	0.4786
sec-Butylbenzene	11 - 65	16.9	0.0048	7.1	0.00057	0.23	S111-12"	0.6564
Tert-Butyl Alcohol (TBA)	3 - 65	4.62	0.03	0.089	0.011	48	S105-0"	0.089 m
Tetrachloroethene	3 - 65	4.62	0.0011	0.0075	0.00057	2.4	S244-0"	0.0075 m
Toluene	6 - 65	9.23	0.0025	0.0078	0.00057	2.4	S108-0"	0.003033
Xylenes, total	10 - 65	15.4	0.0144	184	0.0011	2.2	S111-0"	14.368
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	12 - 65	18.5	0.027	32	0.021	0.44	S113-12"	2.742
2-Methylnaphthalene	12 - 65	18.5	0.034	36	0.021	0.44	111-12",S113-1	4.125
Acenaphthene	6 - 65	9.23	0.12	2.5	0.021	2.3	S113-12"	0.3476
Acenaphthylene	1 - 65	1.54	0.28	0.28	0.021	2.3	S113-0"	0.28 m
Anthracene	9 - 65	13.8	0.14	4.1	0.021	1.1	S113-12"	0.4587
Benzo(a)anthracene	17 - 65	26.2	0.024	11	0.021	1.2	S112-6"	0.6496
Benzo(a)pyrene	16 - 65	24.6	0.027	4.7	0.021	1.2	S112-6"	0.2968
Benzo(b)fluoranthene	8 - 65	12.3	0.025	0.66	0.021	2.3	S259-0"	0.09629
Benzo(ghi)perylene	9 - 65	13.8	0.16	0.41	0.021	2.3	S259-0"	0.19029
Benzo(k)fluoranthene	10 - 65	15.4	0.062	1	0.021	2.3	S105-0"	0.1637
Chrysene	24 - 65	36.9	0.033	14	0.021	1.1	S112-6"	0.9104
Dibenzo(a,h)anthracene	2 - 65	3.08	0.18	0.24	0.021	2.3	S119-0"	0.24 m
Fluoranthene	20 - 65	30.8	0.045	3	0.021	1.1	S112-6"	0.3523
Fluorene	9 - 65	13.8	0.14	4.3	0.021	1.1	S109-0"	0.5942

Table 5-4
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum (mg/kg)	Detects Maximum (mg/kg)	Detection Limits Minimum (mg/kg)	Detection Limits Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Indeno(1,2,3-cd)pyrene	7 - 65	10.8	0.048	0.43	0.021	2.3	S282-12"	0.09388
Naphthalene	5 - 65	7.69	0.063	53	0.0057	24	S111-12"	2.837
Phenanthrene	19 - 65	29.2	0.16	29	0.021	1.1	S112-6"	3.629
Pyrene	29 - 65	44.6	0.054	18	0.021	1.1	S112-6"	1.34
Pesticides and Herbicides								
Dieldrin	1 - 8	12.5	0.019	0.019	0.0054	0.0066	S108-0"	0.019 m
Polychlorinated Biphenyls (PCBs)								
PCB-1254	3 - 5	60	0.056	0.085	0.054	0.057	S113-12"	0.085 m
Total PCBs	3 - 5	60	0.056	0.085	–	–	S113-12"	0.085 m
Inorganic Compounds								
Antimony	14 - 55	25.5	0.877	2.88	0.785	1.01	S104-0"	1.51
Arsenic	65 - 65	100	2.29	18.6	–	–	S110-6"	8.425
Barium	65 - 65	100	56.3	850	–	–	S103-12"	202.6
Beryllium	60 - 65	92.3	0.275	1.42	0.262	0.335	S114-0"	0.832
Cadmium	5 - 65	7.69	0.863	11.9	0.523	0.67	S110-6"	1.391
Chromium	65 - 65	100	4.81	340	–	–	S110-6"	64.74
Cobalt	65 - 65	100	3.97	37.7	–	–	S110-6"	15.84
Copper	65 - 65	100	8.26	3420	–	–	S110-6"	342.7
Lead [d]	65 - 65	100	4.57	4690	–	–	S277-0"	137
Mercury	28 - 65	43.1	0.104	1.94	0.0873	0.112	S110-6"	0.236
Molybdenum	26 - 65	40	0.297	101	0.262	0.335	S110-6"	7.842
Nickel	65 - 65	100	4.96	3620	–	–	S110-6"	320.6
Selenium	20 - 65	30.8	1.01	13.4	0.785	1.01	S110-6"	1.888
Silver	1 - 65	1.54	2.49	2.49	0.262	0.335	S116-0"	2.49 m
Vanadium	65 - 65	100	17.7	128	–	–	S114-0"	48.81
Zinc	65 - 65	100	25.9	1810	–	–	S110-6"	312

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
ND Non-detects.
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-5
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum (mg/kg)	Detects Maximum (mg/kg)	Detection Limits Minimum (mg/kg)	Detection Limits Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Volatile Organic Compounds (VOCs)					-			
1,2,4-Trimethylbenzene	26 - 190	13.7	0.001375	410	0.0011	6.25	S111-12"	20.344
1,2-Dichlorobenzene	1 - 190	0.526	0.12875	0.12875	0.00057	6.25	B098-2	0.12875 m
1,2-Dichloropropane	2 - 190	1.05	0.00275	0.019	0.00057	6.25	B292-5	0.019 m
1,3,5-Trimethylbenzene	14 - 190	7.37	0.002	120	0.0011	6.25	S111-12"	2.807
2-Butanone	13 - 190	6.84	0.023	0.16	0.011	125	S105-0"	0.02815
Acetone	36 - 190	18.9	0.048	0.25	0.028	120	S279-12"	0.06674
Benzene	41 - 190	21.6	0.00096	100	0.00057	6.25	S113-12"	4.043
Carbon Disulfide	4 - 190	2.11	0.014	0.045	0.0057	24	S256-0"	0.045 m
Chloroform	1 - 190	0.526	0.06	0.06	0.00057	6.25	S120-0"	0.06 m
Ethanol	1 - 82	1.22	2.6	2.6	0.28	1200	S105-0"	2.6 m
Ethylbenzene	29 - 190	15.3	0.0012	55	0.00057	6.25	S111-0"	1.928
Isopropylbenzene	20 - 190	10.5	0.0011	8.4	0.00057	6.25	S111-12"	0.3243
Methylene Chloride	1 - 190	0.526	0.47	0.47	0.0057	24	S121-0"	0.47 m
Methyl-t-Butyl Ether (MTBE)	6 - 190	3.16	0.0025	0.007375	0.0011	6.25	B192-2	0.002723
n-Butylbenzene	19 - 190	10	0.0017	38	0.00057	6.25	S111-12"	1.779
n-Propylbenzene	22 - 190	11.6	0.002375	47	0.00057	6.25	S111-12"	1.224
o-Xylene	14 - 190	7.37	0.001	34	0.00057	6.25	S111-0"	0.6148
p/m-Xylene	22 - 190	11.6	0.002	150	0.0011	6.25	S111-0",S111-12"	9.916
p-Isopropyltoluene	12 - 190	6.32	0.002375	6.7	0.00057	6.25	S119-12"	0.1653
sec-Butylbenzene	22 - 190	11.6	0.001625	7.1	0.00057	6.25	S111-12"	0.236
Tert-Butyl Alcohol (TBA)	12 - 190	6.32	0.0125	0.15125	0.011	62.5	B088-5	0.01914
tert-Butylbenzene	2 - 190	1.05	0.0024	0.11	0.00057	6.25	B294-05	0.11 m
Tetrachloroethene	3 - 190	1.58	0.0011	0.0075	0.00057	6.25	S244-0"	0.0075 m
Toluene	18 - 190	9.47	0.001375	3.1875	0.00057	6.25	B188-5	0.09425
Xylenes, total	22 - 190	11.6	0.002	184	0.0011	6.25	S111-0"	11.309
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	14 - 82	17.1	0.027	32	0.021	0.44	S113-12"	2.186
2-Methylnaphthalene	14 - 82	17.1	0.034	36	0.021	0.44	S111-12",S113-12"	3.28
Acenaphthene	31 - 190	16.3	0.00375	2.5	0.0125	2.3	S113-12"	0.1958
Acenaphthylene	8 - 190	4.21	0.002875	0.28	0.0125	2.3	S113-0"	0.01113
Anthracene	31 - 190	16.3	0.00375	6.5	0.0125	1.1	B297-5	0.4802
Benzo(a)anthracene	49 - 190	25.8	0.003125	11	0.0125	1.2	S112-6"	0.4765

Table 5-5
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum (mg/kg)	Detects Maximum (mg/kg)	Detection Limits Minimum (mg/kg)	Detection Limits Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Benzo(a)pyrene	47 - 189	24.9	0.003125	5.9	0.0125	1.2	B297-5	0.317
Benzo(b)fluoranthene	41 - 189	21.7	0.00375	3.8	0.0125	2.3	B297-5	0.1813
Benzo(ghi)perylene	46 - 189	24.3	0.002625	1.5	0.0125	2.3	B297-5	0.1038
Benzo(k)fluoranthene	37 - 189	19.6	0.003125	4.9	0.0125	2.3	B297-5	0.2744
Chrysene	72 - 190	37.9	0.003125	14	0.0125	1.1	S112-6"	0.6616
Dibenzo(a,h)anthracene	10 - 189	5.29	0.00625	0.57	0.0125	2.3	B297-5	0.02179
Fluoranthene	60 - 190	31.6	0.003125	18	0.0125	1.1	B297-5	1.039
Fluorene	28 - 190	14.7	0.004375	4.3	0.0125	1.1	S109-0"	0.2343
Indeno(1,2,3-cd)pyrene	27 - 189	14.3	0.003125	2.4	0.0125	2.3	B297-5	0.07864
Naphthalene	8 - 190	4.21	0.00675	53	0.0057	24	S111-12"	0.9385
Phenanthrene	59 - 190	31.1	0.00275	29	0.0125	1.1	S112-6"	2.085
Pyrene	82 - 190	43.2	0.003125	18	0.0125	1.1	S112-6"	1.405
Pesticides and Herbicides								
Dieldrin	1 - 10	10	0.019	0.019	0.0054	0.0066	S108-0"	0.019 m
Polychlorinated Biphenyls (PCBs)								
PCB-1254	10 - 52	19.2	0.056	20	0.0375	0.065	B192-2	2.236
PCB-1260	4 - 52	7.69	0.04375	0.075	0.0375	1.875	B079-5	0.075 m
Total PCBs	12 - 52	23.1	0.04375	20	–	–	B192-2	18.31
Inorganic Compounds								
Antimony	33 - 91	36.3	0.877	9.8125	0.785	4.55	B089-2	2.265
Arsenic	86 - 101	85.1	1.5375	28.125	1.25	6.07	B108-5	7.378
Barium	101 - 101	100	56.3	850	–	–	S103-12"	201
Beryllium	96 - 101	95	0.275	1.9375	0.262	0.335	B223-5	0.964
Cadmium	34 - 101	33.7	0.01375	11.9	0.15875	0.67	S110-6"	0.703
Chromium	101 - 101	100	4.81	340	–	–	S110-6"	56.34
Chromium, Hexavalent	6 - 6	100	0.0675	0.295	–	–	B190-5	0.295 m
Cobalt	101 - 101	100	3.97	37.7	–	–	S110-6"	16.48
Copper	92 - 101	91.1	8.26	3420	1.25	20	S110-6"	145.2
Lead [d]	101 - 101	100	4.57	4690	–	–	S277-0"	93.8
Mercury	59 - 101	58.4	0.025	1.94	0.0873	0.175	S110-6"	0.167
Molybdenum	36 - 101	35.6	0.297	101	0.195	1.25	S110-6"	5.827
Nickel	101 - 101	100	4.96	3620	–	–	S110-6"	215.8
Selenium	20 - 101	19.8	1.01	13.4	0.785	1.25	S110-6"	1.605

Table 5-5
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b]			Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
	Number of Detects / Number of Samples			FOD %	Minimum (mg/kg)	Maximum (mg/kg)	Minimum (mg/kg)		Maximum (mg/kg)		(mg/kg)
Silver	1	-	101	0.99	2.49	2.49	0.262	-	0.625	S116-0"	2.49 m
Vanadium	101	-	101	100	17.7	128	–	-	–	S114-0"	56.62
Zinc	101	-	101	100	25.9	1810	–	-	–	S110-6"	230.5

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
ND Non-detects.
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-6
Statistical Summary of Soil Gas (at 5 ft) Dataset Used in the BHHRA
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	CAS No.	Frequency of Detection (FOD) [b]			Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
		Number of Detects / Number of Samples			FOD %	Minimum µg/m^3	Maximum µg/m^3	Minimum µg/m^3		Maximum µg/m^3		µg/m^3
Benzene	71-43-2	7	-	63	11	1100	380000	1000	-	1000	V188	19020
Ethylbenzene	100-41-4	6	-	63	10	1600	38000	1000	-	1000	V077	4243
o-Xylene	95-47-6	5	-	63	8	1200	3500	1000	-	1000	V095	1390
p/m-Xylene	-	13	-	63	21	1000	24000	1000	-	1000	V188	2655
Toluene	108-88-3	7	-	63	11	1000	35000	1000	-	1000	V188	3454
Xylenes	1330-20-7	13	-	63	21	1000	26700	1000	-	1000	V188	3084

Notes:

– = not detected, not analyzed, or not applicable
CAS No. = Chemical Abstract Service number
EPC = exposure point concentration
FOD = frequency of detection
µg/m^3 = micrograms per cubic meter
ND = non-detects
UCL = upper confidence level on the mean

[a] All constituents analyzed for are presented.
For duplicate samples, the highest detected value or the lowest detection limit were used.
For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.

Table 5-7
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b]				Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]	
	Number of Detects / Number of Samples			FOD %	Minimum (mg/kg)	-	Maximum (mg/kg)	Minimum (mg/kg)	-	Maximum (mg/kg)		(mg/kg)	
Volatile Organic Compounds (VOCs)													
1,1,1-Trichloroethane	1	-	143	0.699	0.0038	-	0.0038	0.0004	-	0.52	S181-0"	0.0038	m
1,1,2-Trichloroethane	1	-	143	0.699	0.0026	-	0.0026	0.0004	-	0.52	S039-0"	0.0026	m
1,2,3-Trichloropropane	1	-	143	0.699	0.55	-	0.55	0.00081	-	1	S158-12"	0.55	m
1,2,4-Trichlorobenzene	1	-	143	0.699	0.17	-	0.17	0.00081	-	1	S078-0"	0.17	m
1,2,4-Trimethylbenzene	30	-	143	21	0.0025	-	60	0.001	-	0.49	S037-20"	3.342	
1,2-Dichlorobenzene	3	-	143	2.1	0.0012	-	2.9	0.0004	-	0.52	S078-0"	2.9	m
1,2-Dichloropropane	4	-	143	2.8	0.0053	-	0.022	0.0004	-	0.52	S040-12"	0.022	m
1,3,5-Trimethylbenzene	17	-	143	11.9	0.0036	-	28	0.001	-	0.49	S037-20"	0.6089	
1,4-Dichlorobenzene	2	-	143	1.4	0.089	-	0.4	0.0004	-	0.52	S078-0"	0.4	m
2-Butanone	54	-	143	37.8	0.018	-	0.15	0.0081	-	10	S172-0"	0.03599	
Acetone	56	-	143	39.2	0.041	-	0.54	0.027	-	26	S171-12"	0.1271	
Benzene	53	-	143	37.1	0.00071	-	4.3	0.00051	-	0.25	S175-0"	0.3296	
Bromodichloromethane	5	-	143	3.5	0.0022	-	0.14	0.0004	-	0.52	S267-0"	0.00693	
c-1,2-Dichloroethene	1	-	143	0.699	0.0019	-	0.0019	0.0004	-	0.52	S040-0"	0.0019	m
Carbon Disulfide	5	-	143	3.5	0.01	-	0.043	0.004	-	5.2	S058-0"	0.01151	
Chloroform	9	-	143	6.29	0.0014	-	0.26	0.0004	-	0.52	S267-0"	0.01048	
Ethylbenzene	33	-	143	23.1	0.00098	-	19	0.00051	-	0.25	S037-20"	1.258	
Isopropylbenzene	33	-	143	23.1	0.00091	-	4.8	0.00051	-	0.1	S027-0"	0.2534	
Methylene Chloride	3	-	143	2.1	0.022	-	0.58	0.004	-	5.2	S130-12"	0.58	m
Methyl-t-Butyl Ether (MTBE)	5	-	143	3.5	0.0043	-	0.23	0.00081	-	1	S184-0"	0.01395	
n-Butylbenzene	29	-	143	20.3	0.00089	-	11	0.00051	-	0.1	S037-20"	0.4063	
n-Propylbenzene	39	-	143	27.3	0.00062	-	6.6	0.00051	-	0.1	S037-20"	0.4089	
o-Xylene	34	-	143	23.8	0.0011	-	40	0.00051	-	0.25	S037-20"	2.137	
p/m-Xylene	35	-	143	24.5	0.0017	-	89	0.00081	-	0.49	S037-20"	4.671	
p-Isopropyltoluene	25	-	143	17.5	0.0011	-	12	0.00051	-	0.25	S037-20"	0.7433	
sec-Butylbenzene	35	-	143	24.5	0.00091	-	5.2	0.00051	-	0.1	S027-0"	0.2294	
Tert-Butyl Alcohol (TBA)	12	-	143	8.39	0.016	-	0.69	0.0081	-	10	S051-0"	0.04334	
tert-Butylbenzene	5	-	143	3.5	0.0054	-	0.69	0.0004	-	0.52	S027-0"	0.02569	
Tetrachloroethene	1	-	143	0.699	0.002	-	0.002	0.0004	-	0.52	S031-0"	0.002	m
Toluene	45	-	143	31.5	0.00073	-	18	0.0004	-	0.25	S037-20"	1.01	
Trichloroethene	1	-	143	0.699	0.0026	-	0.0026	0.00081	-	1	S081-0"	0.0026	m
Vinyl Chloride	1	-	143	0.699	0.0015	-	0.0015	0.0004	-	0.52	S297-6"	0.0015	m
Xylenes, total	39	-	143	27.3	0.0017	-	129	0.001	-	0.49	S037-20"	6.795	

Table 5-7
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b]				Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
	Number of Detects / Number of Samples			FOD %	Minimum (mg/kg)	-	Maximum (mg/kg)	Minimum (mg/kg)	-	Maximum (mg/kg)		(mg/kg)
Semivolatile Organic Compounds (SVOCs)												
1-Methylnaphthalene	37	-	143	25.9	0.085	-	240	0.021	-	1.2	S042-12"	19.299
2-Methylnaphthalene	39	-	143	27.3	0.04	-	360	0.021	-	1.2	S042-12"	26.869
Acenaphthene	20	-	143	14	0.12	-	14	0.021	-	26	S042-0"	0.5539
Acenaphthylene	7	-	143	4.9	0.12	-	6.2	0.021	-	26	S042-0"	0.4209
Anthracene	13	-	143	9.09	0.12	-	7.3	0.021	-	26	S042-0"	0.3834
Benzo(a)anthracene	24	-	143	16.8	0.12	-	7.4	0.021	-	26	S042-0"	0.4181
Benzo(a)pyrene	24	-	143	16.8	0.024	-	5.1	0.021	-	26	S042-0"	0.3126
Benzo(b)fluoranthene	20	-	143	14	0.032	-	5.9	0.021	-	26	S042-0"	0.3023
Benzo(ghi)perylene	31	-	143	21.7	0.027	-	4	0.021	-	26	S075-0"	0.2284
Benzo(k)fluoranthene	16	-	143	11.2	0.024	-	5.4	0.021	-	26	S042-0"	0.3039
Chrysene	53	-	143	37.1	0.036	-	7.5	0.021	-	26	S042-0"	0.5379
Dibenzo(a,h)anthracene	5	-	143	3.5	0.27	-	3.5	0.021	-	26	S042-0"	0.4718
Fluoranthene	26	-	143	18.2	0.13	-	15	0.021	-	26	S075-0"	0.5649
Fluorene	27	-	143	18.9	0.027	-	39	0.021	-	11	S042-12"	2.073
Indeno(1,2,3-cd)pyrene	12	-	143	8.39	0.038	-	4	0.021	-	26	S075-0"	0.2742
Naphthalene	25	-	143	17.5	0.0092	-	43	0.0051	-	2.5	S027-0"	4.189
Phenanthrene	45	-	143	31.5	0.031	-	59	0.021	-	11	S042-12"	1.864
Pyrene	54	-	143	37.8	0.025	-	13	0.021	-	26	S075-0"	0.8123
Pesticides and Herbicides												
4,4-DDE	2	-	16	12.5	0.0057	-	0.013	0.0053	-	0.0069	S185-6"	0.013 m
Aldrin	1	-	16	6.25	0.18	-	0.18	0.0053	-	0.0069	S185-6"	0.18 m
Chlordane	1	-	16	6.25	1.5	-	1.5	0.053	-	0.069	S185-6"	1.5 m
Dieldrin	1	-	16	6.25	0.025	-	0.025	0.0053	-	0.0069	S185-6"	0.025 m
Polychlorinated Biphenyls (PCBs)												
PCB-1254	1	-	2	50	1.9	-	1.9	0.052	-	0.052	S047-6"	1.9 m
Total PCBs	1	-	2	50	1.9	-	1.9	–	-	–	S047-6"	1.9 m
Inorganic Compounds												
Antimony	19	-	134	14.2	0.86	-	14.2	0.774	-	1.19	S045-0"	1.325
Arsenic	142	-	143	99.3	0.874	-	40.9	0.819	-	0.819	S040-0"	7.252
Barium	143	-	143	100	47	-	1800	–	-	–	S036-0"	205.9
Beryllium	135	-	143	94.4	0.269	-	4.6	0.261	-	0.329	S086-6"	0.655
Cadmium	22	-	143	15.4	0.591	-	3.93	0.517	-	0.693	S038-0"	0.787
Chromium	143	-	143	100	4.47	-	2690	–	-	–	S039-0"	169.7

Table 5-7
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Chromium, Hexavalent	6 - 6	100	0.13 - 2.8	– - –	S144B-0"	2.8 m
Cobalt	143 - 143	100	1.07 - 71.5	– - –	S037-0"	12.67
Copper	143 - 143	100	10.5 - 1370	– - –	S037-0"	138.9
Lead [d]	143 - 143	100	3.1 - 47300	– - –	S037-20"	687
Mercury	90 - 143	62.9	0.0978 - 53.5	0.0862 - 0.11	S026-12"	3.246
Molybdenum	88 - 143	61.5	0.279 - 67.9	0.258 - 0.324	S039-0"	5.815
Nickel	143 - 143	100	2.66 - 71.5	– - –	S025-12"	23.23
Selenium	19 - 143	13.3	0.785 - 3.22	0.776 - 1.04	S053-0"	0.955
Silver	1 - 143	0.699	0.933 - 0.933	0.258 - 0.397	S171-12"	0.933 m
Thallium	1 - 143	0.699	0.841 - 0.841	0.774 - 1.19	S028-0"	0.841 m
Vanadium	143 - 143	100	5.48 - 293	– - –	S025-12"	44.31
Zinc	143 - 143	100	25.4 - 1740	– - –	S181-0"	221.3

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
ND Non-detects.
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-8
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Volatile Organic Compounds (VOCs)						
1,1,1-Trichloroethane	1 - 334	0.299	0.0038 - 0.0038	0.0004 - 12.375	S181-0"	0.0038 m
1,1,2-Trichloroethane	1 - 334	0.299	0.0026 - 0.0026	0.0004 - 12.375	S039-0"	0.0026 m
1,2,3-Trichloropropane	1 - 333	0.3	0.55 - 0.55	0.00081 - 12.375	S158-12"	0.55 m
1,2,4-Trichlorobenzene	1 - 333	0.3	0.17 - 0.17	0.00081 - 12.375	S078-0"	0.17 m
1,2,4-Trimethylbenzene	93 - 333	27.9	0.002125 - 298.75	0.001 - 5.15	B022-5	10.467
1,2-Dichlorobenzene	3 - 333	0.901	0.0012 - 2.9	0.0004 - 12.375	S078-0"	2.9 m
1,2-Dichloropropane	4 - 334	1.2	0.0053 - 0.022	0.0004 - 12.375	S040-12"	0.022 m
1,3,5-Trimethylbenzene	64 - 333	19.2	0.001375 - 104.25	0.001 - 5.15	B022-5	1.603
1,4-Dichlorobenzene	2 - 333	0.601	0.089 - 0.4	0.0004 - 12.375	S078-0"	0.4 m
2-Butanone	60 - 334	18	0.018 - 0.15	0.0081 - 247.5	S172-0"	0.03288
Acetone	73 - 334	21.9	0.041 - 0.54	0.027 - 170	S171-12"	0.08288
Benzene	115 - 334	34.4	0.00071 - 24	0.00051 - 12.375	B242-05	0.6622
Bromodichloromethane	5 - 334	1.5	0.0022 - 0.14	0.0004 - 12.375	S267-0"	0.14 m
c-1,2-Dichloroethene	4 - 334	1.2	0.0019 - 0.0175	0.0004 - 12.375	B143-2	0.0175 m
Carbon Disulfide	8 - 334	2.4	0.0015 - 0.043	0.004 - 33	S058-0"	0.003264
Chloroform	10 - 334	2.99	0.0014 - 0.26	0.0004 - 12.375	S267-0"	0.005912
Ethylbenzene	98 - 333	29.4	0.00094 - 50	0.00051 - 5.15	B237-5	2.518
Iodomethane	1 - 148	0.676	0.005 - 0.005	0.00625 - 12.375	B215-5	0.005 m
Isopropylbenzene	93 - 334	27.8	0.00091 - 29.375	0.00051 - 12.375	B171-2	0.9903
Methylene Chloride	3 - 334	0.898	0.022 - 0.58	0.004 - 33	S130-12"	0.58 m
Methyl-t-Butyl Ether (MTBE)	18 - 334	5.39	0.0015 - 0.23	0.00081 - 12.375	S184-0"	0.005152
n-Butylbenzene	56 - 334	16.8	0.00089 - 14.25	0.00051 - 6.8125	B022-5	0.4528
n-Propylbenzene	105 - 334	31.4	0.00062 - 39	0.00051 - 6.25	B171-2	1.754
o-Xylene	70 - 333	21	0.0011 - 123.375	0.00051 - 6.25	B022-5	3.482
p/m-Xylene	94 - 334	28.1	0.0015 - 242.5	0.00081 - 5.15	B022-5	7.957
p-Isopropyltoluene	64 - 333	19.2	0.0011 - 18	0.00051 - 12.375	B241-5	0.4152
sec-Butylbenzene	94 - 334	28.1	0.00091 - 11.3125	0.00051 - 12.375	B171-2	0.5647
t-1,2-Dichloroethene	2 - 334	0.599	0.001375 - 0.002	0.0004 - 12.375	B160-2	0.002 m
Tert-Butyl Alcohol (TBA)	40 - 334	12	0.011875 - 0.69	0.0081 - 123.75	S051-0"	0.04136
tert-Butylbenzene	8 - 333	2.4	0.0025 - 0.69	0.0004 - 12.375	S027-0"	0.01221
Tetrachloroethene	2 - 334	0.599	0.002 - 0.1525	0.0004 - 12.375	B176-5	0.1525 m
Toluene	76 - 334	22.8	0.00073 - 18	0.0004 - 6.25	S037-20"	0.8929

Table 5-8
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b]				Detects				Detection Limits				Maximum Location	Exposure Point Concentration [c]	
	Number of Detects / Number of Samples			FOD %	Minimum (mg/kg)	-	Maximum (mg/kg)		Minimum (mg/kg)	-	Maximum (mg/kg)			(mg/kg)	
Trichloroethene	3	-	334	0.898	0.00175	-	0.05625		0.00081	-	12.375		B176-5	0.05625	m
Vinyl Chloride	1	-	334	0.299	0.0015	-	0.0015		0.0004	-	12.375		S297-6"	0.0015	m
Xylenes, total	99	-	333	29.7	0.0015	-	365		0.001	-	5.15		B022-5	11.371	
Semivolatile Organic Compounds (SVOCs)															
1-Methylnaphthalene	50	-	186	26.9	0.085	-	240		0.02	-	1.2		B237-5,S042-12"	19.153	
2-Methylnaphthalene	53	-	186	28.5	0.029	-	360		0.02	-	1.2		S042-12"	26.995	
Acenaphthene	68	-	333	20.4	0.0025	-	19		0.0125	-	26		B237-5	0.5012	
Acenaphthylene	36	-	333	10.8	0.003125	-	6.2		0.0125	-	26		S042-0"	0.1504	
Anthracene	50	-	334	15	0.0025	-	7.3		0.0125	-	26		S042-0"	0.1752	
Benzo(a)anthracene	66	-	334	19.8	0.0025	-	7.4		0.0125	-	26		S042-0"	0.2325	
Benzo(a)pyrene	61	-	334	18.3	0.00375	-	5.1		0.0125	-	26		S042-0"	0.1726	
Benzo(b)fluoranthene	51	-	334	15.3	0.0025	-	5.9		0.0125	-	26		S042-0"	0.1512	
Benzo(ghi)perylene	70	-	333	21	0.003125	-	4		0.0125	-	26		S075-0"	0.1344	
Benzo(k)fluoranthene	40	-	334	12	0.0025	-	5.4		0.0125	-	26		S042-0"	0.1405	
Chrysene	119	-	334	35.6	0.00375	-	7.5		0.0125	-	26		S042-0"	0.3673	
Dibenzo(a,h)anthracene	12	-	333	3.6	0.00375	-	3.5		0.0125	-	26		S042-0"	0.04096	
Fluoranthene	73	-	334	21.9	0.003125	-	15		0.0125	-	26		S075-0"	0.3493	
Fluorene	87	-	332	26.2	0.00275	-	39		0.0125	-	11		S042-12"	1.474	
Indeno(1,2,3-cd)pyrene	22	-	332	6.63	0.003125	-	4		0.0125	-	26		S075-0"	0.108	
Naphthalene	65	-	333	19.5	0.00775	-	48.5		0.0051	-	33		B022-5	3.588	
Phenanthrene	121	-	334	36.2	0.0025	-	59		0.00375	-	11		S042-12"	2.126	
Pyrene	122	-	334	36.5	0.002625	-	13		0.0125	-	26		S075-0"	0.5583	
Pesticides and Herbicides															
4,4-DDE	2	-	21	9.52	0.0057	-	0.013		0.0053	-	0.0069		S185-6"	0.013	m
Aldrin	1	-	21	4.76	0.18	-	0.18		0.0053	-	0.0069		S185-6"	0.18	m
Chlordane	1	-	21	4.76	1.5	-	1.5		0.053	-	0.069		S185-6"	1.5	m
Dieldrin	1	-	21	4.76	0.025	-	0.025		0.0053	-	0.0069		S185-6"	0.025	m
Polychlorinated Biphenyls (PCBs)															
PCB-1254	3	-	31	9.68	0.045	-	1.9		0.0375	-	0.06		S047-6"	1.9	m
PCB-1260	1	-	31	3.23	0.30625	-	0.30625		0.0375	-	0.29		B063-2	0.30625	m
Total PCBs	3	-	31	9.68	0.045	-	1.9		–	-	–		S047-6"	1.9	m

Table 5-8
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Inorganic Compounds						
Antimony	61 - 223	27.4	0.86 - 14.2	0.774 - 5.53	S045-0"	1.791
Arsenic	195 - 233	83.7	0.45125 - 40.9	0.58125 - 4.97	S040-0"	5.4
Barium	233 - 233	100	47 - 1800	– - –	S036-0"	206.1
Beryllium	224 - 233	96.1	0.269 - 4.6	0.261 - 0.625	S086-6"	0.867
Cadmium	97 - 233	41.6	0.01875 - 3.93	0.1225 - 0.693	S038-0"	0.453
Chromium	232 - 233	99.6	4.47 - 2690	22.5 - 22.5	S039-0"	89.24
Chromium, Hexavalent	22 - 22	100	0.1075 - 2.8	– - –	S144B-0"	1.119
Cobalt	233 - 233	100	1.07 - 71.5	– - –	S037-0"	14.02
Copper	221 - 233	94.8	10.5 - 1370	1.25 - 28.7	S037-0"	75.13
Lead [d]	229 - 233	98.3	3.1 - 47300	6.26 - 12.9	S037-20"	452
Mercury	160 - 233	68.7	0.025 - 53.5	0.0862 - 0.175	S026-12"	2.025
Molybdenum	104 - 233	44.6	0.15375 - 67.9	0.039 - 2.04	S039-0"	2.726
Nickel	233 - 233	100	2.66 - 71.5	– - –	S025-12"	23.55
Selenium	22 - 233	9.44	0.785 - 11	0.776 - 1.25	B174-2	0.993
Silver	1 - 233	0.429	0.933 - 0.933	0.258 - 0.625	S171-12"	0.933 m
Thallium	1 - 233	0.429	0.841 - 0.841	0.774 - 1.25	S028-0"	0.841 m
Vanadium	233 - 233	100	5.48 - 293	– - –	S025-12"	49.96
Zinc	233 - 233	100	25.4 - 1740	– - –	S181-0"	165.9

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
ND Non-detects.
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-9
Statistical Summary of Soil Gas (at 5 ft) Dataset Used in the BHHRA
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	CAS No.	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum µg/m³	Detection Limits Minimum - Maximum µg/m³	Maximum Location	Exposure Point Concentration [c] µg/m³
Benzene	71-43-2	28 - 81	34.6	1200 - 280000	1000 - 1000	V148	25590
cis-1,2-Dichloroethene	156-59-2	2 - 81	2.47	2100 - 4100	1000 - 10000	V152	4100 m
Ethylbenzene	100-41-4	23 - 81	28.4	1000 - 400000	1000 - 1000	V178	48950
o-Xylene	95-47-6	14 - 81	17.3	1100 - 340000	1000 - 10000	V022	22210
p/m-Xylene	-	37 - 81	45.7	1000 - 980000	1000 - 1000	V178	142300
Tetrachloroethene	127-18-4	1 - 81	1.23	3600 - 3600	1000 - 10000	V215	3600 m
Toluene	108-88-3	25 - 81	30.9	1000 - 590000	1000 - 10000	V178	68870
Trichloroethene	79-01-6	1 - 81	1.23	1200 - 1200	1000 - 10000	V152	1200 m
Xylenes, total	1330-20-7	37 - 81	45.7	1000 - 1250000	1000 - 1000	V178	186400

Notes:

– = not detected, not analyzed, or not applicable
CAS No. = Chemical Abstract Service number
EPC = exposure point concentration
FOD = frequency of detection
µg/m³ = micrograms per cubic meter
ND = non-detects
UCL = upper confidence level on the mean

[a] All constituents analyzed for are presented.
For duplicate samples, the highest detected value or the lowest detection limit were used.
For constituents analyzed in two methods, the result of the more precise method was used

[b] FOD = number of detects / total number of samples analyzed.

[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.

Table 5-10
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 0.5-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Volatile Organic Compounds (VOCs)				-		
1,2,4-Trimethylbenzene	6 - 26	23.1	0.002 - 9.2	0.00097 - 0.4	S298-0	1.124
1,2-Dichlorobenzene	1 - 26	3.85	0.0074 - 0.0074	0.00049 - 0.2	S013-0"	0.0074 m
1,3,5-Trimethylbenzene	2 - 26	7.69	0.28 - 2.1	0.00097 - 0.4	S298-0	2.1 m
1,4-Dichlorobenzene	1 - 26	3.85	0.0052 - 0.0052	0.00049 - 0.2	S013-0"	0.0052 m
2-Butanone	11 - 26	42.3	0.022 - 0.1	0.016 - 4	B325-00	0.04143
Acetone	15 - 26	57.7	0.065 - 0.2	0.04 - 10	S017-0"	0.1199
Benzene	5 - 26	19.2	0.001 - 3.5	0.00049 - 0.027	S020-0"	0.4239
Carbon Disulfide	1 - 26	3.85	0.019 - 0.019	0.0049 - 2	S017-0"	0.019 m
Chloroform	2 - 26	7.69	0.42 - 1.5	0.00049 - 0.027	S020-0"	1.5 m
Ethy benzene	4 - 26	15.4	0.0019 - 0.91	0.00049 - 0.2	S011-0"	0.91 m
Isopropylbenzene	3 - 26	11.5	0.14 - 0.48	0.00049 - 0.0013	S020-0"	0.48 m
n-Butylbenzene	5 - 26	19.2	0.0032 - 1.6	0.00049 - 0.0013	S298-0	0.2338
n-Propylbenzene	4 - 26	15.4	0.0054 - 0.84	0.00049 - 0.0013	S298-0	0.84 m
o-Xylene	5 - 26	19.2	0.0011 - 2.2	0.00049 - 0.2	S298-0	0.2514
p/m-Xylene	5 - 26	19.2	0.003 - 3.7	0.00097 - 0.4	S298-0	0.4458
p-Isopropyltoluene	2 - 26	7.69	0.29 - 0.3	0.00049 - 0.2	S011-0"	0.3 m
sec-Butylbenzene	4 - 26	15.4	0.0014 - 0.69	0.00049 - 0.0013	S020-0"	0.69 m
Tert-Butyl Alcohol (TBA)	2 - 26	7.69	0.012 - 0.031	0.0097 - 4	S008-0"	0.031 m
tert-Butylbenzene	2 - 26	7.69	0.0013 - 0.2	0.00049 - 0.14	S020-0"	0.2 m
Tetrachloroethene	1 - 26	3.85	0.04 - 0.04	0.00049 - 0.2	S009-0"	0.04 m
Toluene	3 - 26	11.5	0.0012 - 0.63	0.00049 - 0.2	S298-0	0.63 m
Xylenes, total	5 - 26	19.2	0.0042 - 5.9	0.00097 - 0.4	S298-0	0.6961
Semivolatile Organic Compounds (SVOCs)						
1-Methylnaphthalene	6 - 26	23.1	0.029 - 250	0.023 - 0.23	S298-0	27.469
2-Methylnaphthalene	5 - 26	19.2	0.045 - 320	0.023 - 0.23	S298-0	35.666
Acenaphthene	4 - 26	15.4	0.051 - 48	0.022 - 0.23	S298-0	48 m
Acenaphthylene	2 - 26	7.69	0.047 - 0.38	0.022 - 22	S004-0"	0.38 m
Anthracene	5 - 26	19.2	0.11 - 0.51	0.022 - 22	S004-0"	0.1673
Benzo(a)anthracene	5 - 26	19.2	0.11 - 0.57	0.022 - 22	S004-0"	0.57 m

Table 5-10
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 0.5-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b]				Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
	Number of Detects / Number of Samples			FOD %	Minimum (mg/kg)	-	Maximum (mg/kg)	Minimum (mg/kg)	-	Maximum (mg/kg)		(mg/kg)
Benzo(a)pyrene	5	-	26	19.2	0.2	-	0.48	0.022	-	22	S004-0"	0.2442
Benzo(b)fluoranthene	5	-	26	19.2	0.11	-	0.47	0.022	-	22	S004-0"	0.1695
Benzo(ghi)perylene	7	-	26	26.9	0.058	-	0.53	0.022	-	22	S004-0"	0.1502
Benzo(k)fluoranthene	2	-	26	7.69	0.35	-	0.52	0.022	-	22	S004-0"	0.52 m
Chrysene	12	-	26	46.2	0.039	-	0.65	0.022	-	22	S007-0"	0.2562
Dibenzo(a,h)anthracene	1	-	26	3.85	0.62	-	0.62	0.022	-	22	S004-0"	0.62 m
Fluoranthene	7	-	26	26.9	0.11	-	0.71	0.022	-	22	S008-0"	0.221
Fluorene	5	-	26	19.2	0.11	-	52	0.022	-	0.23	S298-0	23.898
Indeno(1,2,3-cd)pyrene	5	-	26	19.2	0.06	-	0.67	0.022	-	22	S004-0"	0.145
Naphthalene	4	-	26	15.4	0.039	-	18	0.0049	-	0.013	S298-0	2.135
Phenanthrene	8	-	26	30.8	0.034	-	190	0.023	-	0.23	S298-0	83.642
Pyrene	12	-	26	46.2	0.033	-	26	0.022	-	0.23	S298-0	7.614
Polychlorinated Biphenyls (PCBs)												
PCB-1254	1	-	1	100	0.74	-	0.74	–	-	–	S018-0"	0.74 m
Inorganic Compounds												
Antimony	3	-	26	11.5	1.02	-	13.4	0.774	-	0.989	S019-0"	13.4 m
Arsenic	26	-	26	100	3.14	-	11.6	–	-	–	S007-0"	7.38
Barium	26	-	26	100	87.1	-	562	–	-	–	S020-0"	212.4
Beryllium	25	-	26	96.2	0.285	-	1.05	0.276	-	0.276	B324-00	0.616
Cadmium	9	-	26	34.6	0.625	-	1.66	0.516	-	0.66	S011-0"	0.823
Chromium	26	-	26	100	13.7	-	225	–	-	–	S019-0"	57.07
Cobalt	26	-	26	100	6.29	-	17.6	–	-	–	B324-00	11.97
Copper	26	-	26	100	21.6	-	401	–	-	–	S019-0"	129.3
Lead [d]	26	-	26	100	10.6	-	3810	–	-	–	S011-0"	244
Mercury	20	-	26	76.9	0.092	-	132	0.0887	-	0.098	S019-0"	56.09
Molybdenum	17	-	26	65.4	0.371	-	13.9	0.258	-	0.297	S291-0"	3.498
Nickel	26	-	26	100	10.4	-	31.5	–	-	–	S270-0"	22.57
Selenium	1	-	26	3.85	1.22	-	1.22	0.774	-	0.989	S007-0"	1.22 m

Table 5-10
Statistical Summary of Soil Dataset Used in the BHHRA
Surface Soil (0- to 0.5-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Thallium	3 - 26	11.5	3.14 - 4.71	0.774 - 0.989	B324-00	4.71 m
Vanadium	26 - 26	100	21.3 - 66.6	– - –	B324-00	42.99
Zinc	26 - 26	100	55.4 - 8250	– - –	S018-0"	1810

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
ND Non-detects.
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-11
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum (mg/kg)	Detects Maximum (mg/kg)	Detection Limits Minimum (mg/kg)	Detection Limits Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Volatile Organic Compounds (VOCs)								
1,2,4-Trimethylbenzene	30 - 93	32.3	0.001625	46.4	0.00097	1	B130-2	7.328
1,2-Dichlorobenzene	1 - 93	1.08	0.0074	0.0074	0.00049	1.75	S013-0"	0.0074 m
1,2-Dichloropropane	1 - 93	1.08	2	2	0.00049	1.75	S020-12"	2 m
1,3,5-Trimethylbenzene	16 - 93	17.2	0.0025	17.2	0.00097	1	B130-2	1.049
1,4-Dichlorobenzene	1 - 93	1.08	0.0052	0.0052	0.00049	1.75	S013-0"	0.0052 m
2-Butanone	15 - 93	16.1	0.015	0.1	0.016	35	B325-00	0.02902
2-Hexanone	1 - 93	1.08	0.001625	0.001625	0.00625	10	B121-2	0.001625 m
Acetone	27 - 93	29	0.044	0.2	0.04	26	S017-0"	0.0744
Benzene	33 - 93	35.5	0.001	9.3	0.00049	1.5625	B299-10	1.139
Carbon Disulfide	2 - 93	2.15	0.014	0.019	0.0049	5.2	S017-0"	0.019 m
Chloroform	5 - 93	5.38	0.011	1.6	0.00049	1.75	S020-12"	0.114
Ethylbenzene	24 - 93	25.8	0.00125	14.5	0.00049	0.625	B130-2	1.163
Iodomethane	1 - 44	2.27	0.00225	0.00225	0.00625	1.75	B129-5	0.00225 m
Isopropylbenzene	19 - 93	20.4	0.0015	4.96	0.00049	1.75	B130-2	0.3935
Methyl-t-Butyl Ether (MTBE)	4 - 93	4.3	0.002125	2.85	0.00097	1.75	B121-5	2.85 m
n-Butylbenzene	15 - 93	16.1	0.0028	5.48	0.00049	1.75	B130-2	0.3646
n-Propylbenzene	24 - 93	25.8	0.0017	7.44	0.00049	0.625	B130-2	0.4953
o-Xylene	20 - 92	21.7	0.0011	16.75	0.00049	1.75	B123-2	0.7329
p/m-Xylene	26 - 92	28.3	0.00125	77.5	0.00097	1	B130-2	8.96
p-Isopropyltoluene	15 - 93	16.1	0.0015	4.7375	0.00049	0.625	B123-2	0.374
sec-Buty benzene	21 - 93	22.6	0.001375	2.55	0.00049	1.75	B130-2	0.2329
Styrene	2 - 93	2.15	0.0017	0.25	0.00049	1.75	B139-2	0.25 m
Tert-Butyl Alcohol (TBA)	8 - 93	8.6	0.012	0.098	0.0097	17.5	B235-5	0.02087
tert-Buty benzene	3 - 93	3.23	0.0013	0.28	0.00049	1.75	S020-12"	0.28 m
Tetrachloroethene	1 - 93	1.08	0.04	0.04	0.00049	1.75	S009-0"	0.04 m
Toluene	16 - 93	17.2	0.0011	5.0625	0.00049	1.5625	B123-2	0.4584
Vinyl Acetate	1 - 93	1.08	0.0098	0.0098	0.0049	17.5	B253-05	0.0098 m
Xylenes, total	26 - 93	28	0.00125	71	0.00097	1	B123-2	9.187
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	13 - 49	26.5	0.029	250	0.02	0.23	S298-0	21.886
2-Methylnaphthalene	12 - 49	24.5	0.04	320	0.02	0.23	S298-0	29.341
Acenaphthene	29 - 93	31.2	0.0025	48	0.0125	2.2	S298-0	3.965

Table 5-11
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b]				Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
	Number of Detects / Number of Samples			FOD %	Minimum (mg/kg)	-	Maximum (mg/kg)	Minimum (mg/kg)	-	Maximum (mg/kg)		(mg/kg)
Acenaphthylene	18	-	93	19.4	0.003125	-	0.956	0.0125	-	22	B128-2	0.06616
Anthracene	22	-	93	23.7	0.003375	-	2.79	0.0125	-	22	B121-5	0.1394
Benzo(a)anthracene	25	-	93	26.9	0.00325	-	1.0275	0.0125	-	22	B121-5	0.1258
Benzo(a)pyrene	21	-	93	22.6	0.00375	-	0.83	0.0125	-	22	B121-5	0.07225
Benzo(b)fluoranthene	19	-	93	20.4	0.0025	-	0.47	0.0125	-	22	S004-0"	0.04254
Benzo(ghi)perylene	26	-	93	28	0.003	-	2.4	0.0125	-	22	S011-12"	0.1097
Benzo(k)fluoranthene	15	-	93	16.1	0.002625	-	0.52	0.0125	-	22	S004-0"	0.037
Chrysene	40	-	93	43	0.002875	-	4.3	0.0125	-	22	B121-5	0.469
Dibenzo(a,h)anthracene	6	-	93	6.45	0.002875	-	0.62	0.0125	-	22	S004-0"	0.05913
Fluoranthene	29	-	93	31.2	0.0025	-	3.3	0.0125	-	22	S011-12"	0.1558
Fluorene	36	-	93	38.7	0.003125	-	52	0.0125	-	0.23	S298-0	4.701
Indeno(1,2,3-cd)pyrene	12	-	93	12.9	0.0025	-	0.67	0.0125	-	22	S004-0"	0.03545
Naphthalene	20	-	91	22	0.00375	-	18	0.0049	-	5.1	S298-0	1.804
Phenanthrene	41	-	93	44.1	0.00375	-	190	0.004625	-	0.23	S298-0	15.968
Pyrene	43	-	93	46.2	0.0025	-	26	0.0125	-	2.3	S298-0	2.412
Polychlorinated Biphenyls (PCBs)												
PCB-1254	1	-	7	14.3	0.74	-	0.74	0.0375	-	0.057	S018-0"	0.74 m
Total PCBs	1	-	7	14.3	0.74	-	0.74	–	-	–	S018-0"	0.74 m
Inorganic Compounds												
Antimony	19	-	65	29.2	0.97375	-	13.4	0.774	-	6.67	S019-0"	2.441
Arsenic	53	-	67	79.1	0.82375	-	11.9	1.25	-	3.81	S010-6"	5.548
Barium	67	-	67	100	87.1	-	562	–	-	–	S020-0"	185.5
Beryllium	66	-	67	98.5	0.285	-	1.5125	0.276	-	0.276	B132-2	0.99
Cadmium	33	-	67	49.3	0.1375	-	1.66	0.2675	-	0.66	S011-0"	0.471
Chromium	67	-	67	100	13.7	-	225	–	-	–	S019-0"	47.02
Chromium, Hexavalent	1	-	1	100	0.74	-	0.74	–	-	–	B234-05	0.74 m
Cobalt	66	-	67	98.5	6.29	-	20.875	0.625	-	0.625	B021-5	14.31
Copper	66	-	67	98.5	17	-	401	28.7	-	28.7	S019-0"	75.85
Lead [d]	67	-	67	100	7.42	-	3810	–	-	–	S011-0"	160
Mercury	48	-	67	71.6	0.025	-	132	0.0887	-	0.175	S019-0"	10.76
Molybdenum	27	-	67	40.3	0.10125	-	13.9	0.08625	-	1.25	S291-0"	1.733
Nickel	67	-	67	100	10.4	-	32.6	–	-	–	B326-02	23.73
Selenium	2	-	67	2.99	1.22	-	2.14	0.774	-	1.25	B303-05	2.14 m

Table 5-11
Statistical Summary of Soil Dataset Used in the BHHRA
Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/kg)	Detection Limits Minimum - Maximum (mg/kg)	Maximum Location	Exposure Point Concentration [c] (mg/kg)
Thallium	6 - 67	8.96	3.14 - 5.68	0.774 - 1.25	B324-02	3.32
Vanadium	67 - 67	100	21.3 - 83.625	– - –	B021-5	54.16
Zinc	67 - 67	100	51 - 8250	– - –	S018-0"	754.2

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
ND Non-detects.
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once are presented. For duplicate samples, the highest detected value or the lowest detection limit were used. For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.
[d] The EPC for lead was set at the arithmetic average.

Table 5-12
Statistical Summary of Soil Gas (at 5 ft) Dataset Used in the BHHRA
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	CAS No.	Frequency of Detection (FOD) [b]			Detects			Detection Limits			Maximum Location	Exposure Point Concentration [c]
		Number of Detects / Number of Samples			FOD %	Minimum - Maximum		Minimum - Maximum				
						µg/m^3		µg/m^3				µg/m^3
Benzene	71-43-2	11	-	26	42.3	1400	490000	1000	-	5000	V123	144900
Ethylbenzene	100-41-4	6	-	26	23.1	1200	60000	1000	-	5000	V123	7879
o-Xylene	95-47-6	3	-	26	11.5	1400	16000	1000	-	5000	V123	16000 m
p/m-Xylene	-	15	-	26	57.7	1100	96000	1000	-	1000	V123	30800
Toluene	108-88-3	9	-	26	34.6	1100	54000	1000	-	5000	V123	7309
Xylenes, total	1330-20-7	15	-	26	57.7	1100	112000	1000	-	1000	V123	35250

Notes:

– = not detected, not analyzed, or not applicable
CAS No. = Chemical Abstract Service number
EPC = exposure point concentration
FOD = frequency of detection
µg/m^3 = micrograms per cubic meter
ND = non-detects
UCL = upper confidence level on the mean

[a] All constituents analyzed for are presented.
For duplicate samples, the highest detected value or the lowest detection limit were used.
For constituents analyzed in two methods, the result of the more precise method was used
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.

Table 5-13
Statistical Summary of Onsite Groundwater Dataset Used in the BHHRA

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/L)	Detection Limits Minimum - Maximum (mg/L)	Maximum Location	Exposure Point Concentration [c] (mg/L)
Volatile Organic Compounds (VOCs)						
1,1,2-Trichloroethane	1 - 80	1	0.00067 - 0.00067	0.0003 - 0.2	MW-201	0.00067 m
1,1-Dichloroethane	16 - 80	20	0.00037 - 0.0085	0.00027 - 0.2	W-10	0.001289
1,1-Dichloroethene	20 - 80	25	0.00044 - 0.014	0.00042 - 0.5	MW-105,MW-105	0.002973
1,2,4-Trimethy benzene	30 - 80	38	0.00023 - 0.27	0.00023 - 0.008	W-10	0.03104
1,2-Dichlorobenzene	1 - 53	2	0.00032 - 0.00032	0.00032 - 0.2	MW-103	0.00032 m
1,2-Dichloroethane	27 - 80	34	0.00029 - 0.0039	0.00028 - 0.2	MW-504	0.000868
1,2-Dichloropropane	2 - 80	3	0.019 - 0.025	0.00035 - 0.2	W-10	0.025 m
1,3,5-Trimethy benzene	20 - 80	25	0.00035 - 0.11	0.00026 - 0.2	MW-504,MW-504	0.01464
Benzene	46 - 80	58	0.00035 - 8.1	0.00028 - 0.002	W-10	1.431
c-1,2-Dichloroethene	54 - 80	68	0.00093 - 0.047	0.00032 - 0.2	MW-101	0.01138
Chloroethane	1 - 80	1	0.002 - 0.002	0.0004 - 0.5	W-10	0.002 m
Diisopropyl Ether (DIPE)	8 - 80	10	0.00028 - 0.0016	0.00025 - 0.5	MW-105	0.00063
Ethy benzene	38 - 80	48	0.00025 - 0.465	0.00025 - 0.008	W-10	0.09863
Isopropy benzene	32 - 80	40	0.00029 - 0.066	0.00025 - 0.2	MW-504	0.008365
Methylene Chloride	7 - 80	9	0.0015 - 0.0026	0.00095 - 0.5	W-11	0.001724
Methyl-t-Butyl Ether (MTBE)	11 - 80	14	0.00032 - 0.026	0.00032 - 0.5	MW-103	0.00277
n-Butylbenzene	9 - 80	11	0.0014 - 0.0084	0.00037 - 0.5	W-10	0.002082
n-Propylbenzene	31 - 80	39	0.00027 - 0.059	0.00027 - 0.2	MW-504	0.007807
o-Xylene	20 - 80	25	0.0003 - 0.64	0.0003 - 0.2	W-10	0.07443
p/m-Xylene	27 - 80	34	0.0007 - 2	0.0006 - 0.008	W-10	0.1751
p-Isopropyltoluene	14 - 80	18	0.00034 - 0.018	0.00028 - 0.2	MW-504	0.002108
sec-Butylbenzene	27 - 80	34	0.00027 - 0.01	0.00025 - 0.5	MW-504	0.002041
t-1,2-Dichloroethene	22 - 80	28	0.0003 - 0.0065	0.00027 - 0.2	MW-105	0.001168
Tert-Butyl Alcohol (TBA)	41 - 80	51	0.0075 - 0.34	0.0049 - 5	MW-104A	0.05712
tert-Butylbenzene	7 - 80	9	0.00023 - 0.00084	0.00022 - 0.5	MW-103	0.000427
Tetrachloroethene	8 - 80	10	0.00037 - 0.038	0.00032 - 0.2	MW-105	0.003456
Toluene	28 - 80	35	0.00037 - 1.9	0.00036 - 0.2	W-10	0.1924
Trichloroethene	29 - 80	36	0.00027 - 0.0795	0.00026 - 0.2	MW-105	0.02085
Vinyl Chloride	24 - 80	30	0.00041 - 0.00375	0.0003 - 0.5	W-10	0.001367
Xylenes, total	25 - 80	31	0.00094 - 2.6	0.0009 - 0.016	W-10	0.2102

Table 5-13
Statistical Summary of Onsite Groundwater Dataset Used in the BHHRA

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Frequency of Detection (FOD) [b] Number of Detects / Number of Samples	FOD %	Detects Minimum - Maximum (mg/L)	Detection Limits Minimum - Maximum (mg/L)	Maximum Location	Exposure Point Concentration [c] (mg/L)
Semi Volatile Organic Compounds (SVOCs)				-		
1,4-Dioxane	12 - 14	86	0.00064 - 0.00705	0.00048 - 0.00051	W-10	0.003936
Naphthalene	21 - 80	26	0.00041 - 0.24	0.00041 - 0.5	W-10	0.02685
Total Petroleum Hydrocarbon (TPH)				-		
TPH as Gasoline	59 - 68	86.8	0.031 - 28	0.03 - 0.05	W-10	5.863
Inorganic Compounds				-		
Iron	5 - 8	62.5	0.1 - 2	0.1 - 0.1	MW-205	2 m
Methane	10 - 12	83	0.0015 - 1.5	0.05 - 0.05	MW-205	0.919

Notes:

– = not detected, not analyzed, or not applicable
EPC = exposure point concentration
FOD = frequency of detection
ND Non-detects.
mg/L = milligrams per liter
UCL = upper confidence level on the mean

[a] Only chemicals detected at least once in groundwater.
For duplicate samples, the highest detected value or the lowest detection limit were used.
For constituents analyzed in two methods, the result of the more precise method was used.
[b] FOD = number of detects / total number of samples analyzed.
[c] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. Exposure to lead is evaluated by predicting blood-lead levels using the arithmetic average (avg).
The UCLs were calculated using ProUCL 4.0. The UCL used is the one recommended by ProUCL 4.0.

Table 6-1
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Volatile Organic Compounds (VOCs)								
1,1,2,2-Tetrachloroethane	1.20E-02	2.90E+00	5.90E-01		–	no	no	**YES**
1,1,2-Trichloroethane	7.70E-03	5.50E+00	1.10E+00		–	no	no	**YES**
1,2,3-Trichlorobenzene	9.00E-03	4.00E+02	8.70E+01	1,2,4-Trichlorobenzene	–	no	no	**YES**
1,2,4-Trimethylbenzene	2.70E+01	2.80E+02	6.70E+01		–	no	no	**YES**
1,2-Dichloropropane	2.10E-03	4.70E+00	9.30E-01		–	no	no	**YES**
1,3,5-Trimethylbenzene	9.30E+00	2.00E+02	4.70E+01		–	no	no	**YES**
2-Butanone	9.10E-02	1.90E+05	2.80E+04		–	no	no	no
2-Chlorotoluene	2.80E-03	2.00E+04	1.60E+03		–	no	no	**YES**
4-Chlorotoluene	2.10E-03	7.20E+04	5.50E+03		–	no	no	**YES**
4-Methyl-2-Pentanone	1.20E-02	5.20E+04	5.30E+03		–	no	no	**YES**
Acetone	1.80E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	2.80E-01	5.60E+00	1.10E+00		–	no	no	**YES**
Carbon Disulfide	3.40E-02	3.00E+03	6.70E+02		–	no	no	**YES**
Ethanol	1.60E+00	NA	NA		–	NA	NA	no
Ethylbenzene	1.10E+00	2.90E+01	5.70E+00		–	no	no	**YES**
Isopropylbenzene	5.40E+00	1.10E+04	2.20E+03		–	no	no	**YES**
Methyl-t-Butyl Ether (MTBE)	3.20E-01	1.90E+02	3.90E+01		–	no	no	**YES**
n-Butylbenzene	3.50E+00	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
n-Propylbenzene	8.60E+00	NA	NA		–	NA	NA	**YES**
o-Xylene	2.30E+00	2.30E+04	5.30E+03		–	no	no	**YES**
p/m-Xylene	4.70E+00	2.60E+03	6.00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	2.60E+00	1.10E+04	2.20E+03	Isopropylbenzene	–	no	no	**YES**
sec-Butylbenzene	2.80E+00	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tert-Butyl Alcohol (TBA)	4.40E-02	3.10E+05	2.30E+04	Isobutyl Alcohol	–	no	no	**YES**
Toluene	9.20E-01	4.60E+04	5.00E+03		–	no	no	**YES**
Xylenes, total	7.00E+00	2.60E+03	6.00E+02		–	no	no	**YES**
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	2.70E+02	9.90E+01	2.20E+01		–	**YES**	**YES**	**YES**
2-Methylnaphthalene	3.50E+02	4.10E+03	3.10E+02		–	no	**YES**	**YES**
Acenaphthene	2.60E+01	3.30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	3.40E+00	3.30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	4.00E+00	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	7.20E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(a)pyrene	5.20E+00	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	2.90E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(ghi)perylene	1.40E+00	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	2.00E+00	2.10E+01	1.50E+00		–	no	**YES**	**YES**
Chrysene	2.00E+01	2.10E+02	1.50E+01		–	no	**YES**	**YES**

Table 6-1
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Dibenzo(a,h)anthracene	5.30E-01	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	4.20E+00	2.20E+04	2.30E+03		–	no	no	**YES**
Fluorene	4.20E+01	2.20E+04	2.30E+03		–	no	no	**YES**
Indeno(1,2,3-cd)pyrene	1.40E+00	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Naphthalene	7.50E+00	2.00E+01	3.90E+00		–	no	**YES**	**YES**
Phenanthrene	1.10E+02	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	3.10E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Inorganic Compounds								
Antimony	4.96E+00	3.80E+02	3.00E+01		3.30E-01	no	no	**YES**
Arsenic	1.35E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	5.66E+02	6.30E+04	5.20E+03		5.33E+02	no	no	**YES**
Beryllium	1.13E+00	1.70E+03	1.50E+02		8.00E-01	no	no	**YES**
Cadmium	1.97E+00	7.50E+00	1.70E+00		1.60E-01	no	**YES**	**YES**
Chromium	4.15E+02	1.40E+03	2.80E+02		3.50E+01	no	**YES**	**YES**
Chromium, Hexavalent	1.20E+00	3.70E+01	1.70E+01		–	no	no	**YES**
Cobalt	2.87E+01	3.00E+02	2.30E+01		6.90E+00	no	**YES**	**YES**
Copper	1.64E+03	3.80E+04	3.00E+03		1.48E+01	no	no	**YES**
Lead	4.24E+03	8.00E+02	1.50E+02		1.42E+01	**YES**	**YES**	**YES**
Mercury	2.51E+00	2.80E+01	6.70E+00		1.00E-01	no	no	**YES**
Molybdenum	1.12E+02	4.80E+03	3.80E+02		2.40E+00	no	no	**YES**
Nickel	4.24E+01	1.60E+04	1.60E+03		1.90E+01	no	no	**YES**
Selenium	6.82E+00	4.80E+03	3.80E+02		1.50E-01	no	no	**YES**
Vanadium	1.03E+02	6.70E+03	5.30E+02		6.00E+01	no	no	**YES**
Zinc	1.24E+03	1.00E+05	2.30E+04		1.70E+02	no	no	**YES**

Notes:

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in surface soil (0-2 foot depth interval).
[b] All constituents were considered COPCs unless they were essential nutrients (i.e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e., acetone).

Table 6-2
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Volatile Organic Compounds (VOCs)								
1,1,2,2-Tetrachloroethane	1.20E-02	2 90E+00	5.90E-01		–	no	no	**YES**
1,1,2-Trichloroethane	7.70E-03	5 50E+00	1.10E+00		–	no	no	**YES**
1,2,3-Trichlorobenzene	9.00E-03	4 00E+02	8.70E+01	1,2,4-Trichlorobenzene	–	no	no	**YES**
1,2,4-Trichlorobenzene	4.63E-03	4 00E+02	8.70E+01		–	no	no	**YES**
1,2,4-Trimethylbenzene	4.86E+02	2 80E+02	6.70E+01		–	**YES**	**YES**	**YES**
1,2-Dichloropropane	2.10E-03	4.70E+00	9.30E-01		–	no	no	**YES**
1,3,5-Trimethylbenzene	2.13E+02	2 00E+02	4.70E+01		–	**YES**	**YES**	**YES**
2-Butanone	9.10E-02	1 90E+05	2.80E+04		–	no	no	no
2-Chlorotoluene	2.80E-03	2 00E+04	1.60E+03		–	no	no	**YES**
2-Hexanone	3.13E-03	NA	NA		–	NA	NA	**YES**
4-Chlorotoluene	2.10E-03	7 20E+04	5.50E+03		–	no	no	**YES**
4-Methyl-2-Pentanone	1.20E-02	5 20E+04	5.30E+03		–	no	no	**YES**
Acetone	2.10E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	1.58E+01	5 60E+00	1.10E+00		–	**YES**	**YES**	**YES**
Carbon Disulfide	3.40E-02	3 00E+03	6.70E+02		–	no	no	**YES**
Chloroethane	6.50E-03	6 20E+04	1.50E+04		–	no	no	**YES**
Chloromethane	2.13E-03	8.40E+00	1.70E+00		–	no	no	**YES**
Ethanol	1.60E+00	NA	NA		–	NA	NA	no
Ethylbenzene	7.91E+01	2 90E+01	5.70E+00		–	**YES**	**YES**	**YES**
Iodomethane	1.38E-02	3 50E+01	7.90E+00	Bromomethane	–	no	no	**YES**
Isopropylbenzene	7.94E+00	1.10E+04	2.20E+03		–	no	no	**YES**
Methyl-t-Butyl Ether (MTBE)	3.20E-01	1 90E+02	3.90E+01		–	no	no	**YES**
n-Butylbenzene	3.40E+01	2 90E+01	5.70E+00	Ethylbenzene	–	**YES**	**YES**	**YES**
n-Propylbenzene	5.24E+01	NA	NA		–	NA	NA	**YES**
o-Xylene	2.39E+02	2 30E+04	5.30E+03		–	no	no	**YES**
p/m-Xylene	3.86E+02	2 60E+03	6.00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	2.60E+00	1.10E+04	2.20E+03	Isopropylbenzene	–	no	no	**YES**
sec-Butylbenzene	2.80E+00	2 90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tert-Butyl Alcohol (TBA)	9.50E-01	3.10E+05	2.30E+04	Isobutyl Alcohol	–	no	no	**YES**
ert-Butylbenzene	1.46E-01	2 90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Toluene	9.70E+01	4 60E+04	5.00E+03		–	no	no	**YES**
Xylenes, total	6.25E+02	2 60E+03	6.00E+02		–	no	**YES**	**YES**
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	2.70E+02	9 90E+01	2.20E+01		–	**YES**	**YES**	**YES**
2-Methylnaphthalene	5.50E+02	4.10E+03	3.10E+02		–	no	**YES**	**YES**
Acenaphthene	2.60E+01	3 30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	3.40E+00	3 30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	4.00E+00	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	7.20E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(a)pyrene	5.20E+00	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	2.90E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(ghi)perylene	1.40E+00	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	2.00E+00	2.10E+01	1.50E+00		–	no	**YES**	**YES**
Chrysene	2.00E+01	2.10E+02	1.50E+01		–	no	**YES**	**YES**
Dibenzo(a,h)anthracene	5.30E-01	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	4.20E+00	2 20E+04	2.30E+03		–	no	no	**YES**
Fluorene	4.20E+01	2 20E+04	2.30E+03		–	no	no	**YES**

Table 6-2
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Indeno(1,2,3-cd)pyrene	1.40E+00	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Naphthalene	1.00E+02	2 00E+01	3.90E+00		–	**YES**	**YES**	**YES**
Phenanthrene	1.10E+02	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	3.10E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Polychlorinated Biphenyls (PCBs)								
PCB-1254	5.00E-02	3.00E-01	8.90E-02		–	no	no	**YES**
PCB-1260	4.00E-02	3.00E-01	8.90E-02		–	no	no	**YES**
Total PCBs	9.00E-02	3.00E-01	8.90E-02		–	no	**YES**	**YES**
norganic Compounds								
Antimony	9.68E+00	3 80E+02	3.00E+01		3.30E-01	no	no	**YES**
Arsenic	1.35E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	5.66E+02	6 30E+04	5.20E+03		5.33E+02	no	no	**YES**
Beryllium	1.75E+00	1.70E+03	1.50E+02		8.00E-01	no	no	**YES**
Cadmium	1.97E+00	7 50E+00	1.70E+00		1.60E-01	no	**YES**	**YES**
Chromium	4.15E+02	1.40E+03	2.80E+02		3.50E+01	no	**YES**	**YES**
Chromium, Hexavalent	1.20E+00	3.70E+01	1.70E+01		–	no	no	**YES**
Cobalt	2.87E+01	3 00E+02	2.30E+01		6.90E+00	no	**YES**	**YES**
Copper	1.64E+03	3 80E+04	3.00E+03		1.48E+01	no	no	**YES**
Lead	4.24E+03	8 00E+02	1.50E+02		1.42E+01	**YES**	**YES**	**YES**
Mercury	2.51E+00	2 80E+01	6.70E+00		1.00E-01	no	no	**YES**
Molybdenum	1.12E+02	4 80E+03	3.80E+02		2.40E+00	no	no	**YES**
Nickel	4.24E+01	1 60E+04	1.60E+03		1.90E+01	no	no	**YES**
Selenium	6.82E+00	4 80E+03	3.80E+02		1.50E-01	no	no	**YES**
Vanadium	1.03E+02	6.70E+03	5.30E+02		6.00E+01	no	no	**YES**
Zinc	1.24E+03	1 00E+05	2.30E+04		1.70E+02	no	no	**YES**

Notes

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in combined surface and subsurface soil.
[b] All constituents were considered COPCs unless they were essential nutrients (i.e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e. acetone).

Table 6-3
Data Evaluation and Selection of Constituents of Potential Concern for Soil Gas
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Maximum Concentration		Soil Gas Screening Level		Is Constituent a Soil Gas COPC? [b]
	5 feet	10 feet	Residential	Industrial	
	µg/m^3	µg/m^3	µg/m^3	µg/m^3	(YES, no)
Benzene	4.60E+05	2.80E+05	3.60E+01	1.22E+02	**YES**
Ethylbenzene	1.20E+06	5.70E+05	2.09E+05	5.84E+05	**YES**
o-Xylene	1.60E+06	8.00E+05	3.15E+05	8.79E+05	**YES**
p/m-Xylene	4.80E+06	2.40E+06	3.19E+05	8.87E+05	**YES**
Toluene	3.10E+06	1.40E+06	1.35E+05	3.78E+05	**YES**
Xylenes	6.40E+06	3.20E+06	3.15E+05	8.79E+05	**YES**

Notes:

COPC = constituent of potential concern

µg/m^3 = micrograms per cubic meter

[a] Only constituents detected at least once are presented.

[b] All detected constituents were considered COPCs.

Table 6-4
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Volatile Organic Compounds (VOCs)								
1,2,4-Trimethylbenzene	4.10E+02	2.80E+02	6.70E+01		–	**YES**	**YES**	**YES**
1,3,5-Trimethylbenzene	1.20E+02	2.00E+02	4.70E+01		–	no	**YES**	**YES**
2-Butanone	1.60E-01	1.90E+05	2.80E+04		–	no	no	no
Acetone	2.50E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	1.00E+02	5.60E+00	1.10E+00		–	**YES**	**YES**	**YES**
Carbon Disulfide	4.50E-02	3.00E+03	6.70E+02		–	no	no	**YES**
Chloroform	6.00E-02	1.50E+00	3.00E-01		–	no	no	**YES**
Ethanol	2.60E+00	NA	NA		–	NA	NA	no
Ethylbenzene	5.50E+01	2.90E+01	5.70E+00		–	**YES**	**YES**	**YES**
Isopropylbenzene	8.40E+00	1.10E+04	2.20E+03		–	no	no	**YES**
Methylene Chloride	4.70E-01	5.40E+01	1.10E+01		–	no	no	**YES**
Methyl-t-Butyl Ether (MTBE)	2.60E-03	1.90E+02	3.90E+01		–	no	no	**YES**
n-Butylbenzene	3.80E+01	2.90E+01	5.70E+00	Ethylbenzene	–	**YES**	**YES**	**YES**
n-Propylbenzene	4.70E+01	NA	NA		–	NA	NA	**YES**
o-Xylene	3.40E+01	2.30E+04	5.30E+03		–	no	no	**YES**
p/m-Xylene	1.50E+02	2.60E+03	6.00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	6.70E+00	1.10E+04	2.20E+03	Isopropylbenzene	–	no	no	**YES**
sec-Butylbenzene	7.10E+00	2.90E+01	5.70E+00	Ethylbenzene	–	no	**YES**	**YES**
Tert-Butyl Alcohol (TBA)	8.90E-02	3.10E+05	2.30E+04	Isobutyl Alcohol	–	no	no	**YES**
Tetrachloroethene	7.50E-03	2.70E+00	5.70E-01		–	no	no	**YES**
Toluene	7.80E-03	4.60E+04	5.00E+03		–	no	no	**YES**
Xylenes, total	1.84E+02	2.60E+03	6.00E+02		–	no	no	**YES**
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	3.20E+01	9.90E+01	2.20E+01		–	no	**YES**	**YES**
2-Methylnaphthalene	3.60E+01	4.10E+03	3.10E+02		–	no	no	**YES**
Acenaphthene	2.50E+00	3.30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	2.80E-01	3.30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	4.10E+00	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	1.10E+01	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(a)pyrene	4.70E+00	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	6.60E-01	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Benzo(ghi)perylene	4.10E-01	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	1.00E+00	2.10E+01	1.50E+00		–	no	no	**YES**
Chrysene	1.40E+01	2.10E+02	1.50E+01		–	no	no	**YES**
Dibenzo(a,h)anthracene	2.40E-01	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	3.00E+00	2.20E+04	2.30E+03		–	no	no	**YES**
Fluorene	4.30E+00	2.20E+04	2.30E+03		–	no	no	**YES**
Indeno(1,2,3-cd)pyrene	4.30E-01	2.10E+00	1.50E-01		–	no	**YES**	**YES**

Table 6-4
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Naphthalene	5.30E+01	2.00E+01	3.90E+00		–	**YES**	**YES**	**YES**
Phenanthrene	2.90E+01	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	1.80E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Pesticides and Herbicides								
Dieldrin	1.90E-02	1.10E-01	3.00E-02		–	no	no	**YES**
Polychlorinated Biphenyls (PCBs)								
PCB-1254	8.50E-02	3.00E-01	8.90E-02		–	no	no	**YES**
Total PCBs	8.50E-02	3.00E-01	8.90E-02		–	no	no	**YES**
Inorganic Compounds								
Antimony	2.88E+00	3.80E+02	3.00E+01		3.30E-01	no	no	**YES**
Arsenic	1.86E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	8.50E+02	6.30E+04	5.20E+03		5.33E+02	no	no	**YES**
Beryllium	1.42E+00	1.70E+03	1.50E+02		8.00E-01	no	no	**YES**
Cadmium	1.19E+01	7.50E+00	1.70E+00		1.60E-01	**YES**	**YES**	**YES**
Chromium	3.40E+02	1.40E+03	2.80E+02		3.50E+01	no	**YES**	**YES**
Cobalt	3.77E+01	3.00E+02	2.30E+01		6.90E+00	no	**YES**	**YES**
Copper	3.42E+03	3.80E+04	3.00E+03		1.48E+01	no	**YES**	**YES**
Lead	4.69E+03	8.00E+02	1.50E+02		1.42E+01	**YES**	**YES**	**YES**
Mercury	1.94E+00	2.80E+01	6.70E+00		1.00E-01	no	no	**YES**
Molybdenum	1.01E+02	4.80E+03	3.80E+02		2.40E+00	no	no	**YES**
Nickel	3.62E+03	1.60E+04	1.60E+03		1.90E+01	no	**YES**	**YES**
Selenium	1.34E+01	4.80E+03	3.80E+02		1.50E-01	no	no	**YES**
Silver	2.49E+00	4.80E+03	3.80E+02		–	no	no	**YES**
Vanadium	1.28E+02	6.70E+03	5.30E+02		6.00E+01	no	no	**YES**
Zinc	1.81E+03	1.00E+05	2.30E+04		1.70E+02	no	no	**YES**

Notes:

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in surface soil (0-2 foot depth interval).
[b] All constituents were considered COPCs unless they were essential nutrients (i.e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e., acetone).

Table 6-5
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Volatile Organic Compounds (VOCs)								
1,2,4-Trimethylbenzene	4.10E+02	2.80E+02	6.70E+01		–	**YES**	**YES**	**YES**
1,2-Dichlorobenzene	1 29E-01	1.00E+04	2.00E+03		–	no	no	**YES**
1,2-Dichloropropane	1 90E-02	4.70E+00	9.30E-01		–	no	no	**YES**
1,3,5-Trimethylbenzene	1.20E+02	2.00E+02	4.70E+01		–	no	**YES**	**YES**
2-Butanone	1 60E-01	1.90E+05	2.80E+04		–	no	no	no
Acetone	2 50E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	1.00E+02	5.60E+00	1.10E+00		–	**YES**	**YES**	**YES**
Carbon Disulfide	4 50E-02	3.00E+03	6.70E+02		–	no	no	**YES**
Chloroform	6 00E-02	1.50E+00	3.00E-01		–	no	no	**YES**
Ethanol	2.60E+00	NA	NA		–	NA	NA	no
Ethylbenzene	5.50E+01	2.90E+01	5.70E+00		–	**YES**	**YES**	**YES**
Isopropylbenzene	8.40E+00	1.10E+04	2.20E+03		–	no	no	**YES**
Methylene Chloride	4.70E-01	5.40E+01	1.10E+01		–	no	no	**YES**
Methyl-t-Butyl Ether (MTBE)	7 38E-03	1.90E+02	3.90E+01		–	no	no	**YES**
n-Butylbenzene	3.80E+01	2.90E+01	5.70E+00	Ethylbenzene	–	**YES**	**YES**	**YES**
n-Propylbenzene	4.70E+01	NA	NA		–	NA	NA	**YES**
o-Xylene	3.40E+01	2.30E+04	5.30E+03		–	no	no	**YES**
p/m-Xylene	1.50E+02	2.60E+03	6.00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	6.70E+00	1.10E+04	2.20E+03	Isopropylbenzene	–	no	no	**YES**
sec-Butylbenzene	7.10E+00	2.90E+01	5.70E+00	Ethylbenzene	–	no	**YES**	**YES**
Tert-Butyl Alcohol (TBA)	1 51E-01	3.10E+05	2.30E+04	Isobutyl Alcohol	–	no	no	**YES**
tert-Butylbenzene	1.10E-01	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tetrachloroethene	7 50E-03	2.70E+00	5.70E-01		–	no	no	**YES**
Toluene	3.19E+00	4.60E+04	5.00E+03		–	no	no	**YES**
Xylenes, total	1.84E+02	2.60E+03	6.00E+02		–	no	no	**YES**
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	3.20E+01	9.90E+01	2.20E+01		–	no	**YES**	**YES**
2-Methylnaphthalene	3.60E+01	4.10E+03	3.10E+02		–	no	no	**YES**
Acenaphthene	2.50E+00	3.30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	2 80E-01	3.30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	6.50E+00	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	1.10E+01	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(a)pyrene	5.90E+00	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	3.80E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(ghi)perylene	1.50E+00	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	4.90E+00	2.10E+01	1.50E+00		–	no	**YES**	**YES**
Chrysene	1.40E+01	2.10E+02	1.50E+01		–	no	no	**YES**
Dibenzo(a,h)anthracene	5.70E-01	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	1.80E+01	2.20E+04	2.30E+03		–	no	no	**YES**
Fluorene	4.30E+00	2.20E+04	2.30E+03		–	no	no	**YES**
Indeno(1,2,3-cd)pyrene	2.40E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Naphthalene	5.30E+01	2.00E+01	3.90E+00		–	**YES**	**YES**	**YES**
Phenanthrene	2.90E+01	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	1.80E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Pesticides and Herbicides								
Dieldrin	1 90E-02	1.10E-01	3.00E-02		–	no	no	**YES**
Polychlorinated Biphenyls (PCBs)								

Table 6-5
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
PCB-1254	2.00E+01	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
PCB-1260	7 50E-02	3.00E-01	8.90E-02		–	no	no	**YES**
Total PCBs	2.00E+01	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Inorganic Compounds								
Antimony	9.81E+00	3.80E+02	3.00E+01		3.30E-01	no	no	**YES**
Arsenic	2.81E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	8.50E+02	6.30E+04	5.20E+03		5.33E+02	no	no	**YES**
Beryllium	1.94E+00	1.70E+03	1.50E+02		8.00E-01	no	no	**YES**
Cadmium	1.19E+01	7.50E+00	1.70E+00		1.60E-01	**YES**	**YES**	**YES**
Chromium	3.40E+02	1.40E+03	2.80E+02		3.50E+01	no	**YES**	**YES**
Chromium, Hexavalent	2 95E-01	3.70E+01	1.70E+01		–	no	no	**YES**
Cobalt	3.77E+01	3.00E+02	2.30E+01		6.90E+00	no	**YES**	**YES**
Copper	3.42E+03	3.80E+04	3.00E+03		1.48E+01	no	**YES**	**YES**
Lead	4.69E+03	8.00E+02	1.50E+02		1.42E+01	**YES**	**YES**	**YES**
Mercury	1.94E+00	2.80E+01	6.70E+00		1.00E-01	no	no	**YES**
Molybdenum	1.01E+02	4.80E+03	3.80E+02		2.40E+00	no	no	**YES**
Nickel	3.62E+03	1.60E+04	1.60E+03		1.90E+01	no	**YES**	**YES**
Selenium	1.34E+01	4.80E+03	3.80E+02		1.50E-01	no	no	**YES**
Silver	2.49E+00	4.80E+03	3.80E+02		–	no	no	**YES**
Vanadium	1.28E+02	6.70E+03	5.30E+02		6.00E+01	no	no	**YES**
Zinc	1.81E+03	1.00E+05	2.30E+04		1.70E+02	no	no	**YES**

Notes

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in combined surface and subsurface soil.
[b] All constituents were considered COPCs unless they were essential nutrients (i e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e. acetone).

Table 6-6
Data Evaluation and Selection of Constituents of Potential Concern for Soil Gas
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Maximum Concentration		Soil Gas Screening Level		Is Constituent a Soil Gas COPC? [b]
	5 feet	10 feet	Residential	Industrial	
	µg/m^3	µg/m^3	µg/m^3	µg/m^3	(YES, no)
Benzene	3.80E+05	1.30E+06	3.60E+01	1.22E+02	**YES**
Ethylbenzene	3.80E+04	2.00E+05	2.09E+05	5.84E+05	**YES**
o-Xylene	3.50E+03	4.50E+04	3.15E+05	8.79E+05	**YES**
p/m-Xylene	2.40E+04	3.20E+05	3.19E+05	8.87E+05	**YES**
Toluene	3.50E+04	2.60E+05	1.35E+05	3.78E+05	**YES**
Xylenes	2.67E+04	3.65E+05	3.15E+05	8.79E+05	**YES**

Notes:

COPC = constituent of potential concern

µg/m^3 = micrograms per cubic meter

[a] Only constituents detected at least once are presented.

[b] All detected constituents were considered COPCs.

Table 6-7
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Volatile Organic Compounds (VOCs)								
1,1,1-Trichloroethane	3.80E-03	3.90E+04	9 00E+03		–	no	no	**YES**
1,1,2-Trichloroethane	2.60E-03	5.50E+00	1.10E+00		–	no	no	**YES**
1,2,3-Trichloropropane	5.50E-01	4.10E-01	9.10E-02		–	**YES**	**YES**	**YES**
1,2,4-Trichlorobenzene	1.70E-01	4.00E+02	8.70E+01		–	no	no	**YES**
1,2,4-Trimethylbenzene	6 00E+01	2.80E+02	6.70E+01		–	no	no	**YES**
1,2-Dichlorobenzene	2 90E+00	1.00E+04	2 00E+03		–	no	no	**YES**
1,2-Dichloropropane	2.20E-02	4.70E+00	9.30E-01		–	no	no	**YES**
1,3,5-Trimethylbenzene	2 80E+01	2.00E+02	4.70E+01		–	no	no	**YES**
1,4-Dichlorobenzene	4.00E-01	1.30E+01	2 60E+00		–	no	no	**YES**
2-Butanone	1.50E-01	1.90E+05	2 80E+04		–	no	no	no
Acetone	5.40E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	4 30E+00	5.60E+00	1.10E+00		–	no	**YES**	**YES**
Bromodichloromethane	1.40E-01	4.60E+01	1 00E+01		–	no	no	**YES**
c-1,2-Dichloroethene	1.90E-03	1.00E+04	7 80E+02		–	no	no	**YES**
Carbon Disulfide	4.30E-02	3.00E+03	6.70E+02		–	no	no	**YES**
Chloroform	2.60E-01	1.50E+00	3.00E-01		–	no	no	**YES**
Ethylbenzene	1 90E+01	2.90E+01	5.70E+00		–	no	**YES**	**YES**
Isopropylbenzene	4 80E+00	1.10E+04	2 20E+03		–	no	no	**YES**
Methylene Chloride	5.80E-01	5.40E+01	1.10E+01		–	no	no	**YES**
Methyl-t-Butyl Ether (MTBE)	2.30E-01	1.90E+02	3 90E+01		–	no	no	**YES**
n-Butylbenzene	1.10E+01	2.90E+01	5.70E+00	Ethylbenzene	–	no	**YES**	**YES**
n-Propylbenzene	6 60E+00	NA	NA		–	NA	NA	**YES**
o-Xylene	4 00E+01	2.30E+04	5 30E+03		–	no	no	**YES**
p/m-Xylene	8 90E+01	2.60E+03	6 00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	1 20E+01	1.10E+04	2 20E+03	Isopropylbenzene	–	no	no	**YES**
sec-Butylbenzene	5 20E+00	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tert-Butyl Alcohol (TBA)	6.90E-01	3.10E+05	2 30E+04	Isobutyl Alcohol	–	no	no	**YES**
tert-Butylbenzene	6.90E-01	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tetrachloroethene	2.00E-03	2.70E+00	5.70E-01		–	no	no	**YES**
Toluene	1 80E+01	4.60E+04	5 00E+03		–	no	no	**YES**
Trichloroethene	2.60E-03	1.40E+01	2 80E+00		–	no	no	**YES**
Vinyl Chloride	1.50E-03	1.70E+00	6.00E-02		–	no	no	**YES**
Xylenes, total	1 29E+02	2.60E+03	6 00E+02		–	no	no	**YES**
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	2.40E+02	9.90E+01	2 20E+01		–	**YES**	**YES**	**YES**
2-Methylnaphthalene	3 60E+02	4.10E+03	3.10E+02		–	no	**YES**	**YES**
Acenaphthene	1.40E+01	3.30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	6 20E+00	3.30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	7 30E+00	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	7.40E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(a)pyrene	5.10E+00	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	5 90E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(ghi)perylene	4 00E+00	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	5.40E+00	2.10E+01	1 50E+00		–	no	**YES**	**YES**

Table 6-7
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Chrysene	7 50E+00	2.10E+02	1 50E+01		–	no	no	**YES**
Dibenzo(a,h)anthracene	3 50E+00	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	1 50E+01	2.20E+04	2 30E+03		–	no	no	**YES**
Fluorene	3 90E+01	2.20E+04	2 30E+03		–	no	no	**YES**
Indeno(1,2,3-cd)pyrene	4 00E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Naphthalene	4 30E+01	2.00E+01	3 90E+00		–	**YES**	**YES**	**YES**
Phenanthrene	5 90E+01	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	1 30E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Pesticides and Herbicides								
4,4-DDE	1.30E-02	5.10E+00	1.40E+00		–	no	no	**YES**
Aldrin	1.80E-01	1.00E-01	2.90E-02		–	**YES**	**YES**	**YES**
Chlordane	1 50E+00	1.70E+00	4.30E-01	Chlordane technical	–	no	**YES**	**YES**
Dieldrin	2.50E-02	1.10E-01	3.00E-02		–	no	no	**YES**
Polychlorinated Biphenyls (PCBs)								
PCB-1254	1 90E+00	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Total PCBs	1 90E+00	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Inorganic Compounds								
Antimony	1.42E+01	3.80E+02	3 00E+01		3 30E-01	no	no	**YES**
Arsenic	4 09E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	1 80E+03	6.30E+04	5 20E+03		5.33E+02	no	no	**YES**
Beryllium	4 60E+00	1.70E+03	1 50E+02		8 00E-01	no	no	**YES**
Cadmium	3 93E+00	7.50E+00	1.70E+00		1 60E-01	no	**YES**	**YES**
Chromium	2 69E+03	1.40E+03	2 80E+02		3.50E+01	**YES**	**YES**	**YES**
Chromium, Hexavalent	2 80E+00	3.70E+01	1.70E+01		–	no	no	**YES**
Cobalt	7.15E+01	3.00E+02	2 30E+01		6.90E+00	no	**YES**	**YES**
Copper	1 37E+03	3.80E+04	3 00E+03		1.48E+01	no	no	**YES**
Lead	4.73E+04	8.00E+02	1 50E+02		1.42E+01	**YES**	**YES**	**YES**
Mercury	5 35E+01	2.80E+01	6.70E+00		1 00E-01	**YES**	**YES**	**YES**
Molybdenum	6.79E+01	4.80E+03	3 80E+02		2.40E+00	no	no	**YES**
Nickel	7.15E+01	1.60E+04	1 60E+03		1.90E+01	no	no	**YES**
Selenium	3 22E+00	4.80E+03	3 80E+02		1 50E-01	no	no	**YES**
Silver	9.33E-01	4.80E+03	3 80E+02		–	no	no	**YES**
Thallium	8.41E-01	6.30E+01	5 00E+00		–	no	no	**YES**
Vanadium	2 93E+02	6.70E+03	5 30E+02		6.00E+01	no	no	**YES**
Zinc	1.74E+03	1.00E+05	2 30E+04		1.70E+02	no	no	**YES**

Notes

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in surface soil (0-2 foot depth interval).
[b] All constituents were considered COPCs unless they were essential nutrients (i.e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e. acetone).

Table 6-8
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Volatile Organic Compounds (VOCs)								
1,1,1-Trichloroethane	3.80E-03	3.90E+04	9.00E+03		–	no	no	**YES**
1,1,2-Trichloroethane	2.60E-03	5.50E+00	1.10E+00		–	no	no	**YES**
1,2,3-Trichloropropane	5.50E-01	4.10E-01	9.10E-02		–	**YES**	**YES**	**YES**
1,2,4-Trichlorobenzene	1.70E-01	4.00E+02	8.70E+01		–	no	no	**YES**
1,2,4-Trimethylbenzene	2.99E+02	2.80E+02	6.70E+01		–	**YES**	**YES**	**YES**
1,2-Dichlorobenzene	2.90E+00	1.00E+04	2.00E+03		–	no	no	**YES**
1,2-Dichloropropane	2.20E-02	4.70E+00	9.30E-01		–	no	no	**YES**
1,3,5-Trimethylbenzene	1.04E+02	2.00E+02	4.70E+01		–	no	**YES**	**YES**
1,4-Dichlorobenzene	4.00E-01	1.30E+01	2.60E+00		–	no	no	**YES**
2-Butanone	1.50E-01	1.90E+05	2.80E+04		–	no	no	no
Acetone	5.40E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	2.40E+01	5.60E+00	1.10E+00		–	**YES**	**YES**	**YES**
Bromodichloromethane	1.40E-01	4.60E+01	1.00E+01		–	no	no	**YES**
c-1,2-Dichloroethene	1.75E-02	1.00E+04	7.80E+02		–	no	no	**YES**
Carbon Disulfide	4.30E-02	3.00E+03	6.70E+02		–	no	no	**YES**
Chloroform	2.60E-01	1.50E+00	3.00E-01		–	no	no	**YES**
Ethylbenzene	5.00E+01	2.90E+01	5.70E+00		–	**YES**	**YES**	**YES**
Iodomethane	5.00E-03	3.50E+01	7.90E+00	Bromomethane	–	no	no	**YES**
Isopropylbenzene	2.94E+01	1.10E+04	2.20E+03		–	no	no	**YES**
Methylene Chloride	5.80E-01	5.40E+01	1.10E+01		–	no	no	**YES**
Methyl-t-Butyl Ether (MTBE)	2.30E-01	1.90E+02	3.90E+01		–	no	no	**YES**
n-Butylbenzene	1.43E+01	2.90E+01	5.70E+00	Ethylbenzene	–	no	**YES**	**YES**
n-Propy benzene	3.90E+01	NA	NA		–	NA	NA	**YES**
o-Xylene	1.23E+02	2.30E+04	5.30E+03		–	no	no	**YES**
p/m-Xylene	2.43E+02	2.60E+03	6.00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	1.80E+01	1.10E+04	2.20E+03	Isopropy benzene	–	no	no	**YES**
sec-Buty benzene	1.13E+01	2.90E+01	5.70E+00	Ethylbenzene	–	no	**YES**	**YES**
t-1,2-Dichloroethene	2.00E-03	5.00E+02	1.10E+02		–	no	no	**YES**
Tert-Butyl Alcohol (TBA)	6.90E-01	3.10E+05	2.30E+04	Isobutyl Alcohol	–	no	no	**YES**
tert-Buty benzene	6.90E-01	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tetrachloroethene	1.53E-01	2.70E+00	5.70E-01		–	no	no	**YES**
Toluene	1.80E+01	4.60E+04	5.00E+03		–	no	no	**YES**
Trichloroethene	5.63E-02	1.40E+01	2.80E+00		–	no	no	**YES**
Vinyl Chloride	1.50E-03	1.70E+00	6.00E-02		–	no	no	**YES**
Xylenes, total	3.65E+02	2.60E+03	6.00E+02		–	no	no	**YES**
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	2.40E+02	9.90E+01	2.20E+01		–	**YES**	**YES**	**YES**
2-Methylnaphthalene	3.60E+02	4.10E+03	3.10E+02		–	no	**YES**	**YES**

Table 6-8
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Acenaphthene	1.90E+01	3.30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	6.20E+00	3.30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	7.30E+00	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	7.40E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(a)pyrene	5.10E+00	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	5.90E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Benzo(ghi)perylene	4.00E+00	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	5.40E+00	2.10E+01	1.50E+00		–	no	**YES**	**YES**
Chrysene	7.50E+00	2.10E+02	1.50E+01		–	no	no	**YES**
D benzo(a,h)anthracene	3.50E+00	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	1.50E+01	2.20E+04	2.30E+03		–	no	no	**YES**
Fluorene	3.90E+01	2.20E+04	2.30E+03		–	no	no	**YES**
Indeno(1,2,3-cd)pyrene	4.00E+00	2.10E+00	1.50E-01		–	**YES**	**YES**	**YES**
Naphthalene	4.85E+01	2.00E+01	3.90E+00		–	**YES**	**YES**	**YES**
Phenanthrene	5.90E+01	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	1.30E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Pesticides and Herbicides								
4,4-DDE	1.30E-02	5.10E+00	1.40E+00		–	no	no	**YES**
Aldrin	1.80E-01	1.00E-01	2.90E-02		–	**YES**	**YES**	**YES**
Chlordane	1.50E+00	1.70E+00	4.30E-01	Chlordane technical	–	no	**YES**	**YES**
Dieldrin	2.50E-02	1.10E-01	3.00E-02		–	no	no	**YES**
Polychlorinated Biphenyls (PCBs)								
PCB-1254	1.90E+00	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
PCB-1260	3.06E-01	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Total PCBs	1.90E+00	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Inorganic Compounds								
Antimony	1.42E+01	3.80E+02	3.00E+01		3.30E-01	no	no	**YES**
Arsenic	4.09E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	1.80E+03	6.30E+04	5.20E+03		5.33E+02	no	no	**YES**
Beryllium	4.60E+00	1.70E+03	1.50E+02		8.00E-01	no	no	**YES**
Cadmium	3.93E+00	7.50E+00	1.70E+00		1.60E-01	no	**YES**	**YES**
Chromium	2.69E+03	1.40E+03	2.80E+02		3.50E+01	**YES**	**YES**	**YES**
Chromium, Hexavalent	2.80E+00	3.70E+01	1.70E+01		–	no	no	**YES**
Cobalt	7.15E+01	3.00E+02	2.30E+01		6.90E+00	no	**YES**	**YES**
Copper	1.37E+03	3.80E+04	3.00E+03		1.48E+01	no	no	**YES**
Lead	4.73E+04	8.00E+02	1.50E+02		1.42E+01	**YES**	**YES**	**YES**
Mercury	5.35E+01	2.80E+01	6.70E+00		1.00E-01	**YES**	**YES**	**YES**
Molybdenum	6.79E+01	4.80E+03	3.80E+02		2.40E+00	no	no	**YES**
Nickel	7.15E+01	1.60E+04	1.60E+03		1.90E+01	no	no	**YES**

Table 6-8
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Selenium	1.10E+01	4.80E+03	3.80E+02		1.50E-01	no	no	**YES**
Silver	9.33E-01	4.80E+03	3.80E+02		–	no	no	**YES**
Thallium	8.41E-01	6.30E+01	5.00E+00		–	no	no	**YES**
Vanadium	2.93E+02	6.70E+03	5.30E+02		6.00E+01	no	no	**YES**
Zinc	1.74E+03	1.00E+05	2.30E+04		1.70E+02	no	no	**YES**

Notes:

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in combined surface and subsurface soil.
[b] All constituents detected were considered COPCs unless they were essential nutrients (i.e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e. acetone).

Table 6-9
Data Evaluation and Selection of Constituents of Potential Concern for Soil Gas
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Maximum Concentration		Soil Gas Screening Level		Is Constituent a Soil Gas COPC? [b]
	5 feet	10 feet	Residential	Industrial	
	µg/m^3	µg/m^3	µg/m^3	µg/m^3	(YES, no)
Benzene	2.80E+05	1.00E+06	3.60E+01	1.22E+02	**YES**
cis-1,2-Dichloroethene	4.10E+03	2.00E+04	1.59E+04	4.44E+04	**YES**
Chloroform	–	1.00E+03	4.59E+02	1.54E+03	**YES**
Ethylbenzene	4.00E+05	1.20E+06	2.09E+05	5.84E+05	**YES**
o-Xylene	3.40E+05	1.40E+06	3.15E+05	8.79E+05	**YES**
p/m-Xylene	9.80E+05	5.00E+06	3.19E+05	8.87E+05	**YES**
Tetrachloroethene	3.60E+03	1.70E+04	1.80E+02	6.03E+02	**YES**
Toluene	5.90E+05	8.20E+05	1.35E+05	3.78E+05	**YES**
Trichloroethene	1.20E+03	1.50E+04	5.28E+02	1.77E+03	**YES**
Vinyl Chloride	–	1.60E+03	1.30E+01	4.50E+01	**YES**
Xylenes, total	1.25E+06	5.99E+06	3.15E+05	8.79E+05	**YES**

Notes:

COPC = constituent of potential concern

µg/m^3 = micrograms per cubic meter

[a] Only constituents detected at least once are presented.

[b] All detected constituents were considered COPCs.

Table 6-10
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 0.5-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a]	Site Soil Screening Level (Soil SLs)			Background Level	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b]
		Industrial Scenario	Residential Scenario			Industrial	Residential	
	(mg/kg)	(mg/kg)	(mg/kg)	Surrogate	(mg/kg)	(YES, no)	(YES, no)	(YES, no)
Volatile Organic Compounds (VOCs)								
1,2,4-Trimethylbenzene	9.20E+00	2.80E+02	6.70E+01		–	no	no	**YES**
1,2-Dichlorobenzene	7.40E-03	1.00E+04	2.00E+03		–	no	no	**YES**
1,3,5-Trimethylbenzene	2.10E+00	2.00E+02	4.70E+01		–	no	no	**YES**
1,4-Dichlorobenzene	5.20E-03	1.30E+01	2.60E+00		–	no	no	**YES**
2-Butanone	1.00E-01	1.90E+05	2.80E+04		–	no	no	no
Acetone	2.00E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	3.50E+00	5.60E+00	1.10E+00		–	no	**YES**	**YES**
Carbon Disulfide	1.90E-02	3.00E+03	6.70E+02		–	no	no	**YES**
Chloroform	1.50E+00	1.50E+00	3.00E-01		–	no	**YES**	**YES**
Ethylbenzene	9.10E-01	2.90E+01	5.70E+00		–	no	no	**YES**
Isopropylbenzene	4.80E-01	1.10E+04	2.20E+03		–	no	no	**YES**
n-Butylbenzene	1.60E+00	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
n-Propylbenzene	8.40E-01	NA	NA		–	NA	NA	**YES**
o-Xylene	2.20E+00	2.30E+04	5.30E+03		–	no	no	**YES**
p/m-Xylene	3.70E+00	2.60E+03	6.00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	3.00E-01	1.10E+04	2.20E+03	Isopropylbenzene	–	no	no	**YES**
sec-Butylbenzene	6.90E-01	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tert-Butyl Alcohol (TBA)	3.10E-02	3.10E+05	2.30E+04	Isobutyl Alcohol	–	no	no	**YES**
tert-Butylbenzene	2.00E-01	2.90E+01	5.70E+00	Ethylbenzene	–	no	no	**YES**
Tetrachloroethene	4.00E-02	2.70E+00	5.70E-01		–	no	no	**YES**
Toluene	6.30E-01	4.60E+04	5.00E+03		–	no	no	**YES**
Xylenes, total	5.90E+00	2.60E+03	6.00E+02		–	no	no	**YES**
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	2.50E+02	9.90E+01	2.20E+01		–	**YES**	**YES**	**YES**
2-Methylnaphthalene	3.20E+02	4.10E+03	3.10E+02		–	no	**YES**	**YES**
Acenaphthene	4.80E+01	3.30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	3.80E-01	3.30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	5.10E-01	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	5.70E-01	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Benzo(a)pyrene	4.80E-01	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	4.70E-01	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Benzo(ghi)perylene	5.30E-01	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	5.20E-01	2.10E+01	1.50E+00		–	no	no	**YES**
Chrysene	6.50E-01	2.10E+02	1.50E+01		–	no	no	**YES**
Dibenzo(a,h)anthracene	6.20E-01	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	7.10E-01	2.20E+04	2.30E+03		–	no	no	**YES**
Fluorene	5.20E+01	2.20E+04	2.30E+03		–	no	no	**YES**
Indeno(1,2,3-cd)pyrene	6.70E-01	2.10E+00	1.50E-01		–	no	**YES**	**YES**

Table 6-10
Data Evaluation and Selection of Constituents of Potential Concern for Surface Soil (0- to 0.5-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a]	Site Soil Screening Level (Soil SLs)			Background Level	Does Maximum Exceed Soil SL?		Is Constituent a Surface Soil COPC? [b]
		Industrial Scenario	Residential Scenario			Industrial	Residential	
	(mg/kg)	(mg/kg)	(mg/kg)	Surrogate	(mg/kg)	(YES, no)	(YES, no)	(YES, no)
Naphthalene	1.80E+01	2.00E+01	3.90E+00		–	no	**YES**	**YES**
Phenanthrene	1.90E+02	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	2.60E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Polychlorinated Biphenyls (PCBs)								
PCB-1254	7.40E-01	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Inorganic Compounds								
Antimony	1.34E+01	3.80E+02	3.00E+01		3.30E-01	no	no	**YES**
Arsenic	1.16E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	5.62E+02	6.30E+04	5.20E+03		5.33E+02	no	no	**YES**
Beryllium	1.05E+00	1.70E+03	1.50E+02		8.00E-01	no	no	**YES**
Cadmium	1.66E+00	7.50E+00	1.70E+00		1.60E-01	no	no	**YES**
Chromium	2.25E+02	1.40E+03	2.80E+02		3.50E+01	no	no	**YES**
Cobalt	1.76E+01	3.00E+02	2.30E+01		6.90E+00	no	no	**YES**
Copper	4.01E+02	3.80E+04	3.00E+03		1.48E+01	no	no	**YES**
Lead	3.81E+03	8.00E+02	1.50E+02		1.42E+01	**YES**	**YES**	**YES**
Mercury	1.32E+02	2.80E+01	6.70E+00		1.00E-01	**YES**	**YES**	**YES**
Molybdenum	1.39E+01	4.80E+03	3.80E+02		2.40E+00	no	no	**YES**
Nickel	3.15E+01	1.60E+04	1.60E+03		1.90E+01	no	no	**YES**
Selenium	1.22E+00	4.80E+03	3.80E+02		1.50E-01	no	no	**YES**
Thallium	4.71E+00	6.30E+01	5.00E+00		–	no	no	**YES**
Vanadium	6.66E+01	6.70E+03	5.30E+02		6.00E+01	no	no	**YES**
Zinc	8.25E+03	1.00E+05	2.30E+04		1.70E+02	no	no	**YES**

Notes:

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in surface soil (0-0.5 foot depth interval).
[b] All constituents were considered COPCs unless they were essential nutrients (i.e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e. acetone).

Table 6-11
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Volatile Organic Compounds (VOCs)								
1,2,4-Trimethylbenzene	4.64E+01	2.80E+02	6.70E+01		–	no	no	**YES**
1,2-Dichlorobenzene	7.40E-03	1.00E+04	2.00E+03		–	no	no	**YES**
1,2-Dichloropropane	2.00E+00	4.70E+00	9.30E-01		–	no	**YES**	**YES**
1,3,5-Trimethylbenzene	1.72E+01	2.00E+02	4.70E+01		–	no	no	**YES**
1,4-Dichlorobenzene	5.20E-03	1.30E+01	2.60E+00		–	no	no	**YES**
2-Butanone	1.00E-01	1.90E+05	2.80E+04		–	no	no	no
2-Hexanone	1.63E-03	NA	NA		–	NA	NA	**YES**
Acetone	2.00E-01	6.10E+05	6.10E+04		–	no	no	no
Benzene	9.30E+00	5.60E+00	1.10E+00		–	**YES**	**YES**	**YES**
Carbon Disulfide	1.90E-02	3.00E+03	6.70E+02		–	no	no	**YES**
Chloroform	1.60E+00	1.50E+00	3.00E-01		–	**YES**	**YES**	**YES**
Ethylbenzene	1.45E+01	2.90E+01	5.70E+00		–	no	**YES**	**YES**
Iodomethane	2.25E-03	3.50E+01	7.90E+00	Bromomethane	–	no	no	**YES**
Isopropylbenzene	4.96E+00	1.10E+04	2.20E+03		–	no	no	**YES**
Methyl-t-Butyl Ether (MTBE)	2.85E+00	1.90E+02	3.90E+01		–	no	no	**YES**
n-Butylbenzene	5.48E+00	2.90E+01	5.70E+00	Ethy benzene	–	no	no	**YES**
n-Propylbenzene	7.44E+00	NA	NA		–	NA	NA	**YES**
o-Xylene	1.68E+01	2.30E+04	5.30E+03		–	no	no	**YES**
p/m-Xylene	7.75E+01	2.60E+03	6.00E+02	Xylenes mixture	–	no	no	**YES**
p-Isopropyltoluene	4.74E+00	1.10E+04	2.20E+03	Isopropylbenzene	–	no	no	**YES**
sec-Butylbenzene	2.55E+00	2.90E+01	5.70E+00	Ethy benzene	–	no	no	**YES**
Styrene	2.50E-01	3.80E+04	6.50E+03		–	no	no	**YES**
Tert-Butyl Alcohol (TBA)	9.80E-02	3.10E+05	2.30E+04	Isobutyl Alcohol	–	no	no	**YES**
tert-Butylbenzene	2.80E-01	2.90E+01	5.70E+00	Ethy benzene	–	no	no	**YES**
Tetrachloroethene	4.00E-02	2.70E+00	5.70E-01		–	no	no	**YES**
Toluene	5.06E+00	4.60E+04	5.00E+03		–	no	no	**YES**
Vinyl Acetate	9.80E-03	4.20E+03	9.90E+02		–	no	no	**YES**
Xylenes, total	7.10E+01	2.60E+03	6.00E+02		–	no	no	**YES**

Table 6-11
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	2.50E+02	9.90E+01	2.20E+01		–	**YES**	**YES**	**YES**
2-Methylnaphthalene	3.20E+02	4.10E+03	3.10E+02		–	no	**YES**	**YES**
Acenaphthene	4.80E+01	3.30E+04	3.40E+03		–	no	no	**YES**
Acenaphthylene	9.56E-01	3.30E+04	3.40E+03	Acenaphthene	–	no	no	**YES**
Anthracene	2.79E+00	1.70E+05	1.70E+04		–	no	no	**YES**
Benzo(a)anthracene	1.03E+00	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Benzo(a)pyrene	8.30E-01	1.30E-01	1.50E-02		–	**YES**	**YES**	**YES**
Benzo(b)fluoranthene	4.70E-01	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Benzo(ghi)perylene	2.40E+00	1.70E+04	1.70E+03	Pyrene	–	no	no	**YES**
Benzo(k)fluoranthene	5.20E-01	2.10E+01	1.50E+00		–	no	no	**YES**
Chrysene	4.30E+00	2.10E+02	1.50E+01		–	no	no	**YES**
Dibenzo(a,h)anthracene	6.20E-01	2.10E-01	1.50E-02		–	**YES**	**YES**	**YES**
Fluoranthene	3.30E+00	2.20E+04	2.30E+03		–	no	no	**YES**
Fluorene	5.20E+01	2.20E+04	2.30E+03		–	no	no	**YES**
Indeno(1,2,3-cd)pyrene	6.70E-01	2.10E+00	1.50E-01		–	no	**YES**	**YES**
Naphthalene	1.80E+01	2.00E+01	3.90E+00		–	no	**YES**	**YES**
Phenanthrene	1.90E+02	1.70E+05	1.70E+04	Anthracene	–	no	no	**YES**
Pyrene	2.60E+01	1.70E+04	1.70E+03		–	no	no	**YES**
Polychlorinated Biphenyls (PCBs)								
PCB-1254	7.40E-01	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Total PCBs	7.40E-01	3.00E-01	8.90E-02		–	**YES**	**YES**	**YES**
Inorganic Compounds								
Antimony	1.34E+01	3.80E+02	3.00E+01		3.30E-01	no	no	**YES**
Arsenic	1.19E+01	2.40E-01	7.00E-02		1.30E+01	**YES**	**YES**	**YES**
Barium	5.62E+02	6.30E+04	5.20E+03		5.33E+02	no	no	**YES**
Beryllium	1.51E+00	1.70E+03	1.50E+02		8.00E-01	no	no	**YES**
Cadmium	1.66E+00	7.50E+00	1.70E+00		1.60E-01	no	no	**YES**
Chromium	2.25E+02	1.40E+03	2.80E+02		3.50E+01	no	no	**YES**
Chromium, Hexavalent	7.40E-01	3.70E+01	1.70E+01		–	no	no	**YES**
Cobalt	2.09E+01	3.00E+02	2.30E+01		6.90E+00	no	no	**YES**
Copper	4.01E+02	3.80E+04	3.00E+03		1.48E+01	no	no	**YES**
Lead	3.81E+03	8.00E+02	1.50E+02		1.42E+01	**YES**	**YES**	**YES**

Table 6-11
Data Evaluation and Selection of Constituents of Potential Concern for Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/kg)	Site Soil Screening Level (Soil SLs)			Background Level (mg/kg)	Does Maximum Exceed Soil SL?		Is Constituent a Surface/ Subsurface Soil COPC? [b] (YES, no)
		Industrial Scenario (mg/kg)	Residential Scenario (mg/kg)	Surrogate		Industrial (YES, no)	Residential (YES, no)	
Mercury	1.32E+02	2.80E+01	6.70E+00		1.00E-01	**YES**	**YES**	**YES**
Molybdenum	1.39E+01	4.80E+03	3.80E+02		2.40E+00	no	no	**YES**
Nickel	3.26E+01	1.60E+04	1.60E+03		1.90E+01	no	no	**YES**
Selenium	2.14E+00	4.80E+03	3.80E+02		1.50E-01	no	no	**YES**
Thallium	5.68E+00	6.30E+01	5.00E+00		–	no	**YES**	**YES**
Vanadium	8.36E+01	6.70E+03	5.30E+02		6.00E+01	no	no	**YES**
Zinc	8.25E+03	1.00E+05	2.30E+04		1.70E+02	no	no	**YES**

Notes:

– = not detected, not analyzed, or not applicable
CAS No. = Chemical Abstract Service number
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in combined surface and subsurface soil.
[b] All constituents were considered COPCs unless they were essential nutrients (i.e., calcium, magnesium, potassium, sodium), or they were known laboratory contaminants (i.e. acetone).

Table 6-12
Data Evaluation and Selection of Constituents of Potential Concern for Soil Gas
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent [a]	Maximum Concentration		Soil Gas Screening Level		Is Constituent a Soil Gas COPC? [b]
	5 feet	10 feet	Residential	Industrial	
	µg/m^3	µg/m^3	µg/m^3	µg/m^3	(YES, no)
Benzene	4.90E+05	1.40E+06	3.60E+01	1.22E+02	**YES**
cis-1,2-Dichloroethene	–	1.20E+03	1.59E+04	4.44E+04	**YES**
Ethylbenzene	6.00E+04	7.70E+05	2.09E+05	5.84E+05	**YES**
o-Xylene	1.60E+04	6.70E+05	3.15E+05	8.79E+05	**YES**
p/m-Xylene	9.60E+04	2.30E+06	3.19E+05	8.87E+05	**YES**
Toluene	5.40E+04	5.80E+05	1.35E+05	3.78E+05	**YES**
Trichloroethene	–	1.60E+03	5.28E+02	1.77E+03	**YES**
Xylenes, total	1.12E+05	2.97E+06	3.15E+05	8.79E+05	**YES**

Notes:

COPC = constituent of potential concern

µg/m^3 = micrograms per cubic meter

[a] Only constituents detected at least once are presented.

[b] All detected constituents were considered COPCs.

Table 6-13
Selection Constituents of Potential Concern for Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/L)	Frequency of Detection (FOD) (%)	Groundwater Screening Level (Tap Water SL) (mg/L)	Surrogate	Is Constituent a Groundwater COPC? [b] (YES, no)
Volatile Organic Compounds (VOCs)					
1,1,2-Trichloroethane	6.70E-04	1.25E+00	2.40E-04		**YES**
1,1-Dichloroethane	8.50E-03	2.00E+01	2.40E-03		**YES**
1,1-Dichloroethene	1.40E-02	2.50E+01	3.40E-01		**YES**
1,2,4-Trimethylbenzene	2.70E-01	3.75E+01	1.50E-02		**YES**
1,2-Dichlorobenzene	3.20E-04	1.89E+00	3.70E-01		**YES**
1,2-Dichloroethane	3.90E-03	3.38E+01	1.50E-04		**YES**
1,2-Dichloropropane	2.50E-02	2.50E+00	3.90E-04		**YES**
1,3,5-Trimethylbenzene	1.10E-01	2.50E+01	1.20E-02		**YES**
Benzene	8.10E+00	5.75E+01	4.10E-04		**YES**
c-1,2-Dichloroethene	4.70E-02	6.75E+01	3.70E-01		**YES**
Chloroethane	2.00E-03	1.25E+00	2.10E+01		**YES**
Diisopropyl Ether (DIPE)	1.60E-03	1.00E+01	8.30E-01		**YES**
Ethylbenzene	4.65E-01	4.75E+01	1.50E-03		**YES**
Isopropylbenzene	6.60E-02	4.00E+01	6.80E-01		**YES**
Methylene Chloride	2.60E-03	8.75E+00	4.80E-03		no
Methyl-t-Butyl Ether (MTBE)	2.60E-02	1.38E+01	1.20E-02		**YES**
n-Butylbenzene	8.40E-03	1.13E+01	1.50E-03	Ethylbenzene	**YES**
n-Propylbenzene	5.90E-02	3.88E+01	NA		**YES**
o-Xylene	6.40E-01	2.50E+01	1.40E+00		**YES**
p/m-Xylene	2.00E+00	3.38E+01	2.00E-01	Xylenes mixture	**YES**
p-Isopropyltoluene	1.80E-02	1.75E+01	6.80E-01	Isopropylbenzene	**YES**
sec-Butylbenzene	1.00E-02	3.38E+01	1.50E-03	Ethylbenzene	**YES**
t-1,2-Dichloroethene	6.50E-03	2.75E+01	1.10E-01		**YES**
Tert-Butyl Alcohol (TBA)	3.40E-01	5.13E+01	1.10E+01	Isobutyl Alcohol	**YES**
tert-Butylbenzene	8.40E-04	8.75E+00	1.50E-03	Ethylbenzene	**YES**
Tetrachloroethene	3.80E-02	1.00E+01	1.10E-04		**YES**
Toluene	1.90E+00	3.50E+01	2.30E+00		**YES**
Trichloroethene	7.95E-02	3.63E+01	1.70E-03		**YES**
Vinyl Chloride	3.75E-03	3.00E+01	1.60E-05		**YES**
Xylenes, total	2.60E+00	3.13E+01	2.00E-01		**YES**
Semi Volatile Organic Compounds (SVOCs)					
1,4-Dioxane	7.05E-03	8.57E+01	6.10E-03		**YES**
Naphthalene	2.40E-01	2.63E+01	1.40E-04		**YES**

Table 6-13
Selection Constituents of Potential Concern for Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Maximum Concentration [a] (mg/L)	Frequency of Detection (FOD) (%)	Groundwater Screening Level (Tap Water SL) (mg/L)	Surrogate	Is Constituent a Groundwater COPC? [b] (YES, no)
Inorganic Compounds					
Iron	2.00E+00	6.25E+01	2.60E+01		**YES**
Methane	1.50E+00	8.33E+01	NA		**YES**

Notes:

– = not detected, not analyzed, or not applicable
CAS No. = Chemical Abstract Service number
COPC = constituent of potential concern
mg/kg = milligrams per kilograms
NA = not available, not applicable or not analyzed

[a] Maximum concentration in groundwater sampled in 2007 through 2009.
[b] All constituents detected were considered COPCs unless they were known laboratory contaminants (i.e. methylene chloride).

Table 6-14
Exposure Point Concentrations
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-2 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-2 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Volatile Organic Compounds (VOCs)					
1,1,2,2-Tetrachloroethane	**YES**	**YES**	1.20E-02 m	1.20E-02 m	–
1,1,2-Trichloroethane	**YES**	**YES**	7.70E-03 m	7.70E-03 m	–
1,2,3-Trichlorobenzene	**YES**	**YES**	9.00E-03 m	9.00E-03 m	–
1,2,4-Trichlorobenzene	no	**YES**	–	4.63E-03 m	–
1,2,4-Trimethylbenzene	**YES**	**YES**	2.16E+00	1.54E+01	–
1,2-Dichloropropane	**YES**	**YES**	2.10E-03 m	2.10E-03 m	–
1,3,5-Trimethylbenzene	**YES**	**YES**	7.49E-01	6.51E+00	–
2-Chlorotoluene	**YES**	**YES**	2.80E-03 m	2.80E-03 m	–
2-Hexanone	no	**YES**	–	3.13E-03 m	–
4-Chlorotoluene	**YES**	**YES**	2.10E-03 m	2.10E-03 m	–
4-Methyl-2-Pentanone	**YES**	**YES**	1.20E-02 m	1.20E-02 m	–
Benzene	**YES**	**YES**	1.77E-02	4.70E-01	7.32E+04
Carbon Disulfide	**YES**	**YES**	3.40E-02 m	9.45E-03	–
Chloroethane	no	**YES**	–	6.50E-03 m	–
Chloromethane	no	**YES**	–	2.13E-03 m	–
Ethylbenzene	**YES**	**YES**	1.45E-01	3.32E+00	1.54E+05
Iodomethane	no	**YES**	–	1.38E-02 m	–
Isopropylbenzene	**YES**	**YES**	3.55E-01	3.13E-01	–
Methyl-t-Butyl Ether (MTBE)	**YES**	**YES**	1.03E-02	6.74E-03	–
n-Buty benzene	**YES**	**YES**	3.99E-01	1.32E+00	–
n-Propylbenzene	**YES**	**YES**	5.77E-01	1.91E+00	–
o-Xylene	**YES**	**YES**	2.02E-01	7.70E+00	1.99E+05
p/m-Xylene	**YES**	**YES**	4.96E-01	1.50E+01	–
p-Isopropyltoluene	**YES**	**YES**	9.39E-02	6.99E-02	–
sec-Buty benzene	**YES**	**YES**	2.02E-01	1.48E-01	–
Tert-Butyl Alcohol (TBA)	**YES**	**YES**	1.37E-02	4.30E-02	–
tert-Buty benzene	no	**YES**	–	1.46E-01 m	–
Toluene	**YES**	**YES**	9.52E-02	3.46E+00	3.53E+05
Xylenes, total	**YES**	**YES**	6.82E-01	2.26E+01	7.56E+05
Semivolatile Organic Compounds (SVOCs)					
1-Methylnaphthalene	**YES**	**YES**	1.90E+01	2.22E+01	–
2-Methylnaphthalene	**YES**	**YES**	2.40E+01	3.72E+01	–
Acenaphthene	**YES**	**YES**	2.50E+00	1.24E+00	–
Acenaphthylene	**YES**	**YES**	1.27E-01	1.02E-01	–
Anthracene	**YES**	**YES**	2.26E-01	1.49E-01	–
Benzo(a)anthracene	**YES**	**YES**	7.27E-01	3.04E-01	–
Benzo(a)pyrene	**YES**	**YES**	3.12E-01	1.44E-01	–
Benzo(b)fluoranthene	**YES**	**YES**	2.00E-01	9.40E-02	–
Benzo(ghi)perylene	**YES**	**YES**	1.56E-01	8.15E-02	–
Benzo(k)fluoranthene	**YES**	**YES**	1.25E-01	6.03E-02	–
Chrysene	**YES**	**YES**	1.92E+00	6.53E-01	–
Dibenzo(a,h)anthracene	**YES**	**YES**	8.40E-02	6.70E-02	–
Fluoranthene	**YES**	**YES**	3.21E-01	2.37E-01	–
Fluorene	**YES**	**YES**	2.59E+00	1.80E+00	–
Indeno(1,2,3-cd)pyrene	**YES**	**YES**	9.28E-02	5.03E-02	–
Naphthalene	**YES**	**YES**	1.03E+00	5.06E+00	–
Phenanthrene	**YES**	**YES**	6.50E+00	4.47E+00	–
Pyrene	**YES**	**YES**	3.87E+00	1.32E+00	–
Polychlorinated Biphenyls (PCBs)					
PCB-1254	no	**YES**	–	5.00E-02 m	–
PCB-1260	no	**YES**	–	4.00E-02 m	–

Table 6-14
Exposure Point Concentrations
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-2 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-2 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Inorganic Compounds					
Antimony	**YES**	**YES**	1.29E+00	2.29E+00	–
Arsenic	**YES**	**YES**	5.48E+00	4.75E+00	–
Barium	**YES**	**YES**	2.03E+02	1.93E+02	–
Beryllium	**YES**	**YES**	5.77E-01	7.96E-01	–
Cadmium	**YES**	**YES**	7.52E-01	4.96E-01	–
Chromium	**YES**	**YES**	7.16E+01	5.91E+01	–
Chromium, Hexavalent	**YES**	**YES**	1.20E+00 m	7.28E-01	–
Cobalt	**YES**	**YES**	1.18E+01	1.35E+01	–
Copper	**YES**	**YES**	1.36E+02	7.33E+01	–
Lead	**YES**	**YES**	2.17E+02	1.45E+02	–
Mercury	**YES**	**YES**	2.46E-01	1.78E-01	–
Molybdenum	**YES**	**YES**	8.64E+00	3.52E+00	–
Nickel	**YES**	**YES**	1.95E+01	2.14E+01	–
Selenium	**YES**	**YES**	1.08E+00	1.06E+00	–
Vanadium	**YES**	**YES**	4.08E+01	4.92E+01	–
Zinc	**YES**	**YES**	2.51E+02	1.89E+02	–

Notes:

– = not detected, not analyzed, or not applicable
$\mu g/m^3$ = micrograms per cubic meter
COPC = constituent of potential concern
EPC = exposure point concentration
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] The EPC was the UCL or the maximum concentration where the UCL was incalculable.
EPCs marked with "m" are based on the maximum detected concentration.
The UCLs were calculated using ProUCL 4.0.
The UCL used is the one recommended by ProUCL 4.0.

Table 6-15
Exposure Point Concentrations
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-2 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-2 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Volatile Organic Compounds (VOCs)					
1,2,4-Trimethylbenzene	**YES**	**YES**	2.49E+01	2.03E+01	–
1,2-Dichlorobenzene	no	**YES**	–	1.29E-01 m	–
1,2-Dichloropropane	no	**YES**	–	1.90E-02 m	–
1,3,5-Trimethylbenzene	**YES**	**YES**	8.22E+00	2.81E+00	–
Benzene	**YES**	**YES**	1.17E+01	4.04E+00	1.90E+04
Carbon Disulfide	**YES**	**YES**	4.50E-02 m	4.50E-02 m	–
Chloroform	**YES**	**YES**	6.00E-02 m	6.00E-02 m	–
Ethy benzene	**YES**	**YES**	5.41E+00	1.93E+00	4.24E+03
Isopropylbenzene	**YES**	**YES**	9.13E-01	3.24E-01	–
Methylene Chloride	**YES**	**YES**	4.70E-01 m	4.70E-01 m	–
Methyl-t-Butyl Ether (MTBE)	**YES**	**YES**	2.60E-03 m	2.72E-03	–
n-Buty benzene	**YES**	**YES**	2.18E+00	1.78E+00	–
n-Propy benzene	**YES**	**YES**	3.51E+00	1.22E+00	–
o-Xylene	**YES**	**YES**	1.82E+00	6.15E-01	1.39E+03
p/m-Xylene	**YES**	**YES**	1.27E+01	9.92E+00	–
p-Isopropyltoluene	**YES**	**YES**	4.79E-01	1.65E-01	–
sec-Buty benzene	**YES**	**YES**	6.56E-01	2.36E-01	–
Tert-Butyl Alcohol (TBA)	**YES**	**YES**	8.90E-02 m	1.91E-02	–
tert-Butylbenzene	no	**YES**	–	1.10E-01 m	–
Tetrachloroethene	**YES**	**YES**	7.50E-03 m	7.50E-03 m	–
Toluene	**YES**	**YES**	3.03E-03	9.43E-02	3.45E+03
Xylenes, total	**YES**	**YES**	1.44E+01	1.13E+01	3.08E+03
Semivolatile Organic Compounds (SVOCs)					
1-Methylnaphthalene	**YES**	**YES**	2.74E+00	2.19E+00	–
2-Methylnaphthalene	**YES**	**YES**	4.13E+00	3.28E+00	–
Acenaphthene	**YES**	**YES**	3.48E-01	1.96E-01	–
Acenaphthylene	**YES**	**YES**	2.80E-01 m	1.11E-02	–
Anthracene	**YES**	**YES**	4.59E-01	4.80E-01	–
Benzo(a)anthracene	**YES**	**YES**	6.50E-01	4.77E-01	–
Benzo(a)pyrene	**YES**	**YES**	2.97E-01	3.17E-01	–
Benzo(b)fluoranthene	**YES**	**YES**	9.63E-02	1.81E-01	–
Benzo(ghi)perylene	**YES**	**YES**	1.90E-01	1.04E-01	–
Benzo(k)fluoranthene	**YES**	**YES**	1.64E-01	2.74E-01	–
Chrysene	**YES**	**YES**	9.10E-01	6.62E-01	–
D benzo(a,h)anthracene	**YES**	**YES**	2.40E-01 m	2.18E-02	–
Fluoranthene	**YES**	**YES**	3.52E-01	1.04E+00	–
Fluorene	**YES**	**YES**	5.94E-01	2.34E-01	–
Indeno(1,2,3-cd)pyrene	**YES**	**YES**	9.39E-02	7.86E-02	–
Naphthalene	**YES**	**YES**	2.84E+00	9.39E-01	–
Phenanthrene	**YES**	**YES**	3.63E+00	2.09E+00	–
Pyrene	**YES**	**YES**	1.34E+00	1.41E+00	–
Pesticides and Herbicides					
Dieldrin	**YES**	**YES**	1.90E-02 m	1.90E-02 m	–
Polychlorinated Biphenyls (PCBs)					
PCB-1254	**YES**	**YES**	8.50E-02 m	2.24E+00	–
PCB-1260	no	**YES**	–	7.50E-02 m	–
Inorganic Compounds					
Antimony	**YES**	**YES**	1.51E+00	2.27E+00	–
Arsenic	**YES**	**YES**	8.43E+00	7.38E+00	–
Barium	**YES**	**YES**	2.03E+02	2.01E+02	–
Beryllium	**YES**	**YES**	8.32E-01	9.64E-01	–
Cadmium	**YES**	**YES**	1.39E+00	7.03E-01	–
Chromium	**YES**	**YES**	6.47E+01	5.63E+01	–

Table 6-15
Exposure Point Concentrations
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-2 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-2 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Chromium, Hexavalent	no	**YES**	–	2.95E-01 m	–
Cobalt	**YES**	**YES**	1.58E+01	1.65E+01	–
Copper	**YES**	**YES**	3.43E+02	1.45E+02	–
Lead	**YES**	**YES**	1.37E+02	9.38E+01	–
Mercury	**YES**	**YES**	2.36E-01	1.67E-01	–
Molybdenum	**YES**	**YES**	7.84E+00	5.83E+00	–
Nickel	**YES**	**YES**	3.21E+02	2.16E+02	–
Selenium	**YES**	**YES**	1.89E+00	1.61E+00	–
Silver	**YES**	**YES**	2.49E+00 m	2.49E+00 m	–
Vanadium	**YES**	**YES**	4.88E+01	5.66E+01	–
Zinc	**YES**	**YES**	3.12E+02	2.31E+02	–

Notes:

– = not detected, not analyzed, or not applicable
$\mu g/m^3$ = micrograms per cubic meter
COPC = constituent of potential concern
EPC = exposure point concentration
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] The EPC was the UCL or the maximum concentration where the UCL was incalculable.
EPCs marked with "m" are based on the maximum detected concentration.
The UCLs were calculated using ProUCL 4.0.
The UCL used is the one recommended by ProUCL 4.0.

Table 6-16
Exposure Point Concentrations
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-2 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-2 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	**YES**	**YES**	3.80E-03 m	3.80E-03 m	–
1,1,2-Trichloroethane	**YES**	**YES**	2.60E-03 m	2.60E-03 m	–
1,2,3-Trichloropropane	**YES**	**YES**	5.50E-01 m	5.50E-01 m	–
1,2,4-Trichlorobenzene	**YES**	**YES**	1.70E-01 m	1.70E-01 m	–
1,2,4-Trimethylbenzene	**YES**	**YES**	3.34E+00	1.05E+01	–
1,2-Dichlorobenzene	**YES**	**YES**	2.90E+00 m	2.90E+00 m	–
1,2-Dichloropropane	**YES**	**YES**	2.20E-02 m	2.20E-02 m	–
1,3,5-Trimethylbenzene	**YES**	**YES**	6.09E-01	1.60E+00	–
1,4-Dichlorobenzene	**YES**	**YES**	4.00E-01 m	4.00E-01 m	–
Benzene	**YES**	**YES**	3.30E-01	6.62E-01	2.56E+04
Bromodichloromethane	**YES**	**YES**	6.93E-03	1.40E-01 m	–
c-1,2-Dichloroethene	**YES**	**YES**	1.90E-03 m	1.75E-02 m	4.10E+03 m
Carbon Disulfide	**YES**	**YES**	1.15E-02	3.26E-03	–
Chloroform	**YES**	**YES**	1.05E-02	5.91E-03	–
Ethy benzene	**YES**	**YES**	1.26E+00	2.52E+00	4.90E+04
Iodomethane	no	**YES**	–	5.00E-03 m	–
Isopropylbenzene	**YES**	**YES**	2.53E-01	9.90E-01	–
Methylene Chloride	**YES**	**YES**	5.80E-01 m	5.80E-01 m	–
Methyl-t-Butyl Ether (MTBE)	**YES**	**YES**	1.40E-02	5.15E-03	–
n-Buty benzene	**YES**	**YES**	4.06E-01	4.53E-01	–
n-Propylbenzene	**YES**	**YES**	4.09E-01	1.75E+00	–
o-Xylene	**YES**	**YES**	2.14E+00	3.48E+00	2.22E+04
p/m-Xylene	**YES**	**YES**	4.67E+00	7.96E+00	–
p-Isopropyltoluene	**YES**	**YES**	7.43E-01	4.15E-01	–
sec-Buty benzene	**YES**	**YES**	2.29E-01	5.65E-01	–
t-1,2-Dichloroethene	no	**YES**	–	2.00E-03 m	–
Tert-Butyl Alcohol (TBA)	**YES**	**YES**	4.33E-02	4.14E-02	–
tert-Buty benzene	**YES**	**YES**	2.57E-02	1.22E-02	–
Tetrachloroethene	**YES**	**YES**	2.00E-03 m	1.53E-01 m	3.60E+03 m
Toluene	**YES**	**YES**	1.01E+00	8.93E-01	6.89E+04
Trichloroethene	**YES**	**YES**	2.60E-03 m	5.63E-02 m	1.20E+03 m
Vinyl Chloride	**YES**	**YES**	1.50E-03 m	1.50E-03 m	–
Xylenes, total	**YES**	**YES**	6.80E+00	1.14E+01	1.86E+05
Semivolatile Organic Compounds (SVOCs)					
1-Methylnaphthalene	**YES**	**YES**	1.93E+01	1.92E+01	–
2-Methylnaphthalene	**YES**	**YES**	2.69E+01	2.70E+01	–
Acenaphthene	**YES**	**YES**	5.54E-01	5.01E-01	–
Acenaphthylene	**YES**	**YES**	4.21E-01	1.50E-01	–
Anthracene	**YES**	**YES**	3.83E-01	1.75E-01	–
Benzo(a)anthracene	**YES**	**YES**	4.18E-01	2.33E-01	–
Benzo(a)pyrene	**YES**	**YES**	3.13E-01	1.73E-01	–
Benzo(b)fluoranthene	**YES**	**YES**	3.02E-01	1.51E-01	–
Benzo(ghi)perylene	**YES**	**YES**	2.28E-01	1.34E-01	–
Benzo(k)fluoranthene	**YES**	**YES**	3.04E-01	1.41E-01	–
Chrysene	**YES**	**YES**	5.38E-01	3.67E-01	–
Dibenzo(a,h)anthracene	**YES**	**YES**	4.72E-01	4.10E-02	–
Fluoranthene	**YES**	**YES**	5.65E-01	3.49E-01	–
Fluorene	**YES**	**YES**	2.07E+00	1.47E+00	–
Indeno(1,2,3-cd)pyrene	**YES**	**YES**	2.74E-01	1.08E-01	–
Naphthalene	**YES**	**YES**	4.19E+00	3.59E+00	–
Phenanthrene	**YES**	**YES**	1.86E+00	2.13E+00	–
Pyrene	**YES**	**YES**	8.12E-01	5.58E-01	–

Table 6-16
Exposure Point Concentrations
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-2 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-2 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Pesticides and Herbicides					
4,4-DDE	**YES**	**YES**	1.30E-02 m	1.30E-02 m	–
Aldrin	**YES**	**YES**	1.80E-01 m	1.80E-01 m	–
Chlordane	**YES**	**YES**	1.50E+00 m	1.50E+00 m	–
Dieldrin	**YES**	**YES**	2.50E-02 m	2.50E-02 m	–
Polychlorinated Biphenyls (PCBs)					
PCB-1254	**YES**	**YES**	1.90E+00 m	1.90E+00 m	–
PCB-1260	no	**YES**	–	3.06E-01 m	–
Inorganic Compounds					
Antimony	**YES**	**YES**	1.33E+00	1.79E+00	–
Arsenic	**YES**	**YES**	7.25E+00	5.40E+00	–
Barium	**YES**	**YES**	2.06E+02	2.06E+02	–
Beryllium	**YES**	**YES**	6.55E-01	8.67E-01	–
Cadmium	**YES**	**YES**	7.87E-01	4.53E-01	–
Chromium	**YES**	**YES**	1.70E+02	8.92E+01	–
Chromium, Hexavalent	**YES**	**YES**	2.80E+00 m	1.12E+00	–
Cobalt	**YES**	**YES**	1.27E+01	1.40E+01	–
Copper	**YES**	**YES**	1.39E+02	7.51E+01	–
Lead	**YES**	**YES**	6.87E+02	4.52E+02	–
Mercury	**YES**	**YES**	3.25E+00	2.03E+00	–
Molybdenum	**YES**	**YES**	5.82E+00	2.73E+00	–
Nickel	**YES**	**YES**	2.32E+01	2.36E+01	–
Selenium	**YES**	**YES**	9.55E-01	9.93E-01	–
Silver	**YES**	**YES**	9.33E-01 m	9.33E-01 m	–
Thallium	**YES**	**YES**	8.41E-01 m	8.41E-01 m	–
Vanadium	**YES**	**YES**	4.43E+01	5.00E+01	–
Zinc	**YES**	**YES**	2.21E+02	1.66E+02	–

Notes:

– = not detected, not analyzed, or not applicable
$\mu g/m^3$ = micrograms per cubic meter
COPC = constituent of potential concern
EPC = exposure point concentration
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] The EPC was the UCL or the maximum concentration where the UCL was incalculable.
EPCs marked with "m" are based on the maximum detected concentration.
The UCLs were calculated using ProUCL 4.0.
The UCL used is the one recommended by ProUCL 4.0.

Table 6-17
Exposure Point Concentrations
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-0.5 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-0.5 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Volatile Organic Compounds (VOCs)					
1,2,4-Trimethylbenzene	**YES**	**YES**	1.12E+00	7.33E+00	–
1,2-Dichlorobenzene	**YES**	**YES**	7.40E-03 m	7.40E-03 m	–
1,2-Dichloropropane	no	**YES**	–	2.00E+00 m	–
1,3,5-Trimethylbenzene	**YES**	**YES**	2.10E+00 m	1.05E+00	–
1,4-Dichlorobenzene	**YES**	**YES**	5.20E-03 m	5.20E-03 m	–
2-Hexanone	no	**YES**	–	1.63E-03 m	–
Benzene	**YES**	**YES**	4.24E-01	1.14E+00	1.45E+05
Carbon Disulfide	**YES**	**YES**	1.90E-02 m	1.90E-02 m	–
Chloroform	**YES**	**YES**	1.50E+00 m	1.14E-01	–
Ethylbenzene	**YES**	**YES**	9.10E-01 m	1.16E+00	7.88E+03
Iodomethane	no	**YES**	–	2.25E-03 m	–
Isopropylbenzene	**YES**	**YES**	4.80E-01 m	3.94E-01	–
Methyl-t-Butyl Ether (MTBE)	no	**YES**	–	2.85E+00 m	–
n-Butylbenzene	**YES**	**YES**	2.34E-01	3.65E-01	–
n-Propylbenzene	**YES**	**YES**	8.40E-01 m	4.95E-01	–
o-Xylene	**YES**	**YES**	2.51E-01	7.33E-01	1.60E+04 m
p/m-Xylene	**YES**	**YES**	4.46E-01	8.96E+00	–
p-Isopropyltoluene	**YES**	**YES**	3.00E-01 m	3.74E-01	–
sec-Butylbenzene	**YES**	**YES**	6.90E-01 m	2.33E-01	–
Styrene	no	**YES**	–	2.50E-01 m	–
Tert-Butyl Alcohol (TBA)	**YES**	**YES**	3.10E-02 m	2.09E-02	–
tert-Butylbenzene	**YES**	**YES**	2.00E-01 m	2.80E-01 m	–
Tetrachloroethene	**YES**	**YES**	4.00E-02 m	4.00E-02 m	–
Toluene	**YES**	**YES**	6.30E-01 m	4.58E-01	7.31E+03
Vinyl Acetate	no	**YES**	–	9.80E-03 m	–
Xylenes, total	**YES**	**YES**	6.96E-01	9.19E+00	3.53E+04
Semivolatile Organic Compounds (SVOCs)					
1-Methylnaphthalene	**YES**	**YES**	2.75E+01	2.19E+01	–
2-Methylnaphthalene	**YES**	**YES**	3.57E+01	2.93E+01	–
Acenaphthene	**YES**	**YES**	4.80E+01 m	3.97E+00	–
Acenaphthylene	**YES**	**YES**	3.80E-01 m	6.62E-02	–
Anthracene	**YES**	**YES**	1.67E-01	1.39E-01	–
Benzo(a)anthracene	**YES**	**YES**	5.70E-01 m	1.26E-01	–
Benzo(a)pyrene	**YES**	**YES**	2.44E-01	7.23E-02	–
Benzo(b)fluoranthene	**YES**	**YES**	1.70E-01	4.25E-02	–
Benzo(ghi)perylene	**YES**	**YES**	1.50E-01	1.10E-01	–
Benzo(k)fluoranthene	**YES**	**YES**	5.20E-01 m	3.70E-02	–
Chrysene	**YES**	**YES**	2.56E-01	4.69E-01	–
Dibenzo(a,h)anthracene	**YES**	**YES**	6.20E-01 m	5.91E-02	–
Fluoranthene	**YES**	**YES**	2.21E-01	1.56E-01	–
Fluorene	**YES**	**YES**	2.39E+01	4.70E+00	–
Indeno(1,2,3-cd)pyrene	**YES**	**YES**	1.45E-01	3.55E-02	–
Naphthalene	**YES**	**YES**	2.14E+00	1.80E+00	–
Phenanthrene	**YES**	**YES**	8.36E+01	1.60E+01	–
Pyrene	**YES**	**YES**	7.61E+00	2.41E+00	–
Polychlorinated Biphenyls (PCBs)					
PCB-1254	**YES**	**YES**	7.40E-01 m	7.40E-01 m	–
Inorganic Compounds					
Antimony	**YES**	**YES**	1.34E+01 m	2.44E+00	–
Arsenic	**YES**	**YES**	7.38E+00	5.55E+00	–
Barium	**YES**	**YES**	2.12E+02	1.86E+02	–
Beryllium	**YES**	**YES**	6.16E-01	9.90E-01	–
Cadmium	**YES**	**YES**	8.23E-01	4.71E-01	–

Table 6-17
Exposure Point Concentrations
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern (COPC)	COPC?		Exposure Point Concentrations [a]		
	Surface Soil (0-0.5 ft)	Subsurface Soil (0-10 ft)	Surface Soil (0-0.5 ft) (mg/kg)	Subsurface Soil (0-10 ft) (mg/kg)	Soil Gas (at 5 ft) ($\mu g/m^3$)
Chromium	**YES**	**YES**	5.71E+01	4.70E+01	–
Chromium, Hexavalent	no	**YES**	–	7.40E-01 m	–
Cobalt	**YES**	**YES**	1.20E+01	1.43E+01	–
Copper	**YES**	**YES**	1.29E+02	7.59E+01	–
Lead	**YES**	**YES**	2.44E+02	1.60E+02	–
Mercury	**YES**	**YES**	5.61E+01	1.08E+01	–
Molybdenum	**YES**	**YES**	3.50E+00	1.73E+00	–
Nickel	**YES**	**YES**	2.26E+01	2.37E+01	–
Selenium	**YES**	**YES**	1.22E+00 m	2.14E+00 m	–
Thallium	**YES**	**YES**	4.71E+00 m	3.32E+00	–
Vanadium	**YES**	**YES**	4.30E+01	5.42E+01	–
Zinc	**YES**	**YES**	1.81E+03	7.54E+02	–

Notes:

– = not detected, not analyzed, or not applicable
$\mu g/m^3$ = micrograms per cubic meter
COPC = constituent of potential concern
EPC = exposure point concentration
mg/kg = milligrams per kilograms
UCL = upper confidence level on the mean

[a] The EPC was the UCL or the maximum concentration where the UCL was incalculable.
EPCs marked with "m" are based on the maximum detected concentration.
The UCLs were calculated using ProUCL 4.0.
The UCL used is the one recommended by ProUCL 4.0.

Table 6-18
Exposure Point Concentrations
Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Is Constituent a Groundwater COPC? [a] (YES, no)	Exposure Point Concentrations [b] (mg/L)
Volatile Organic Compounds (VOCs)		
1,1,2-Trichloroethane	**YES**	6.70E-04
1,1-Dichloroethane	**YES**	1.29E-03
1,1-Dichloroethene	**YES**	2.97E-03
1,2,4-Trimethylbenzene	**YES**	3.10E-02
1,2-Dichlorobenzene	**YES**	3.20E-04
1,2-Dichloroethane	**YES**	8.68E-04
1,2-Dichloropropane	**YES**	2.50E-02
1,3,5-Trimethylbenzene	**YES**	1.46E-02
Benzene	**YES**	1.43E+00
c-1,2-Dichloroethene	**YES**	1.14E-02
Chloroethane	**YES**	2.00E-03
Diisopropyl Ether (DIPE)	**YES**	6.30E-04
Ethylbenzene	**YES**	9.86E-02
Isopropylbenzene	**YES**	8.37E-03
Methylene Chloride	no	1.72E-03
Methyl-t-Butyl Ether (MTBE)	**YES**	2.77E-03
n-Butylbenzene	**YES**	2.08E-03
n-Propylbenzene	**YES**	7.81E-03
o-Xylene	**YES**	7.44E-02
p/m-Xylene	**YES**	1.75E-01
p-Isopropyltoluene	**YES**	2.11E-03
sec-Butylbenzene	**YES**	2.04E-03
t-1,2-Dichloroethene	**YES**	1.17E-03
Tert-Butyl Alcohol (TBA)	**YES**	5.71E-02
tert-Butylbenzene	**YES**	4.27E-04
Tetrachloroethene	**YES**	3.46E-03
Toluene	**YES**	1.92E-01
Trichloroethene	**YES**	2.09E-02
Vinyl Chloride	**YES**	1.37E-03
Xylenes, total	**YES**	2.10E-01
Semi Volatile Organic Compounds (SVOCs)		
1,4-Dioxane	**YES**	3.94E-03
Naphthalene	**YES**	2.69E-02
Inorganic Compounds		
Iron	**YES**	2.00E+00
Methane	**YES**	9.19E-01

Notes:

– = not detected, not analyzed, or not applicable
COPC = constituent of potential concern
EPC = exposure point concentration
mg/kg = milligrams per kilograms

[a] All constituents detected were considered COPCs unless they were known laboratory contaminants (i.e. methylene chloride).

[b] The EPC was the UCL or the maximum concentration where the UCL was incalculable. EPCs marked with "m" are based on the maximum detected concentration. The UCLs were calculated using ProUCL 4.0.

Table 6-18
Exposure Point Concentrations
Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Is Constituent a Groundwater COPC? [a] (YES, no)	Exposure Point Concentrations [b] (mg/L)

The UCL used is the one recommended by ProUCL 4.0.

Table 6-19
Soil Volatilization Factors

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Volatilization Factors:	(calculated only for volatile organic compounds)								
Constituent	**Solubility in Water (mg/L) (S)**	**Saturation Limit in Soil (mg/kg) (Csat)**	**Diffusivity in Air (cm^2/sec) (D_{air})**	**Diffusivity in Water (cm^2/sec) (D_{wat})**	**Henry's Law Constant (atm-m^3/mol) (H)**	**Henry's Law Constant (unitless) (H_o)**	**Partition Coefficient (mL/g) (Koc)**	**Apparent Diffusivity (cm^2/sec) (D_A)**	**Volatilization Factor (m^3/kg) (VF)**
Volatile Organic Compounds (VOCs)									
1,1,1,2-Tetrachloroe hane		—	4.23E-02	9.14E-06	2.42E-03	9.89E-02	1.45E+02	2.26E-04	8 27E+03
1,1,1-Trichloroethane	1 33E+03	—	7.80E-02	8.80E-06	1.72E-02	7.03E-01	1.10E+02	3.27E-03	2.17E+03
1,1,2,2-Tetrachloroe hane	2 97E+03	—	7.10E-02	7.90E-06	3.45E-04	1.41E-02	9.35E+01	8.05E-05	1 38E+04
1,1,2-Trichloroethane	4.42E+03	—	7.80E-02	8.80E-06	9.13E-04	3.73E-02	5.00E+01	3.81E-04	6 36E+03
1,1-Dichloroethane	5 06E+03	—	7.42E-02	1.05E-05	5.62E-03	2.30E-01	3.16E+01	2.73E-03	2 38E+03
1,1-Dichloroethene	2 25E+03	—	9.00E-02	1.04E-05	2.61E-02	1.07E+00	5.90E+01	7.80E-03	1.41E+03
1,2,3-Trichlorobenzene	1 80E+01	—	3.00E-02	8.23E-06	1.25E-03	5.11E-02	3.28E+04	4.15E-07	1 93E+05
1,2,3-Trichloropropane	1.75E+03	—	7.10E-02	7.90E-06	4.09E-04	1.67E-02	7.25E+01	1.18E-04	1.14E+04
1,2,4-Trichlorobenzene	3.46E+01	—	3.00E-02	8.23E-06	1.42E-03	5.80E-02	1.78E+03	8.60E-06	4 23E+04
1,2-Dichlorobenzene	1 56E+02	—	6.90E-02	7.90E-06	1.90E-03	7.76E-02	6.15E+02	7.51E-05	1.43E+04
1,2-Dichloroethane	8 52E+03	—	1.04E-01	9.90E-06	9.79E-04	4.00E-02	1.74E+01	1.05E-03	3 84E+03
1,2-Dichloropropane	2 80E+03	—	7.82E-02	8.73E-06	2.80E-03	1.14E-01	4.37E+01	1.24E-03	3 52E+03
1,3,5-Trimethylbenzene	4 82E+01	—	6.02E-02	8.67E-06	8.78E-03	3.59E-01	1.62E+03	1.16E-04	1.15E+04
1,4-Dichlorobenzene	7 38E+01	—	6.90E-02	7.90E-06	2.40E-03	9.81E-02	6.15E+02	9.47E-05	1 28E+04
2-Butanone	2 23E+05	—	8.08E-02	9.80E-06	5.59E-05	2.28E-03	1.89E+00	8.86E-05	1 32E+04
2-Chlorotoluene	3.74E+02	—	5.50E-02	8.65E-06	3.57E-03	1.46E-01	7.56E+02	9.17E-05	1 30E+04
2-Hexanone	1.75E+04	—	7.82E-02	7.18E-06	9.30E-05	3.80E-03	2.33E+01	6.61E-05	1 53E+04
4-Chlorotoluene	1 06E+02	—	6.78E-02	7.23E-06	4.40E-03	1.80E-01	3.40E+02	2.99E-04	7.18E+03
4-Methyl-2-Pentanone	1 90E+04	—	7.50E-02	7.80E-06	1.38E-04	5.64E-03	1.48E+01	1.19E-04	1.14E+04
Acetone	1 00E+06	—	1.24E-01	1.14E-05	3.88E-05	1.59E-03	5.81E-01	1.02E-04	1 23E+04
Acetonitrile	1 00E+06	—	1.26E-01	1.66E-05	3.46E-05	1.41E-03	1.32E+01	5.35E-05	1.70E+04
Benzene	1.75E+03	—	8.80E-02	9.80E-06	5.55E-03	2.27E-01	5.90E+01	2.14E-03	2.68E+03
Bromobenzene	4.10E+02	—	7.09E-02	9.58E-06	2.08E-03	8.50E-02	2.68E+02	1.86E-04	9 09E+03
Bromodichloromethane	6.74E+03	—	2.98E-02	1.06E-05	1.60E-03	6.54E-02	5.50E+01	2.35E-04	8.10E+03
Bromoform	3.10E+03	—	1.49E-02	1.03E-05	5.35E-04	2.19E-02	8.70E+01	2.78E-05	—
c-1,2-Dichloroethene	3 50E+03	—	7.36E-02	1.13E-05	4.08E-03	1.67E-01	3.55E+01	1.90E-03	2 85E+03
Carbon Disulfide	1.19E+03	—	1.04E-01	1.00E-05	3.03E-02	1.24E+00	4.57E+01	1.13E-02	1.17E+03
Chloroethane	5.68E+03	—	2.71E-01	1.15E-05	8.82E-03	3.60E-01	1.62E+01	1.96E-02	8 86E+02
Chloroform	7 92E+03	—	1.04E-01	1.00E-05	3.67E-03	1.50E-01	3.98E+01	2.26E-03	2.61E+03
Chloromethane	5 33E+03	—	1.26E-01	6.50E-06	8.82E-03	3.60E-01	3.50E+01	6.40E-03	1 55E+03
Diisopropyl Ether (DIPE)	8 80E+03	9.50E+03	7.37E-02	6.87E-06	2.30E-03	9.40E-02	1.60E+02	3.43E-04	6.71E+03
E hanol	7 92E+05	—	1.35E-01	1.20E-05	4.66E-06	1.90E-04	1.00E+00	1.36E-05	—
E hylbenzene	1.69E+02	—	7.50E-02	7.80E-06	7.88E-03	3.22E-01	3.63E+02	5.50E-04	5 29E+03
Iodomethane	0 00E+00	—	7.49E-02	1.27E-05	0.00E+00	0.00E+00	0.00E+00	8.06E-07	—
Isopropylbenzene	6.13E+01	—	6.50E-02	7.10E-06	1.16E+00	4.74E+01	3.31E+03	5.68E-03	1.65E+03
Me hylene Chloride	1 30E+04	—	1.01E-01	1.17E-05	2.19E-03	8.95E-02	1.18E+01	2.57E-03	2.45E+03
Me hyl-t-Butyl Ether (MTBE)	5.10E+04	—	1.02E-01	1.05E-05	5.87E-04	2.40E-02	6.00E+00	9.32E-04	4 07E+03
n-Butylbenzene	1.18E+01	—	7.84E-02	6.12E-06	1.59E-02	6.50E-01	1.76E+03	2.51E-04	7 83E+03
n-Propylbenzene	5 22E+01	—	7.11E-02	6.59E-06	1.05E-02	4.29E-01	7.41E+02	3.51E-04	6.62E+03
o-Xylene	1.78E+02	—	8.70E-02	1.00E-05	5.19E-03	2.12E-01	2.60E+02	5.78E-04	5.16E+03
p/m-Xylene	1.73E+02	—	7.35E-02	8.12E-06	7.50E-03	3.06E-01	1.60E+02	1.07E-03	3.79E+03
p-Isopropyltoluene	2 34E+01	—	7.84E-02	6.12E-06	1.10E-02	4.50E-01	1.32E+03	2.31E-04	8.17E+03
sec-Butylbenzene	1.76E+01	—	7.84E-02	6.12E-06	1.76E-02	7.19E-01	1.58E+03	3.09E-04	7 06E+03
Styrene	3.10E+02	—	7.10E-02	8.00E-06	2.75E-03	1.12E-01	7.77E+02	8.89E-05	1 32E+04
t-1,2-Dichloroe hene	6 30E+03	—	7.07E-02	1.19E-05	9.38E-03	3.83E-01	5.25E+01	2.96E-03	2 28E+03
Tert-Butyl Alcohol (TBA)	2.18E+05	—	9.48E-02	8.60E-06	2.10E-05	8.59E-04	1.47E+00	4.03E-05	1 95E+04
tert-Butylbenzene	2 95E+01	—	7.84E-02	6.12E-06	1.32E-02	5.39E-01	1.18E+03	3.09E-04	7 06E+03
Tetrachloroethene	2 00E+02	—	7.20E-02	8.20E-06	1.84E-02	7.52E-01	1.55E+02	2.46E-03	2 50E+03
Toluene	5 26E+02	—	8.70E-02	8.60E-06	6.64E-03	2.71E-01	1.82E+02	1.01E-03	3 90E+03
Trichloroethene	1.10E+03	—	7.90E-02	9.10E-06	1.03E-02	4.21E-01	1.66E+02	1.51E-03	3 20E+03
Vinyl Acetate	2 00E+04	—	8.50E-02	9.20E-06	5.11E-04	2.09E-02	5.22E+00	7.00E-04	4.69E+03
Vinyl Chloride	2.76E+03	—	1.06E-01	1.23E-05	2.70E-02	1.10E+00	1.86E+01	1.48E-02	1 02E+03
Xylenes, total	1.75E+02	—	7.14E-02	9.34E-06	6.63E-03	2.71E-01	1.90E+02	7.98E-04	4 39E+03

Table 6-19
Soil Volatilization Factors

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Volatilization Factors:	(calculated only for volatile organic compounds)								
Constituent	**Solubility in Water (mg/L) (S)**	**Saturation Limit in Soil (mg/kg) (Csat)**	**Diffusivity in Air (cm^2/sec) (D_{air})**	**Diffusivity in Water (cm^2/sec) (D_{wat})**	**Henry's Law Constant (atm-m^3/mol) (H)**	**Henry's Law Constant (unitless) (H_o)**	**Partition Coefficient (mL/g) (Koc)**	**Apparent Diffusivity (cm^2/sec) (D_A)**	**Volatilization Factor (m^3/kg) (VF)**
Semivolatile Organic Compounds (SVOCs)									
1,4-Dioxane	1 00E+06	—	2.29E-01	1.02E-05	4.80E-06	1.96E-04	7.82E+03	5.23E-08	—
1-Methylnaphthalene	2 58E+01	—	4.80E-02	7.84E-06	2.60E-04	1.06E-02	7.82E+03	5.79E-07	1.63E+05
2-Methylnaphthalene	2.46E+01	—	4.80E-02	7.84E-06	5.18E-04	2.12E-02	7.47E+03	1.21E-06	1.13E+05
Acenaphthene	3,6	—	4.21E-02	7.69E-06	1.60E-04	6.54E-03	7.14E+03	3.43E-07	2.12E+05
Acenaphthylene	1.61E+01	—	4.39E-02	7.53E-06	1.13E-04	4.62E-03	3.09E+03	5.82E-07	1.63E+05
Anthracene	4 34E-02	—	3.24E-02	7.74E-06	6.50E-05	2.66E-03	2.97E+04	2.60E-08	7.70E+05
Benzo(a)anthracene	9.40E-03	—	5.10E-02	9.00E-06	3.35E-06	1.37E-04	3.98E+05	1.80E-10	—
Benzo(a)pyrene	1.62E-03	—	4.30E-02	9.00E-06	1.13E-06	4.62E-05	1.02E+06	2.66E-11	—
Benzo(b)fluoranthene	1.50E-03	—	2.26E-02	5.56E-06	1.11E-04	4.54E-03	1.23E+06	7.45E-10	—
Benzo(ghi)perylene	2.60E-04	—	4.20E-02	4.81E-06	1.41E-07	5.76E-06	3.86E+06	1.87E-12	—

Notes:

— = not available or not applicable
atm = atmosphere
cm = centimeter(s)
g = gram(s)
kg = kilogram(s)
L = liter(s)
m = meter(s)
mg = milligram(s)
mL = milliliter(s)
mol = mole(s)
sec = second(s)

References:

USEPA. 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Office of Emergency and Remedial Response, Washington, DC. OSWER 9355.4-24. December.

Table 6-20
Receptor Exposure Parameters

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Parameter	Symbol	Units	Resident				Commercial/ Industrial		Construction		Utility Trench	
			Child	[ref]	Adult	[ref]	Worker	[ref]	Worker	[ref]	Worker	[ref]
General Factors												
Averaging Time (cancer)	ATc	days	25,550	[a,1]	25,550	[a,1]	25,550	[a,1]	25,550	[a,1]	25,550	[a,1]
Averaging Time (noncancer)	ATnc	days	2,190	[a,1]	8,760	[a,1]	9,125	[a,1]	365	[a,1]	2,555	[a,1]
Body Weight	BW	kg	15	[1,3]	70	[1,3]	70	[1,1,2]	70	[1,2]	70	[1,2]
Exposure Time	ET	hours/day	24	[b,2]	24	[b,2]	8	[2]	8	[2]	8	[2]
Exposure Frequency	EF	days/year	350	[1,2,3]	350	[1,2,3]	250	[1,2]	250	PJ	20	PJ
Exposure Duration	ED	years	6	[1,2,3]	24	[1,2,3]	25	[1,2]	1	PJ	7	[6]
Groundwater - Ingestion (Oral)												
Groundwater Ingestion Rate	IRgw	L/day	1	[1,3]	2	[1,3]	–		–		–	
Groundwater - Dermal Contact												
Exposed Skin Surface Area	SSAgw	cm^2	6,600	[5]	18,000	[5]	3,300	[3]	5,500	[4]	5,500	[4]
Exposure Time; groundwater contact	ETgw	hours/day	1.0	[5]	0.58	[5]	1	PJ	1	PJ	1	PJ
Soil - Ingestion (Oral)												
Incidental Soil Ingestion Rate	IRs	mg/day	100	[4]	50	[4]	50	[2,3]	330	[c,5]	330	[c,5]
Fraction Ingested from Source	FI	unitless	1		1		1		1		1	
Soil - Dermal Contact												
Exposed Skin Surface Area	SA	cm^2	2,800	[3]	5,700	[3]	3,300	[3]	5,800	[4]	5,800	[4]
Soil-to-Skin Adherence Rate	AF	$mg/cm^2/day$	0.2	[5]	0.07	[5]	0.2	[5]	0.2	[3]	0.2	[3]
Soil/Air - Inhalation of Dust/Inhalation												
Age-Adjusted Intake Factor, Inhalation	IFi	m^3-yr/kg-day	–		–		–					
Particulate Emmission Factor	PEF	m^3/kg	1.32E+09	[5]	1.32E+09	[5]	1.32E+09	[5]	1.00E+06	[5]	1.00E+06	[5]
Breathing Rate per hour	BR	m^3/hour	0.35	[4]	0.83	[4]	1.7	[4]	2.5	[4]	2.5	[4]

Table 6-20
Receptor Exposure Parameters

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Notes:

-- = not applicable, not analyzed, not available
cm = centimeter(s)
kg = kilogram(s)
L = liter(s)
m = meter(s)
mg = milligram(s)
PJ = professional judgment (see text)

[a] The averaging time for cancer risk is the expected lifespan of 70 years expressed in days.
The averaging time for non-cancer hazard is the total exposure duration expressed in days.
[b] Value of 24 hours/day based on CalEPA (1992) recommendations.
[c] Exposure is based on the recommended ingestion rates for construction workers.

References [ref]:

[1] USEPA. 1989. *Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part A).* U.S. Environmental Protection Agency.

[2] USEPA. 1991. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals).* EPA/540/R-92/003. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response Toxic Integration Branch.

[3] USEPA. 2004. *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment.* EPA/540/R/99/005. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response.

[4] USEPA. 1997a. *Exposure Factors Handbook.* EPA/600/P-95/002Ba. U.S. Environmental Protection Agency. February.
[5] CalEPA. 2005. Note: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Military Facilities.
[6] CalEPA. 2003 Air Toxics Hot Spots Program Risk Assessment Guidelines Part IV Technical Support Document for Exposure Assessment and Stochastic Analysis.

Table 6-21
Dermal Absorption Parameters

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern	ABSd [a]	Kp (cm/hour) [b]		Absorption Parameters [c]					[d]
		Value	[ref]	FA (unitless)	τ (hour)	t* (hour)	B (unitless)	[ref]	(L/cm²/event)
Volatile Organic Compounds (VOCs)									
1,1,1,2-Tetrachloroethane	0	9 9E-03	calc	1.0	0.91	2.18	0.0494	calc	2.61E-05
1,1,1-Trichloroethane	0	1 3E-02	DRA	1.0	0.60	1.43	0.0577	DRA	2.78E-05
1,1,2,2-Tetrachloroethane	0	6 9E-03	DRA	1.0	0.93	2.24	0.0344	DRA	1.84E-05
1,1,2-Trichloroethane	0	6.4E-03	DRA	1.0	0.60	1.43	0.0284	DRA	1.37E-05
1,1-Dichloroethane	0	6.7E-03	DRA	1.0	0.38	0.92	0.0257	DRA	1.18E-05
1,1-Dichloroethene	0	1 2E-02	DRA	1.0	0.37	0.89	0.0438	DRA	2.08E-05
1,2,3-Trichlorobenzene	0	1.1E-01	EPI	1.0	1.09	2.62	0.58	calc	3.23E-04
1,2,3-Trichloropropane	0	5 3E-03	calc	0.0	0.70	1.70	0.025	calc	0.00E+00
1,2,4-Trichlorobenzene	0	6.6E-02	DRA	1.0	1.11	2.66	0.335	DRA	1.92E-04
1,2,4-Trimethylbenzene	0	1 3E-01	EPI	1.0	0.49	1.18	0.561	calc	2.57E-04
1,2-Dichlorobenzene	0	4.1E-02	DRA	1.0	0.71	1.71	0.1912	DRA	9.55E-05
1,2-Dichloroethane	0	4 2E-03	DRA	1.0	0.38	0.92	0.0158	DRA	7.38E-06
1,2-Dichloropropane	0	7 8E-03	DRA	1.0	0.46	1.10	0.0319	DRA	1.46E-05
1,3,5-Trimethylbenzene	0	9.4E-02	EPI	1.0	0.49	1.18	0.398	calc	1.83E-04
1,4-Dichlorobenzene	0	4 2E-02	DRA	1.0	0.71	1.71	0.1959	DRA	9.78E-05
2-Butanone	0	9.6E-04	DRA	1.0	0.27	0.65	0.0031	DRA	1.48E-06
2-Chlorotoluene	0	8.6E-02	EPI	1.0	0.54	1.30	0.373	calc	1.75E-04
2-Hexanone	0	3 5E-03	calc	1.0	0.38	0.91	0.0137	calc	6.23E-06
4-Chlorotoluene	0	5 3E-02	calc	0.0	0.54	1.30	0.23	calc	0.00E+00
4-Methyl-2-Pentanone	0	2.7E-03	DRA	1.0	0.39	0.93	0.0102	DRA	4.80E-06
Acetone	0	5 2E-04	calc	1.0	0.22	0.53	0.0015	calc	7.49E-07
Acetonitrile	0	5.6E-04	calc	1.0	0.18	0.43	0.0014	calc	7.61E-07
Benzene	0	1 5E-02	DRA	1.0	0.29	0.70	0.0501	DRA	2.34E-05
Bromobenzene	0	2 0E-02	calc	1.0	0.80	1.90	0.095	calc	4.94E-05
Bromodichloromethane	0	4.6E-03	DRA	1.0	0.88	2.12	0.0229	DRA	1.19E-05
Bromoform	0.1	2 2E-03	DRA	1.0	2.79	6.70	0.0132	DRA	1.02E-05
c-1,2-Dichloroethene	0	7.7E-03	calc	1.0	0.37	0.89	0.029	calc	1.33E-05
Carbon Disulfide	0	1.7E-02	DRA	1.0	0.30	0.72	0.06	DRA	2.68E-05
Chloroethane	0	6.1E-03	DRA	1.0	0.24	0.59	0.0187	DRA	8.97E-06
Chloroform	0	6 8E-03	DRA	1.0	0.50	1.19	0.0285	DRA	1.33E-05
Chloromethane	0	3 3E-03	DRA	1.0	0.20	0.49	0.009	DRA	4.60E-06
Diisopropyl Ether (DIPE)	0	5.4E-03	calc	0.0	0.37	0.88	0.0033	calc	0.00E+00
E hanol	0.1	6 0E-04	RAIS	—	—	—	—		6.01E-07
E hylbenzene	0	4 9E-02	DRA	1.0	0.42	1.01	0.192	DRA	8.78E-05
Iodomethane	0	2 8E-03	DRA	1.0	0.36	0.87	0.0107	DRA	4.81E-06
Isopropylbenzene	0	1.4E-01	EPI	1.0	0.49	1.18	0.59	calc	2.71E-04
Methylene Chloride	0	3 5E-03	DRA	1.0	0.32	0.76	0.0126	DRA	5.72E-06
Methyl-t-Butyl Ether (MTBE)	0	3.4E-03	calc	0.0	0.33	0.79	0.012	calc	0.00E+00
n-Butylbenzene	0	3.7E-01	EPI	1.0	0.59	2.37	1.66	calc	7.90E-04
n-Propylbenzene	0	1 5E-01	EPI	1.0	0.49	1.96	0.62	calc	2.84E-04
o-Xylene	0	5 3E-02	DRA	1.0	0.42	1.01	0.21	DRA	9.49E-05
p/m-Xylene	0	5 3E-02	DRA	1.0	0.42	1.01	0.21	DRA	9.49E-05
p-Isopropyltoluene	0	2.4E-01	EPI	1.0	0.59	2.28	1.05	calc	5.01E-04
sec-Butylbenzene	0	1.4E-01	calc	1.0	0.59	0.78	0.62	calc	3.39E-04
Styrene	0	3.7E-02	DRA	1.0	0.41	0.98	0.145	DRA	6.70E-05
t-1,2-Dichloroe hene	0	7.7E-03	DRA	1.0	0.37	0.89	0.029	DRA	1.33E-05
Tert-Butyl Alcohol (TBA)	0	2 0E-03	calc	calc	0.27	0.66	0.0065	calc	2.00E-06
tert-Butylbenzene	0	2.4E-01	EPI	1.0	0.59	2.28	1.07	calc	5.10E-04
Tetrachloroethene	0	3 3E-02	DRA	1.0	0.91	2.18	0.163	DRA	8.70E-05
Toluene	0	3.1E-02	DRA	1.0	0.35	0.84	0.113	DRA	5.20E-05
Trichloroethene	0	1 2E-02	DRA	1.0	0.58	1.39	0.0529	DRA	2.53E-05
Vinyl Acetate	0	1.6E-03	calc	1.0	0.32	0.77	0.0057	calc	2.62E-06
Vinyl Chloride	0	5.6E-03	DRA	1.0	0.24	0.57	0.017	DRA	8.24E-06
Xylenes, total	0	5 3E-02	DRA	1.0	0.42	1.01	0.21	DRA	9.49E-05
Semivolatile Organic Compounds (SVOCs)									
1,4-Dioxane	0.1	3 3E-04	DRA	1.0	0.33	0.80	0.0012	DRA	5.48E-07
1-Methylnaphthalene	0	1 5E-01	EPI	1.0	0.66	2.59	0.665	calc	3.26E-04
2-Methylnaphthalene	0	1.4E-01	EPI	1.0	0.66	2.60	0.651	calc	3.19E-04
Acenaphthene	0.13	1 3E-01	EPI	1.0	0.77	3.05	0.635	calc	3.23E-04
Acenaphthylene	0.13	1.4E-01	EPI	1.0	0.75	2.94	0.669	calc	3.38E-04
Anthracene	0.13	2 3E-01	EPI	1.0	1.05	4.09	1.16	calc	6.37E-04
Benzo(a)anthracene	0.13	4.7E-01	DRA	1.0	2.03	8.53	2.8	DRA	1.85E-03
Benzo(a)pyrene	0.13	7 0E-01	DRA	1.0	2.69	11.67	4.28	DRA	3.17E-03
Benzo(b)fluoranthene	0.13	7 0E-01	DRA	1.0	2.77	12.03	4.28	DRA	3.22E-03
Benzo(ghi)perylene	0.13	1.9E+00	EPI	0.6	3.70	16.86	11.83	calc	5.90E-03

Table 6-21
Dermal Absorption Parameters

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent of Potential Concern	ABSd [a]	Kp (cm/hour) [b]		Absorption Parameters [c]					[d]
		Value	[ref]	FA (unitless)	τ (hour)	t* (hour)	B (unitless)	[ref]	(L/cm²/event)
Benzo(k)fluoranthene	0.13	1.2E+00	EPI	0.8	2.72	12.17	7.331	calc	4.38E-03
Chrysene	0.13	4.7E-01	DRA	1.0	2.03	8.53	2.804	DRA	1.85E-03
Dibenzo(a,h)anthracene	0.13	1.5E+00	DRA	0.6	3.88	17.57	9.7	DRA	4.90E-03
Fluoran hene	0.13	2 2E-01	DRA	1.0	1.45	5.68	1.2034	DRA	7.32E-04
Fluorene	0.13	1.7E-01	EPI	1.0	0.90	3.46	0.848	calc	4.48E-04
Indeno(1,2,3-cd)pyrene	0.13	1.0E+00	DRA	0.6	3.78	16.83	6.7	DRA	3.22E-03
Naph halene	0.13	4.7E-02	DRA	1.0	0.56	1.34	0.205	DRA	9.72E-05
Phenanthrene	0.13	1.4E-01	DRA	1.0	1.06	4.11	0.719	DRA	3.98E-04
Pyrene	0.13	3 2E-01	EPI	1.0	1.43	5.77	1.77	calc	1.07E-03
Pesticides and Herbicides									
4,4-DDD	0.1	1 8E-01	DRA	0.8	6.65	25.99	1.239	DRA	1.03E-03
4,4-DDE	0.1	1.6E-01	DRA	0.8	6.48	25.08	1.097	DRA	9.01E-04
4,4-DDT	0.03	2.7E-01	DRA	0.7	10.45	42.51	1.955	DRA	1.69E-03
Aldrin	0.1	1.4E-03	DRA	1.0	11.89	28.54	0.0102	DRA	1.33E-05
Chlordane	0.04	3 8E-02	DRA	0.7	21.21	50.91	0.296	DRA	3.39E-04
Dieldrin	0.1	1 2E-02	DRA	0.8	14.62	35.09	0.0882	DRA	1.01E-04
Polychlorinated Biphenyls (PCBs)									
PCB-1254	0.14	1.3E+00	EPI	0.6	7.12	32.12	8.97	calc	5.71E-03
PCB-1260	0.14	5.5E+00	EPI	0.1	12.39	57.78	40.5	calc	5.33E-03
Total PCBs	0.1	4 3E-01	DRA	0.5	11.29	47.90	3.2	DRA	2.00E-03
Inorganic Compounds									
Antimony	0	1 0E-03	W	—	—	—	—		1.00E-06
Arsenic	0.03	1 0E-03	W	—	—	—	—		1.00E-06
Barium	0	1 0E-03	W	—	—	—	—		1.00E-06
Beryllium	0	1 0E-03	W	—	—	—	—		1.00E-06
Cadmium	0.001	1 0E-03	DRA	—	—	—	—		1.00E-06
Chromium	0	2 0E-03	DRA	—	—	—	—		2.00E-06
Chromium, Hexavalent	0	2 0E-03	DRA	—	—	—	—		2.00E-06
Cobalt	0	4 0E-04	DRA	—	—	—	—		4.00E-07
Copper	0	1 0E-03	W	—	—	—	—		1.00E-06
Iron	0	1 0E-03	W	—	—	—	—		1.00E-06
Lead	0	1 0E-04	DRA	—	—	—	—		1.00E-07
Mercury	0	1 0E-03	DRA	—	—	—	—		1.00E-06
Methane	0.1	6 8E-03	calc	1.0	0.13	0.31	0.0104	calc	8.52E-06
Molybdenum	0	1 0E-03	W	—	—	—	—		1.00E-06
Nickel	0	2 0E-04	DRA	—	—	—	—		2.00E-07
Selenium	0	1 0E-03	W	—	—	—	—		1.00E-06
Silver	0	6 0E-04	DRA	—	—	—	—		6.00E-07
Thallium	0	1 0E-03	W	—	—	—	—		1.00E-06
Vanadium	0	1 0E-03	W	—	—	—	—		1.00E-06
Zinc	0	6 0E-04	DRA	—	—	—	—		6.00E-07

Notes:

calc = Calculated value (DRA; USEPA 2004).
cm = Centimeter.
L = Liter.
W = Assumed to be equal to the value for water (DRA; USEPA 2004).

[a] Dermal absorption efficiency for uptake of constituents from a soil matrix (unitless) (USEPA 2004).
[b] Permeability coefficient for dermal contact with constituents in water (centimeters per hour).
[c] Absorption parameters for use in the non-steady state model for dermal contact wi h constituents in water.
τ = Lag time for dermal absorption through the skin.
B = Ratio of the permeability coefficient through the stratus corneum relative to the permeability coefficient across the viable epidermis. B values with "DRA" as the reference are calculated but are consistent with values presented in the guidance.
FA = Fraction of absorbed water.
t* = Time required to reach steady state.
[d] Dermal absorption (DA) calculated according to equations presented in USEPA 2004 based on exposure time (ET) = 1 hour.

References [ref]:

DRA = USEPA. 2004. *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final.* Office of Emergency and Remedial Response, Washington, DC. EPA/540/R/99/005. OSWER 9852.7-02EP. PB99-963312. July.
EPI = USEPA. 2004. EPI Suite software, Version 3.12. Office of Pollution Prevention and Toxics, Washington DC. August 17. Available at: http://www.epa.gov/opptintr/exposure/docs/episuitedl.htm.

Table 6-22
Carcinogenic Toxicity Values for Oral and Dermal Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Oral CSF [a] (mg/kg/day) [1]	[ref]	TEF	Adjustment Factor [b]	Dermal CSF [b] (mg/kg/day) [1]	Tumor Site	Weight of Evidence Classification [c]
Volatile Organic Compounds (VOCs)							
1,1,1,2-Tetrachloroethane	2.6E-02	I	–	1	2.6E-02	liver	C
1,1,1-Trichloroethane	NA		–	1	NA	–	D
1,1,2,2-Tetrachloroethane	2.7E-01	CA	–	1	2.7E-01	liver	C
1,1,2-Trichloroethane	7.2E-02	CA	–	1	7 2E-02	liver	C
1,1-Dichloroethane	5.7E-03	CA	–	1	5.7E-03	NA	C
1,1-Dichloroethene	NA		–	1	NA	–	C
1,2,3-Trichlorobenzene	NA		–	1	NA	–	NA
1,2,3-Trichloropropane	7.0E+00	H	–	1	7.0E+00	multiple sites	B2
1,2,4-Trichlorobenzene	3.6E-03	CA	–	1	3.6E-03	–	D
1,2,4-Trimethylbenzene	NA		–	1	NA	–	NA
1,2-Dibromo-3-Chloropropane	7.0E+00	CA	–	1	7.0E+00	stomach, liver, kidney	B2
1,2-Dichlorobenzene	NA		–	1	NA	–	D
1,3-Dichlorobenzene	NA		–	1	NA	–	D
1,2-Dichloroethane	4.7E-02	CA	–	1	4.7E-02	circulatory system	B2
1,2-Dichloropropane	3.6E-02	CA	–	1	3.6E-02	liver	B2
1,3,5-Trimethylbenzene	NA		–	1	NA	–	NA
1,4-Dichlorobenzene	5.4E-03	CA	–	1	5.4E-03	liver	C
2-Butanone	NA		–	1	NA	–	D
2-Chlorotoluene	NA		–	1	NA	–	NA
2,2-Dichloropropane	NA		–	1	NA	–	NA
2-Hexanone	NA		–	1	NA	–	NA
4-Chlorotoluene	NA		–	1	NA	–	NA
4-Methyl-2-Pentanone	NA		–	1	NA	–	NA
Acetone	NA		–	1	NA	–	D
Acetonitrile	NA		–	1	NA	–	D
Benzene	1.0E-01	CA	–	1	1 0E-01	leukemia	A
Bromobenzene	NA		–	1	NA	–	NA
Bromodichlorome hane	1.3E-01	CA	–	1	1 3E-01	kidney	B2
Bromoform	1.1E-02	CA	–	1	1.1E-02	intestine	B2
c-1,2-Dichloroethene	NA		–	1	NA	–	D
Carbon Disulfide	NA		–	1	NA	–	NA
Carbon Tetrachloride	1.5E-01	CA	–	1	1 5E-01	liver	B2
Chlorobenzene	NA		–	1	NA	–	D
Chloroethane	NA		–	1	NA	–	C
Chloroform	3.1E-02	CA	–	1	3.1E-02	NA	B2
Chloromethane	1.3E-02	H	–	1	1 3E-02	kidney	C
Dibromome hane	NA		–	1	NA	–	NA
Diisopropyl Ether (DIPE)	NA		–	1	NA	–	NA
Ethanol	NA		–	1	NA	–	NA
Ethylbenzene	1.1E-02	CA	–	1	1.1E-02	–	D
Iodomethane	NA		–	1	NA	–	D
Isopropylbenzene	NA		–	1	NA	–	D
Methylene Chloride	1.4E-02	CA	–	1	1.4E-02	liver	B2
Methyl-t-Butyl Ether (MTBE)	1.8E-03	CA	–	1	1 8E-03	–	NA
n-Butylbenzene	NA		–	1	NA	–	NA
n-Propylbenzene	NA		–	1	NA	–	NA
o-Xylene	NA		–	1	NA	–	D
p/m-Xylene	NA		–	1	NA	–	D
p-Isopropyltoluene	NA		–	1	NA	–	NA
sec-Butylbenzene	NA		–	1	NA	–	NA
Styrene [d]	NA		–	1	NA	–	B2
t-1,2-Dichloroethene	NA		–	1	NA	–	NA
Tert-Amyl Methyl Ether (TAME)	NA		–	1	NA	–	NA

Table 6-22
Carcinogenic Toxicity Values for Oral and Dermal Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Oral CSF [a] (mg/kg/day)[1]	[ref]	TEF	Adjustment Factor [b]	Dermal CSF [b] (mg/kg/day)[1]	Tumor Site	Weight of Evidence Classification [c]
Tert-Butyl Alcohol (TBA)	NA		–	1	NA	–	NA
tert-Butylbenzene	NA		–	1	NA	–	NA
Tetrachloroe hene	5.4E-01	CA	–	1	5.4E-01	liver, kidney	B2
Toluene	NA		–	1	NA	–	D
Trichloroethene	1.3E-02	CA	–	1	1 3E-02	multiple sites	C-B2
Trichlorofluoromethane	NA		–	1	NA	–	NA
Vinyl Acetate	NA		–	1	NA	–	NA
Vinyl Chloride	2.7E-01	CA	–	1	2.7E-01	liver	A
Xylenes, total	NA		–	1	NA	–	D
Semivolatile Organic Compounds (SVOCs)					0.0E+00		
1,4-Dioxane	2.7E-02	CA	–	1	2.7E-02	nasal cavity	B2
1-Methylnaph halene	2.9E-02	P	–	1	2 9E-02	–	NA
2-Methylnaph halene	NA		–	1	NA	–	NA
Acenaphthene	NA		–	1	NA	–	NA
Acenaphthylene	NA		–	1	NA	–	D
Anthracene	NA		–	1	NA	–	D
Benzo(a)an hracene	1.2E+00	CA	1.0E-01	1	1.2E+00	stomach	B2
Benzo(a)pyrene	1.2E+01	CA	1.0E+00	1	1.2E+01	stomach	B2
Benzo(b)fluoranthene	1.2E+00	CA	1.0E-01	1	1.2E+00	stomach	B2
Benzo(ghi)perylene	NA		–	1	NA	–	D
Benzo(k)fluoranthene	1.2E+00	CA	1.0E-02	1	1.2E+00	stomach	B2
Chrysene	1.2E-01	CA	1.0E-03	1	1 2E-01	stomach	B2
Dibenzo(a,h)anthracene	4.1E+00	CA	1.0E+00	1	4.1E+00	stomach	B2
Fluoranthene	NA		–	1	NA	–	D
Fluorene	NA		–	1	NA	–	D
Indeno(1,2,3-cd)pyrene	1.2E+00	CA	1.0E-01	1	1.2E+00	stomach	B2
Naphthalene	NA		–	1	NA	–	C
N-Nitrosodimethylamine	1.6E+01	CA	–	1	1.6E+01	multiple	B2
Phenanthrene	NA		–	1	NA	–	D
Pyrene	NA		–	1	NA	–	D
Pesticides and Herbicides							
4,4-DDD	2.4E-01	CA	–	1	2.4E-01	liver	B2
4,4-DDE	3.4E-01	CA	–	1	3.4E-01	liver	B2
4,4-DDT	3.4E-01	CA	–	1	3.4E-01	liver	B2
Aldrin	1.7E+01	CA	–	1	1.7E+01	liver	B2
Chlordane	1.3E+00	CA	–	1	1.3E+00	liver	B2
Dieldrin	1.6E+01	CA	–	1	1.6E+01	liver	B2
Polychlorinated Biphenyls (PCBs)							
PCB-1254 [e]	2.0E+00	CA	–	1	2.0E+00	liver	B2
PCB-1260 [e]	2.0E+00	CA	–	1	2.0E+00	liver	B2
Inorganic Compounds							
Antimony	NA		–	0.15	NA	–	NA
Arsenic	9.5E+00	CA	–	1	9.5E+00	skin	A
Barium	NA		–	0 07	NA	–	D
Beryllium	NA		–	0.007	NA	–	B1
Cadmium [f]	NA		–	0.025	NA	–	D/B1
Chromium	NA		–	0.013	NA	–	D/A
Chromium, Hexavalent [g]	NA		–	1	NA	–	D/A
Cobalt	NA		–	1	NA	–	NA
Copper	NA		–	1	NA	–	D
Iron	NA		–	1	NA	–	NA
Lead [h]	NA		–	1	NA	–	B2
Mercury	NA		–	1	NA	–	C
Methane	NA		–	1	NA	–	NA

Table 6-22
Carcinogenic Toxicity Values for Oral and Dermal Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Oral CSF [a] (mg/kg/day)$^{-1}$ [ref]	TEF	Adjustment Factor [b]	Dermal CSF [b] (mg/kg/day)$^{-1}$	Tumor Site	Weight of Evidence Classification [c]
Molybdenum	NA	–	1	NA	–	NA
Nickel	NA	–	0 04	NA	–	NA
Selenium	NA	–	1	NA	–	D
Silver	NA	–	0 04	NA	–	D
Thallium	NA	–	1	NA	–	NA
Vanadium	NA	–	0.026	NA	–	NA
Zinc	NA	–	1	NA	–	D

Notes:

– = not applicable
CSF = cancer slope factor
IARC = International Agency for Research on Cancer
(mg/kg/day)$^{-1}$ Inverse milligrams per kilogram per day (risk per unit dose).
NA = not available
TEF = benzo(a)pyrene toxicity equivalence factor for carcinogenic PAHs

[a] Toxicity values were obtained from sources referenced above in the following order of priority: CA, *I, P, H, A, W.*
[b] The oral-to-dermal adjustment factor (oral absorption efficiency) as used to calculate the dermal CSFd values, USEPA 2004.
CSF (dermal) = CSF (oral) / Adjustment Factor (oral absorption efficiency)
[c] USEPA cancer weight-of-evidence categories are as follows:
Group A: Human carcinogen (sufficient evidence of carcinogenicity in humans).
Group B: Probable human carcinogen.
B1 - Limited evidence of carcinogenicity in humans.
B2 - Sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans.
Group C: Possible human carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data).
Group D: Not classifiable as to human carcinogenicity (inadequate or no evidence).
Group E: Evidence of noncarcinogenicity for humans (no evidence of carcinogenicity in adequate studies).
[d] The B2 cancer classification recommended by IARC has not been adopted by the USEPA.
[e] CSF for high persistence polychlorinated biphenyls per communication with CalEPA.
[f] Carcinogenic only via inhalation (Class D for oral exposure; Class B1 for inhalation exposure).
[g] Carcinogenic only via inhalation (Class D for oral exposure; Class A for inhalation exposure).
[h] The effect of exposure to lead is assessed by estimating blood lead levels.

References [ref]:

A Agency for Toxic Substances Disease Registry (ATDSR) as referenced in USEPA Regional Screening Table (USEPA, 2008).
CA CalEPA, Toxicity Criteria database (CalEPA, 2009).
H USEPA, Heal h Effects Summary Table (HEAST; USEPA, 1997).
I USEPA, Integrated Risk Information System (IRIS; USEPA, 2009).
P Provisional Peer Reviewd Toxocity Values (PPRTV) by the Na ional Center for Environmental Assessment (NCEA) as referenced in USEPA (USEPA, 2008).
W World Heal h Organization, as referenced in USEPA Regional Screening Table (USEPA, 2008).

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Table 6-23
Carcinogenic Toxicity Values for Inhalation Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Inhalation Unit Risk Factor (URF) [a] $(mg/m^3)^{-1}$	[ref]	Tumor Site	Weight of Evidence Classification [b]
Volatile Organic Compounds (VOCs)				
1,1,1,2-Tetrachloroethane	7.4E-03	I	liver	C
1,1,1-Trichloroethane	NA		–	D
1,1,2,2-Tetrachloroethane	5.8E-02	CA	liver	C
1,1,2-Trichloroethane	1.6E-02	CA	liver	C
1,1-Dichloroethane	1.6E-03	CA	NA	C
1,1-Dichloroethene	NA		–	C
1,2,3-Trichlorobenzene	NA		–	NA
1,2,3-Trichloropropane	NA		–	B2
1,2,4-Trichlorobenzene	NA		–	D
1,2-Dichlorobenzene	NA		–	D
1,2-Dichloroethane	2.1E-02	CA	circulatory system	B2
1,2-Dichloropropane	1.0E-02	CA	NA	B2
1,3,5-Trimethylbenzene	NA		–	NA
1,4-Dichlorobenzene	1.1E-02	CA	NA	C
2-Chlorotoluene	NA		–	NA
2-Hexanone	NA		–	NA
4-Chlorotoluene	NA		–	NA
4-Methyl-2-Pentanone	NA		–	NA
Acetone	NA		–	D
Acetonitrile	NA		–	D
Benzene	2.9E-02	CA	leukemia	A
Bromobenzene	NA		–	NA
Bromodichloromethane	3.7E-02	CA	–	B2
Bromoform	1.1E-03	I	intestine	B2
c-1,2-Dichloroethene	NA		–	D
Carbon Disulfide	NA		–	NA
Chloroethane	NA		–	C
Chloroform	5.3E-03	CA	liver	B2
Chloromethane	1.8E-03	H	NA	C
Diisopropyl Ether (DIPE)	NA		–	NA
Ethanol	NA		–	NA
Ethylbenzene	2.5E-03	CA	–	D
Iodomethane	NA		–	D
Isopropylbenzene	NA		–	D
Methylene Chloride	1.0E-03	CA	lung, liver	B2
Methyl-t-Butyl Ether (MTBE)	2.6E-04	CA	–	NA
n-Butylbenzene	NA		–	NA
n-Propylbenzene	NA		–	NA
o-Xylene	NA		–	D
p/m-Xylene	NA		–	D
p-Isopropyltoluene	NA		–	NA
sec-Butylbenzene	NA		–	NA
Styrene [c]	NA		–	B2
t-1,2-Dichloroethene	NA		–	NA
Tert-Butyl Alcohol (TBA)	NA		–	NA
tert-Butylbenzene	NA		–	NA
Tetrachloroethene	5.9E-03	CA	liver, kidney	B2
Toluene	NA		–	D
Trichloroethene	2.0E-03	CA	lung	C-B2
Vinyl Acetate	NA		–	NA
Vinyl Chloride	7.8E-02	CA	liver	A
Xylenes, total	NA		–	D

Table 6-23
Carcinogenic Toxicity Values for Inhalation Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent		Inhalation Unit Risk Factor (URF) [a] $(mg/m^3)^{-1}$	[ref]	Tumor Site	Weight of Evidence Classification [b]
Semivolatile Organic Compounds (SVOCs)					
1,4-Dioxane		7.7E-03	CA	–	B2
1-Methylnaphthalene		NA		–	NA
2-Methylnaphthalene		NA		–	NA
Acenaphthene		NA		–	NA
Acenaphthylene		NA		–	D
Anthracene		NA		–	D
Benzo(a)anthracene		1.1E-01	CA	respiratory	B2
Benzo(a)pyrene		1.1E+00	CA	respiratory	B2
Benzo(b)fluoranthene		1.1E-01	CA	respiratory	B2
Benzo(ghi)perylene		NA		–	D
Benzo(k)fluoranthene		1.1E-01	CA	respiratory	B2
Chrysene		1.1E-02	CA	respiratory	B2
Dibenzo(a,h)anthracene		1.2E+00	CA	respiratory	B2
Fluoranthene		NA		–	D
Fluorene		NA		–	D
Indeno(1,2,3-cd)pyrene		1.1E-01	CA	respiratory	B2
Naphthalene		3.4E-02	CA	respiratory	C
Phenanthrene		NA		–	D
Pyrene		NA		–	D
Pesticides and Herbicides					
4,4-DDD		6.9E-02	CA	–	B2
4,4-DDE		9.7E-02	CA	–	B2
4,4-DDT		9.7E-02	CA	liver	B2
Aldrin		4.9E+00	CA	liver	B2
Chlordane		3.4E-01	CA	liver	B2
Dieldrin		4.6E+00	CA	liver	B2
Polychlorinated Biphenyls (PCBs)					
PCB-1254	[d]	5.7E-01	I	liver	B2
PCB-1260	[d]	5.7E-01	I	liver	B2
Inorganic Compounds					
Antimony		NA		–	NA
Arsenic		3.3E+00	CA	lung	A
Barium		NA		–	D
Beryllium		2.4E+00	CA	lung	B1
Cadmium	[e]	4.2E+00	CA	respiratory	D/B1
Chromium		NA		–	NA
Chromium, Hexavalent	[f]	1.5E+02	CA	lung	D/A
Cobalt		9.0E+00	P	lung	NA
Copper		NA		–	D
Iron		NA		–	NA
Lead	[g]	1.2E-02		–	B2
Mercury		NA		–	C
Methane		NA		–	NA
Molybdenum		NA		–	NA
Nickel		2.6E-01	CA	–	NA
Selenium		NA		–	D
Silver		NA		–	D

Table 6-23
Carcinogenic Toxicity Values for Inhalation Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Inhalation Unit Risk Factor (URF) [a] $(mg/m^3)^{-1}$ [ref]	Tumor Site	Weight of Evidence Classification [b]
Thallium	NA	–	NA
Vanadium	NA	–	NA
Zinc	NA	–	D

Notes

– = not applicable
IARC = International Agency for Research on Cancer
$(mg/m^3)^{-1}$ = inverse milligrams per kilogram per day (risk per unit dose)
NA = not available

[a] Toxicity values were obtained from sources referenced above in the following order of priority: CA, *I, P, H, A, W.*
[b] USEPA cancer weight-of-evidence categories are as follows:
Group A: Human carcinogen (sufficient evidence of carcinogenicity in humans).
Group B: Probable human carcinogen.
B1 - Limited evidence of carcinogenicity in humans.
B2 - Sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans.
Group C: Possible human carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data).
Group D: Not classifiable as to human carcinogenicity (inadequate or no evidence).
Group E: Evidence of noncarcinogenicity for humans (no evidence of carcinogenicity in adequate studies).
[c] The B2 cancer classification recommended by IARC has not been adopted by the USEPA.
[d] Toxicity data for Aroclor mixture; values are for soil/water exposure. The oral slope factor is not adjusted to assess dermal exposure.

[e] Carcinogenic only via inhalation (Class D for oral exposure; Class B1 for inhalation exposure).
[f] Carcinogenic only via inhalation (Class D for oral exposure; Class A for inhalation exposure).
[g] The effect of exposure to lead is assessed by estimating blood lead levels.

References [ref]:

A = Agency for Toxic Substances Disease Registry (ATDSR) as referenced in USEPA Regional Screening Table (USEPA, 2008).
CA = CalEPA, Toxicity Criteria database (CalEPA, 2009).
H = USEPA, Health Effects Summary Table (HEAST; USEPA, 1997).
I = USEPA, Integrated Risk Information System (IRIS; USEPA 2009).
P = Provisional Peer Reviewd Toxocity Values (PPRTV) by the National Center for Environmental Assessment (NCEA) as referenced in USEPA (USPEA, 2008).
W = World Health Organization, as referenced in USEPA Regional Screening Table (USEPA, 2008).

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USEPA. 2006. *On the Computation of the 95% Upper Confidence Limit of the Unknown Population Mean Based Upon Data Sets with Below Detection Limit Observations.* EPA/600/R-06/22. U.S. Environmental Protection Agency, Office of Research and Development.

USEPA. 2008. Oak Ridge National Laboratory (ORNL). Regional Screening Levels (RSLs). Available at: http://epa-prgs.ornl.gov/chemicals/faq.shtml.

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Table 6-24
Noncarcinogenic Toxicity Values for Oral and Dermal Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Oral RfD (mg/kg/day) [a] Subchronic	[ref]	Chronic	[ref]	Adjustment Factor [a]	Dermal RfD (mg/kg/day) [a,b] Subchronic	Chronic	Target Site/ Critical Effect	Confidence Level/ Uncertainty Factor
Volatile Organic Compounds (VOCs)									
1,1,1,2-Tetrachloroethane	3.0E-02	H	3.0E-02	I	1	3.0E-02	3.0E-02	liver, kidney	low/3000
1,1,1-Trichloroethane	2.0E+00	c	2.0E+00	I	1	2.0E+00	2.0E+00	NA	NA
1,1,2,2-Tetrachloroethane	4.0E-03	c	4.0E-03	P	1	4.0E-03	4.0E-03	respiratory	NA
1,1,2-Trichloroethane	4.0E-02	H	4.0E-03	I	1	4.0E-02	4.0E-03	blood	medium/1000
1,1-Dichloroethane	2.0E+00	cx	2.0E-01	P	1	2.0E+00	2.0E-01	NR	NA/1000
1,1-Dichloroethene	5.0E-02	c	5.0E-02	I	1	5.0E-02	5.0E-02	liver	medium/100
1,2,3-Trichlorobenzene	NA		NA		1	NA	NA	–	NA
1,2,3-Trichloropropane	6.0E-02	H	6.0E-03	I	1	6.0E-02	6.0E-03	WB, liver, kidney, blood	low/1000
1,2,4-Trichlorobenzene	1.0E-02	H	1.0E-02	I	1	1.0E-02	1.0E-02	adrenal, brain	low/1000
1,2,4-Trimethylbenzene	NA		NA		1	NA	NA	–	NA
1,2-Dichlorobenzene	9.0E-01	Hw	9.0E-02	I	1	9.0E-01	9.0E-02	NR (liver)	low/1000
1,2-Dichloroethane	2.0E-02	c	2.0E-02	P	1	2.0E-02	2.0E-02	kidney	high/1000
1,2-Dichloropropane	NA		NA		1	NA	NA	–	NA
1,3,5-Trimethylbenzene	5.0E-02	c	5.0E-02	P	1	5.0E-02	5.0E-02	NA	NA
1,4-Dichlorobenzene	NA		NA		1	NA	NA	–	NA
2-Butanone	2.0E+00	H	6.0E-01	I	1	2.0E+00	6.0E-01	fetus	low/3000
2-Chlorotoluene	2.0E-01	H	2.0E-02	I	1	2.0E-01	2.0E-02	WB	low/1000
2-Hexanone	NA		NA		1	NA	NA	–	NA
4-Chlorotoluene	7.0E-02	c	7.0E-02	P	1	7.0E-02	7.0E-02	NA	NA
4-Methyl-2-Pentanone	8.0E-02	c	8.0E-02	H	1	8.0E-02	8.0E-02	liver, kidney	NA
Acetone	2.7E+00	cx	9.0E-01	I	1	2.7E+00	9.0E-01	liver, kidney	medium/1000
Acetonitrile	NA		NA		1	NA	NA	–	NA
Benzene [c]	1.2E-02	cx	4.0E-03	I	1	1.2E-02	4.0E-03	blood	medium/300
Bromobenzene	2.0E-02	c	2.0E-02	P	1	2.0E-02	2.0E-02	NA	NA
Bromodichloromethane	2.0E-02	H	2.0E-02	I	1	2.0E-02	2.0E-02	kidney	medium/1000
Bromoform	2.0E-01	H	2.0E-02	I	1	2.0E-01	2.0E-02	liver	medium/1000
c-1,2-Dichloroethene	1.0E-01	H	1.0E-02	P	1	1.0E-01	1.0E-02	blood	low/3000
Carbon Disulfide	1.0E-01	H	1.0E-01	I	1	1.0E-01	1.0E-01	fetus	medium/100
Chloroethane	NA		NA		1	NA	NA	–	NA
Chloroform	1.0E-02	H	1.0E-02	I	1	1.0E-02	1.0E-02	liver	medium/1000
Chloromethane	NA		NA		1	NA	NA	–	NA
Diisopropyl Ether (DIPE)	NA		NA		1	NA	NA	–	NA
Ethanol	NA		NA		1	NA	NA	–	NA
Ethylbenzene	1.0E+00	cx	1.0E-01	I	1	1.0E+00	1.0E-01	liver, kidney	low/1000
Iodomethane	NA		NA		1	NA	NA	NA	NA
Isopropylbenzene	4.0E-01	H	1.0E-01	I	1	4.0E-01	1.0E-01	kidney	low/1000
Methylene Chloride	6.0E-02	H	6.0E-02	I	1	6.0E-02	6.0E-02	liver	medium/100
Methyl-t-Butyl Ether (MTBE)	NA		NA		1	NA	NA	–	NA
n-Butylbenzene	NA		NA		1	NA	NA	NA	NA
n-Propylbenzene	NA		NA		1	NA	NA	NA	NA
o-Xylene	2.0E+00	c	2.0E+00	H	1	2.0E+00	2.0E+00	CNS, WB	medium/100
p/m-Xylene [d]	2.0E-01	cs	2.0E-01	Is	1	2.0E-01	2.0E-01	CNS, WB	medium/100
p-Isopropyltoluene	NA		NA		1	NA	NA	–	NA
sec-Butylbenzene	NA		NA		1	NA	NA	NA	NA
Styrene	2.0E+00	cx	2.0E-01	I	1	2.0E+00	2.0E-01	liver, RBCs	medium/1000
t-1,2-Dichloroethene	2.0E-01	H	2.0E-02	I	1	2.0E-01	2.0E-02	blood	low/1000
Tert-Butyl Alcohol (TBA)	NA		NA		1	NA	NA	NA	NA
tert-Butylbenzene	NA		NA		1	NA	NA	NA	NA
Tetrachloroethene	1.0E-01	H	1.0E-02	I	1	1.0E-01	1.0E-02	liver	medium/1000
Toluene	8.0E-01	cx	8.0E-02	I	1	8.0E-01	8.0E-02	liver, kidney	medium/3000
Trichloroethene	NA		NA		1	NA	NA	–	NA
Vinyl Acetate	1.0E+00	H	1.0E+00	H	1	1.0E+00	1.0E+00	NR	NA/100
Vinyl Chloride	3.0E-03	c	3.0E-03	I	1	3.0E-03	3.0E-03	liver	medium/30
Xylenes, total	2.0E-01	c	2.0E-01	I	1	2.0E-01	2.0E-01	CNS, WB	medium/100
Semivolatile Organic Compounds (SVOCs)									
1,4-Dioxane	NA		NA		1	NA	NA	–	NA
1-Methylnaphthalene	NA		NA		1	NA	NA	–	NA
2-Methylnaphthalene	4.0E-03	c	4.0E-03	I	1	4.0E-03	4.0E-03	lungs	low/1000
Acenaphthene	6.0E-01	H	6.0E-02	I	1	6.0E-01	6.0E-02	liver	low/3000
Acenaphthylene	NA		NA		1	NA	NA	NA	NA
Anthracene	3.0E+00	H	3.0E-01	I	1	3.0E+00	3.0E-01	NR	low/3000
Benzo(a)anthracene	NA		NA		1	NA	NA	–	NA
Benzo(a)pyrene	NA		NA		1	NA	NA	–	NA
Benzo(b)fluoranthene	NA		NA		1	NA	NA	–	NA
Benzo(ghi)perylene	NA		NA		1	NA	NA	NA	NA
Benzo(k)fluoranthene	NA		NA		1	NA	NA	–	NA
Chrysene	NA		NA		1	NA	NA	–	NA
Dibenzo(a,h)anthracene	NA		NA		1	NA	NA	–	NA
Fluoranthene	4.0E-01	H	4.0E-02	I	1	4.0E-01	4.0E-02	liver, kidney, blood	low/3000
Fluorene	4.0E-01	H	4.0E-02	I	1	4.0E-01	4.0E-02	RBCs	low/3000
Indeno(1,2,3-cd)pyrene	NA		NA		1	NA	NA	–	NA
Naphthalene	2.0E-01	cx	2.0E-02	I	1	2.0E-01	2.0E-02	WB	low/3000
Phenanthrene	NA		NA		1	NA	NA	NA	NA
Pyrene	3.0E-01	H	3.0E-02	I	1	3.0E-01	3.0E-02	kidney	low/3000

Table 6-24
Noncarcinogenic Toxicity Values for Oral and Dermal Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Oral RfD (mg/kg/day) [a] Subchronic	[ref]	Chronic	[ref]	Adjustment Factor [a]	Dermal RfD (mg/kg/day) [a,b] Subchronic	Chronic	Target Site/ Critical Effect	Confidence Level/ Uncertainty Factor
Pesticides and Herbicides									
4,4-DDD	NA		NA		1	NA	NA	–	NA
4,4-DDE	NA		NA		1	NA	NA	–	NA
4,4-DDT	5.0E-04	H	5.0E-04	I	1	5.0E-04	5.0E-04	liver	medium/100
Aldrin	3.0E-05	H	3.0E-05	I	1	3.0E-05	3.0E-05	liver	medium/1000
Chlordane	5.0E-04	c	5.0E-04	I	1	5.0E-04	5.0E-04	liver	medium/300
Dieldrin	5.0E-05	H	5.0E-05	I	1	5.0E-05	5.0E-05	liver	medium/100
Polychlorinated Biphenyls (PCBs)									
PCB-1254	5.0E-05	H	2.0E-05	I	1	5.0E-05	2.0E-05	eye, nails, immune system	medium/300
PCB-1260	NA		NA		1	NA	NA	–	NA
Inorganic Compounds									
Antimony	4.0E-04	H	4.0E-04	I	0.15	6.0E-05	6.0E-05	WB, blood	low/1000
Arsenic	3.0E-04	c	3.0E-04	I	1	3.0E-04	3.0E-04	skin, vascular	medium/3
Barium	2.0E-01	c	2.0E-01	I	0.07	1.4E-02	1.4E-02	kidney	medium/300
Beryllium	5.0E-03	H	2.0E-03	I	0.007	3.5E-05	1.4E-05	intestine	low-medium/300
Cadmium [e]	5E-04 / 1E-03	c	5E-04 / 1E-03	I	0.025	1.3E-05/ 2.5E-05	1.3E-05/ 2.5E-05	kidney	high/10
Cadmium	1.0E-03	c	1.0E-03	I	0.025	2.5E-05	2.5E-05	kidney	high/10
Cadmium	5.0E-04	c	5.0E-04	I	0.025	1.3E-05	1.3E-05	kidney	high/10
Chromium [f]	1.5E+00	c	1.5E+00	I	0.013	2.0E-02	2.0E-02	NR	low/100
Chromium, Hexavalent	2.0E-02	H	3.0E-03	I	1	2.0E-02	3.0E-03	NR	low/300
Cobalt	3.0E-04	c	3.0E-04	P	1	3.0E-04	3.0E-04	skin	NA
Copper	4.0E-02	c	4.0E-02	H	1	4.0E-02	4.0E-02	GI	NA
Iron	7.0E-01	c	7.0E-01	P	1	7.0E-01	7.0E-01	blood, liver, GI	NA
Lead	NA		NA		1	NA	NA	–	NA
Mercury [g]	3.0E-04	c	3.0E-04	I	1	3.0E-04	3.0E-04	Autoimmune effects	NA
Methane	NA		NA		1	NA	NA	–	NA
Molybdenum	5.0E-03	H	5.0E-03	I	1	5.0E-03	5.0E-03	urine, joints, blood	medium/30
Nickel	2.0E-02	H	2.0E-02	I	0.04	8.0E-04	8.0E-04	WB	medium/300
Selenium	5.0E-03	H	5.0E-03	I	1	5.0E-03	5.0E-03	WB	high/3
Silver	5.0E-03	H	5.0E-03	I	0.04	2.0E-04	2.0E-04	skin	low/3
Thallium [h]	8.0E-04	Hs	6.5E-05	I	1	8.0E-04	6.5E-05	liver, blood, hair	low/3000
Vanadium	7.0E-03	H	7.0E-03	H	0.026	1.8E-04	1.8E-04	liver	low/100
Zinc	3.0E-01	H	3.0E-01	I	1	3.0E-01	3.0E-01	blood	medium/3

Notes:

c = The chronic value is used if available.
CNS = Central nervous system.
GI = Gastrointestinal tract.
mg/kg/day = Milligrams per kilogram per day.
NA = Not available.
NR = None reported.
RBCs Red blood cells.
RfD Reference Dose.
s Value is based on use of a surrogate compound, as indicated.
WB Whole body (includes increased mortality and changes to body weight).
x The uncertainty factor for subchronic to chronic extrapolation was removed.

[a] Toxicity values were obtained from sources referenced above in the following order of priority: CA, *I, P, C, H, A, W.*
[b] The oral-to-dermal adjustment factor (oral absorption efficiency) as used to calculate the dermal RfD values, USEPA 2004.
RfD (dermal) = RfD (oral) × Adjustment Factor (oral absorption efficiency).
[c] An uncertainty factor of 3 was applied to the subchronic toxicity value for benzene, as referenced in IRIS (USEPA 2009).
[d] Xylene mixture used as a surrogate.
[e] RfDs for exposure via water/food consumption. The RfD for food is used to assess soil exposure.
[f] Toxicity values for chromium III were used.
[g] Toxicity values for mercuric chloride were used.
[h] The oral RfD for thallium is derived from the oral RfD for thallium sulfate by factoring out the molecular weight of the sulfate ion. Thallium sulfate has a molecular weight of 504.82. The two atoms of thallium contribute 81% of the molecular weight. Thallium sulfate's oral RfD of 8E-05 multiplied by 81% gives a Thallium oral RfD of 6.5E-05.

References [ref]:

A Agency for Toxic Substances Disease Registry (ATDSR) as referenced in USEPA Regional Screening Table (USEPA, 2008).
CA CalEPA, Toxicity Criteria database (CalEPA, 2009).
H USEPA, Health Effects Summary Table (HEAST; USEPA, 1997).
I USEPA, Integrated Risk Information System (IRIS; USEPA, 2009).
P Provisional Peer Reviewed Toxicity Values (PPRTV) by the National Center for Environmental Assessment (NCEA) as referenced in Regional Screening Table (USEPA, 2008).
RAIS Oak Ridge National Laboratory (ORNL), Risk Assessment Information System (RAIS; ORNL 2009).
W World Health Organization, as referenced in USEPA Regional Screening Table (USEPA, 2008).

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Table 6-25
Noncarcinogenic Toxicity Values for Inhalation Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Inhalation RfC (mg/m^3) [a] Subchronic [ref]		Chronic [ref]		Target Site/ Critical Effect	Confidence Level/ Uncertainty Factor
Volatile Organic Compounds (VOCs)						
1,1,1,2-Tetrachloroethane	NA		NA		–	NA
1,1,1-Trichloroethane	1.0E+00	c	1.0E+00	CA(REL)	NA	NA
1,1,2,2-Tetrachloroethane	NA		NA		–	NA
1,1,2-Trichloroethane	NA		NA		–	NA
1,1-Dichloroethane	NA		NA		–	NA
1,1-Dichloroethene	7.0E-02	c	7.0E-02	CA(REL)	liver	NA
1,2,3-Trichlorobenzene	NA		NA		–	NA
1,2,3-Trichloropropane	NA		NA		–	NA
1,2,4-Trichlorobenzene	2.0E+00	H	4.0E-03	P	liver	NA/1000
1,2,4-Trimethy benzene	7.0E-03	c	7.0E-03	P	NA	NA
1,2-Dichlorobenzene	2.0E+00	H	2.0E-01	H	WB	NA/1000
1,2-Dichloroethane	4.0E-01	c	4.0E-01	CA(REL)	liver	NA
1,2-Dichloropropane	1.3E-02	H	4.0E-03	I	nasal	medium/300
1,3,5-Trimethy benzene	6.0E-03	c	6.0E-03	P	NA	NA
1,4-Dichlorobenzene	8.0E-01	c	8.0E-01	CA(REL)	liver	NA
2-Butanone	5.0E+00	c	5.0E+00	I	developmental	medium/300
2-Chlorotoluene	NA		NA		–	NA
2-Hexanone	NA		NA		–	NA
4-Chlorotoluene	NA		NA		–	NA
4-Methyl-2-Pentanone	3.0E+00	c	3.0E+00	I	fetus	low-med/300
Acetone	3.1E+01	c	3.1E+01	A	NA	NA
Acetonitrile	5.0E-01	H	6.0E-02	I	WB (mortality)	medium/1000
Benzene	6.0E-02	c	6.0E-02	CA(REL)	blood	NA
Bromobenzene	1.0E-02	c	1.0E-02	P	NA	NA
Bromodichloromethane	NA		NA		–	NA
Bromoform	NA		NA		–	NA
c-1,2-Dichloroethene	NA		NA		–	NA
Carbon Disulfide	8.0E-01	c	8.0E-01	CA(REL)	PNS	NA
Chloroethane	3.0E+01	c	3.0E+01	CA(REL)	fetus	NA
Chloroform	3.0E-01	c	3.0E-01	CA(REL)	liver, kidney, CNS	NA
Chloromethane	9.0E-01	cx	9.0E-02	I	brain	medium/1000
Diisopropyl Ether (DIPE)	4.0E-01	c	4.0E-01	P	NA	NA
Ethanol	NA		NA		–	NA
Ethylbenzene	2.0E+00	c	2.0E+00	CA(REL)	developmental	NA
Iodomethane	NA		NA		NA	NA
Isopropylbenzene	4.0E-01	c	4.0E-01	I	kidney, adrenal	medium/1000
Methylene Chloride	4.0E-01	c	4.0E-01	CA(REL)	liver	NA
Methyl-t-Butyl Ether (MTBE)	8.0E+00	c	8.0E+00	CA(REL)	liver, kidney	NA
n-Butylbenzene	NA		NA		–	NA
n-Propylbenzene	NA		NA		–	NA
o-Xylene	7.0E-01	c	7.0E-01	CA(REL)	CNS	NA
p/m-Xylene [c]	3.0E-01	csx	1.0E-01	Is	CNS	medium/300
p-Isopropyltoluene	NA		NA		–	NA
sec-Butylbenzene	NA		NA		–	NA
Styrene	9.0E-01	c	9.0E-01	CA(REL)	CNS	NA
t-1,2-Dichloroethene	6.0E-02	c	6.0E-02	P	NA	NA
Tert-Butyl Alcohol (TBA)	NA		NA		–	NA
tert-Butylbenzene	NA		NA		–	NA
Tetrachloroethene	3.5E-02	c	3.5E-02	CA(REL)	NS	NA
Toluene	3.0E-01	c	3.0E-01	CA(REL)	CNS	NA
Trichloroethene	6.0E-01	c	6.0E-01	CA(REL)	–	NA
Vinyl Acetate	2.0E-01	c	2.0E-01	CA(REL)	nasal	NA
Vinyl Chloride	1.0E-01	c	1.0E-01	I	liver	medium/30
Xylenes, total	7.0E-01	c	7.0E-01	CA(REL)	CNS	NA

Table 6-25
Noncarcinogenic Toxicity Values for Inhalation Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Inhalation RfC (mg/m^3) [a]				Target Site/ Critical Effect	Confidence Level/ Uncertainty Factor
	Subchronic	[ref]	Chronic	[ref]		
Semivolatile Organic Compounds (SVOCs)						
1,4-Dioxane	3.0E+00	c	3.0E+00	CA(REL)	NA	NA
1-Methylnaphthalene	NA		NA		–	NA
2-Methylnaphthalene	NA		NA		–	NA
Acenaphthene	NA		NA		–	NA
Acenaphthylene	NA		NA		–	NA
Anthracene	NA		NA		–	NA
Benzo(a)anthracene	NA		NA		–	NA
Benzo(a)pyrene	NA		NA		–	NA
Benzo(b)fluoranthene	NA		NA		–	NA
Benzo(ghi)perylene	NA		NA		–	NA
Benzo(k)fluoranthene	NA		NA		–	NA
Chrysene	NA		NA		–	NA
Dibenzo(a,h)anthracene	NA		NA		–	NA
Fluoranthene	NA		NA		–	NA
Fluorene	NA		NA		–	NA
Indeno(1,2,3-cd)pyrene	NA		NA		–	NA
Naphthalene	9.0E-03	c	9.0E-03	CA(REL)	nasal	NA
Phenanthrene	NA		NA		–	NA
Pyrene	NA		NA		–	NA
Pesticides and Herbicides						
4,4-DDD	NA		NA		–	NA
4,4-DDE	NA		NA		–	NA
4,4-DDT	NA		NA		–	NA
Aldrin	NA		NA		–	NA
Chlordane	7.0E-03	cx	7.0E-04	I	liver	low/1000
Dieldrin	NA		NA		–	NA
Polychlorinated Biphenyls (PCBs)						
PCB-1254	NA		NA		–	NA
PCB-1260	NA		NA		–	NA
Inorganic Compounds						
Antimony	NA		NA		–	NA
Arsenic	1.5E-05	c	1.5E-05	CA(REL)	NA	NA
Barium	5.0E-03	H	5.0E-04	H	fetus	NA/1000
Beryllium	7.0E-06	c	7.0E-06	CA(REL)	lung	NA
Cadmium	2.0E-05	c	2.0E-05	CA(REL)	–	NA
Chromium	NA		NA		–	NA
Chromium, Hexavalent	2.0E-04	c	2.0E-04	CA(REL)	lung	NA
Cobalt	6.0E-06	c	6.0E-06	P	NA	NA
Copper	NA		NA		–	NA
Iron	NA		NA		–	NA
Lead	NA		NA		–	NA
Mercury	3.0E-05	c	3.0E-05	CA(REL)	–	NA
Methane	NA		NA		–	NA
Molybdenum	NA		NA		–	NA
Nickel	5.0E-05	c	5.0E-05	CA(REL)	–	NA
Selenium	2.0E-02	c	2.0E-02	CA(REL)	–	NA
Silver	NA		NA		–	NA
Thallium	NA		NA		–	NA

Table 6-25
Noncarcinogenic Toxicity Values for Inhalation Exposure

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Inhalation RfC (mg/m^3) [a]		Target Site/ Critical Effect	Confidence Level/ Uncertainty Factor
	Subchronic [ref]	Chronic [ref]		
Vanadium	NA	NA	–	NA
Zinc	NA	NA	–	NA

Notes:

– = Not applicable.
c = The chronic value is used if available.
CNS = Central nervous system.
mg/m^3 = Milligrams per cubic meter.
NA = Not available.
NR = None reported.
RfC = Reference Concentration.
NS = Nervous system.
s = Value is based on use of a surrogate compound, as indicated.
WB = Whole body (includes increased mortality and changes to body weight).
x = The uncertainty factor for subchronic to chronic extrapolation was removed.

[a] Toxicity values were obtained from sources referenced above in the following order of priority: CA, *I, P, C, H, A, W.*
[b] Xylene mixture used as a surrogate.

References [ref]:

A = Agency for Toxic Substances Disease Registry (ATDSR) as referenced in USEPA Regional Screening Table (USEPA, 2008).
CA = CalEPA, Toxicity Criteria database (CalEPA, 2009).
H = USEPA, Health Effects Summary Table (HEAST; USEPA, 1997).
I = USEPA, Integrated Risk Information System (IRIS; USEPA, 2009).
P = Provisional Peer Reviewd Toxocity Values (PPRTV) by the National Center for Environmental Assessment (NCEA) as referenced in USEPA Regional Screening Level Table (USEPA, 2008).
REL = Reference Exposure Level.
W = World Health Organization, as referenced in USEPA Regional Screening Table (USEPA, 2008).

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Table 6-26
Summary of Calculated Human Health Risks and Hazard Indices

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Excess Lifetime Cancer Risk and Total non-cancer Hazard Index [a, b]

RECEPTOR Exposure Medium - Scenario	Area 1				Area 2				Area 3				Area 4			
	All Constituents		All Constituents Except Arsenic		All Constituents		All Constituents Except Arsenic		All Constituents		All Constituents Except Arsenic		All Constituents		All Constituents Except Arsenic	
	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI
CURRENT																
Hypothetical Current Onsite Commercial/Industrial Worker Receptor																
Direct Contact with Soil (0-2 ft for areas 1 through 3 and 0-0 5 ft for area 4)	**2E-05**	0 05	**3E-06**	0.04	**3E-05**	0 2	**1E-05**	0.1	**3E-05**	0 2	**9E-06**	0 2	**2E-05**	0 2	**5E-06**	0.2
Inhalation of Vapors Indoors	7E-07	0.007	7E-07	0 007	2E-07	0.0005	2E-07	0.0005	2E-07	0 002	2E-07	0.002	**1E-06**	0 004	**1E-06**	0.004
Total	**2E-05**	0 06	**4E-06**	0.05	**3E-05**	0 2	**1E-05**	0.1	**3E-05**	0 2	**9E-06**	0 2	**2E-05**	0 2	**6E-06**	0.2
Hypothetical Current Offsite Child and Adult Resident Receptors																
Hypothetical Current Offsite Child Resident Receptor																
Airborne Particulate Inhalation (0-2 ft for areas 1 through 3 and 0-0.5 ft for area 4)	2E-08	0.002	2E-08	0 002	2E-08	0 007	1E-08	0 007	4E-08	0 003	3E-08	0.002	9E-09	0 003	8E-09	0.003
Hypothetical Current Offsite Adult Resident Receptor																
Airborne Particulate Inhalation (0-2 ft for areas 1 through 3 and 0-0.5 ft for area 4)	8E-08	0.002	7E-08	0 002	7E-08	0 007	6E-08	0 007	1E-07	0 003	1E-07	0.002	4E-08	0 003	3E-08	0.003
Total for Child/Adult [c]	1E-07	0.002	9E-08	0 002	8E-08	0 007	7E-08	0 007	2E-07	0 003	2E-07	0.002	5E-08	0 003	4E-08	0.003
FUTURE																
Hypothetical Future Onsite Construction Worker Receptor																
Direct Contact with Soil (0-10 ft)	**3E-06**	1	**1E-06**	0 9	**5E-06**	**2**	**2E-06**	**2**	**5E-06**	1	**2E-06**	1	**4E-06**	1	**1E-06**	1
Hypothetical Future Onsite Utility/Trench Worker Receptor																
Direct Contact with Soil (0-10 ft)	**2E-06**	0 09	6E-07	0.08	**3E-06**	0 2	9E-07	0 2	**3E-06**	0.1	**1E-06**	0.1	**2E-06**	0.1	6E-07	0.1
Hypothetical Future Onsite Commercial/Industrial Worker Receptor																
Direct Contact with Soil (0-10 ft)	**1E-05**	0.1	**2E-06**	0.1	**3E-05**	0 3	**9E-06**	0 2	**2E-05**	0 2	**7E-06**	0 2	**2E-05**	0 2	**3E-06**	0.2
Inhalation of Vapors Indoors	7E-07	0.007	7E-07	0 007	2E-07	0.0005	2E-07	0.0005	2E-07	0 002	2E-07	0.002	**1E-06**	0 004	**1E-06**	0.004
Total	**1E-05**	0.1	**3E-06**	0.1	**3E-05**	0 3	**9E-06**	0 2	**2E-05**	0 2	**8E-06**	0 2	**2E-05**	0 2	**4E-06**	0.2
Hypothetical Future Onsite Child and Adult Resident Receptors																
Hypothetical Future Onsite Child Resident Receptor																
Direct Contact with Soil (0-10 ft)	**3E-05**	0.9	**4E-06**	0.7	**6E-05**	**2**	**1E-05**	**2**	**5E-05**	**2**	**2E-05**	**2**	**4E-05**	**2**	**5E-06**	**2**
Direct Contact with Groundwater	**1E-03**	**10**	**1E-03**	**10**	**1E-03**	**10**	**1E-03**	**10**	**1E-03**	**10**	**1E-03**	**10**	**1E-03**	**10**	**1E-03**	**10**
Inhalation of Vapors Indoors	**1E-06**	0 01	**1E-06**	0.01	3E-07	0.0007	3E-07	0.0007	4E-07	0 003	4E-07	0.003	**2E-06**	0 006	**2E-06**	0.006
Total	**1E-03**	**11**	**1E-03**	**11**	**1E-03**	**12**	**1E-03**	**12**	**1E-03**	**12**	**1E-03**	**12**	**1E-03**	**12**	**1E-03**	**12**
Hypothetical Future Onsite Adult Resident Receptor																
Direct Contact with Soil (0-10 ft)	**2E-05**	0.3	**5E-06**	0 3	**4E-05**	0.4	**2E-05**	0.4	**3E-05**	0 3	**1E-05**	0 3	**2E-05**	0.4	**8E-06**	0.4
Direct Contact with Groundwater	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**
Inhalation of Vapors Indoors	**1E-06**	0 01	**1E-06**	0.01	3E-07	0.0007	3E-07	0.0007	4E-07	0 003	4E-07	0.003	**2E-06**	0 006	**2E-06**	0.006
Total	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**	**2E-03**	**4**
Total for Child/Adult [c]	**3E-03**	**11**	**3E-03**	**11**	**3E-03**	**12**	**3E-03**	**12**	**3E-03**	**12**	**3E-03**	**12**	**3E-03**	**12**	**3E-03**	**12**

Table 6-26
Summary of Calculated Human Health Risks and Hazard Indices

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Excess Lifetime Cancer Risk and Total non-cancer Hazard Index [a, b]

RECEPTOR / Exposure Medium - Scenario	Area 1				Area 2				Area 3				Area 4			
	All Constituents		All Constituents Except Arsenic		All Constituents		All Constituents Except Arsenic		All Constituents		All Constituents Except Arsenic		All Constituents		All Constituents Except Arsenic	
	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI
Hypothetical Future Offsite Child and Adult Resident Receptors																
Hypothetical Future Offsite Child Resident Receptor																
Airborne Particulate Inhalation (0-10 ft)	2E-08	0.003	2E-08	0 002	2E-08	0 006	2E-08	0 006	2E-08	0 003	2E-08	0.003	2E-08	0 003	2E-08	0.003
Hypothetical Future Offsite Adult Resident Receptor																
Airborne Particulate Inhalation (0-10 ft)	6E-08	0.003	6E-08	0 002	7E-08	0 006	6E-08	0 006	8E-08	0 003	8E-08	0.003	7E-08	0 003	6E-08	0.003
Total for Child/Adult [c]	8E-08	0.003	8E-08	0 002	9E-08	0 006	8E-08	0 006	1E-07	0 003	1E-07	0.003	8E-08	0 003	8E-08	0.003

Notes

ELCR = Excess Lifetime Cancer Risk.
HI = hazard index
PAHs = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls

[a] Cancer risk estimates exceeding $1x10^{-6}$ and 1×10^{-5} for residential and commercial receptors respectively and non-cancer hazard estimates exceeding one are in bold.
[b] For HIs exceeding 1, target organ HIs were calculated.
[c] Consistent with USEPA (1989) risk assessment guidelines, the "total HI" for the resident reflects the higher of the child and the adult HI. The two HIs are not summed together.

References

USEPA. 1989. Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part A). U.S. Environmental Protection Agency.

Table 6-27
Summary of Estimated Blood Lead Levels

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Receptor	Soil Interval	Model Used	95th Percentile Blood Lead Level [a] (µg/dl)							
			Area 1		Area 2		Area 3		Area 4	
			Receptor	Fetus	Receptor	Fetus	Receptor	Fetus	Receptor	Fetus
Reasonable Maximum Exposure (RME) Scenario										
Current Exposure Scenario [b]										
Hypothetical Current Onsite Commercial/Industrial Worker Receptor	0-2	USEPA ALM [c]	2 0	7.1	1.9	6.7	2.7	9.5	2.1	7.3
Hypothetical Current Off-Site Resident Receptor										
Hypothetical Current Off-Site Child Resident Receptor	0-2	DTSC LEADSPREAD [d]	3 2	–	3.2	–	3.2	–	3.2	–
Hypothetical Current Off-Site Adult Resident Receptor	0-2	DTSC LEADSPREAD [d]	2.4	–	2.4	–	2.4	–	2.4	–
Future Exposure Scenario										
Hypothetical Future Onsite Construction Worker Receptor	0-10	USEPA ALM [c]	2.1	7 5	2.0	7.0	3.0	10.6	2.2	7.7
Hypothetical Future Onsite Utility/Trench Worker Receptor	0-10	USEPA ALM [c]	1.7	6 2	1.7	6.1	1.8	6.4	1.7	6 2
Hypothetical Future Onsite Commercial/Industrial Worker Receptor	0-10	USEPA ALM [c]	1 9	6 8	1.8	6.5	2.4	8 3	1.9	6 8
Hypothetical Future Offsite Resident Receptor										
Hypothetical Future Offsite Child Resident Receptor	0-10	DTSC LEADSPREAD [d]	3 2	–	3.2	–	3.2	–	3.2	–
Hypothetical Future Offsite Adult Resident Receptor	0-10	DTSC LEADSPREAD [d]	2.4	–	2.4	–	2.4	–	2.4	–
Hypothetical Future Onsite Resident Receptor										
Hypothetical Future Onsite Child Resident Receptor	0-10	DTSC LEADSPREAD [d]	5 0	–	4.4	–	8.7	–	5.2	–
Hypothetical Future Onsite Adult Resident Receptor	0-10	DTSC LEADSPREAD [d]	3.1	–	2.9	–	4.8	–	3.2	–

Notes

– : not applicable
µg/dl : microgram(s) per deciliter

[a] The reported blood-lead levels for all adult worker receptors reflect the geometric mean. All other values reported for the child resident, the adult resident, and the fetus represent the 95th percentile estimated blood lead lev
[b] Current exposure evaluation using 0-2 ft soil column for Areas 1,2, and 3. 0-0.5 ft soil column used to evaluate Area 4. As noted in the main tex
[c] USEPA ALM: USEPA Adult Lead Methodology Spreadsheet
USEPA Technical Review Workgroup for Lead, Adult Lead Committee (USEPA, 2003)
Model Run Outputs are presented in Appendix H
[d] CalEPA model: Lead Risk Assessment Spreadsheet - Version 7 (CalEPA, 1999)
Compare to a target blood lead level of 10 ug/dl
Model Run Outputs are presented in Appendix H

References

USEPA 2003. Recommendations of the Technical Review of Workgroup for Lead for an Approach to Assessing Risk Associated with Adult Exposures to Lead in Soil.

DTSC 1999. LEADSPREAD Version 7. http://www.dtsc ca.gov/AssessingRisk/leadspread cfm.

Table 8-1
Site-Specific Cleanup Goals for Soil COPCs with an ELCR Exceeding 1 x 10^{-6} or an HI Greater Than 1
For the Hypothetical Current Onsite Commercial Industrial Worker and the Future Onsite Resident Receptor

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Hypothetical Human Receptor	EPCs (mg/kg)	Source of EPC	Site ELCR	Site HI	TR	THI	SSCGs [a]		California and USEPA Health-Based Criteria	
							Cancer SSCG [b]	Noncancer SSCG [c]	CHHSLs	RSLs
Current Onsite Commercial/Industrial										
Benzene	11.7	Area 2	1.1E-05	1.8E-02	1E-06	1	1.1E+00	6.5E+02	NA	5.6E+00
B(a)P	0.31	Area 1	1.8E-06	NT	1E-06	1	1.8E-01	NT	1.3E-01	2.1E-01
PCB-1254	1.90	Area 3	1.9E-06	1.3E-01	1E-06	1	1.0E+00	1.4E+01	3.0E-01 [d]	7.4E-01
Future Onsite Child/Adult Resident [e]										
1,2,3-Trichloropropane	0.55	Area 3	3.0E-06	6.3E-05	1E-06	1	1.8E-01	8.8E+03	NA	9.1E-02
1,2-Dichloropropane	2.00	Area 4	2.4E-06	1.4E-01	1E-06	1	8.4E-01	1.5E+01	NA	9.3E-01
Benzene	0.47	Area 1	2.1E-06	3.6E-03	1E-06	1	2.2E-01	1.3E+02	NA	1.1E+00
B(a)P	0.14	Area 1	2.5E-06	NT	1E-06	1	5.8E-02	NT	3.8E-02	1.5E-02
Aldrin	0.18	Area 3	3.9E-06	6.0E-02	1E-06	1	4.6E-02	3.0E+00	3.3E-02	2.9E-02
Chlordane	1.50	Area 3	1.9E-06	2.3E-02	1E-06	1	7.8E-01	6.4E+01	4.3E-01	1.6E+00
PCB-1254	2.24	Area 2	6.6E-06	1.3E+00	1E-06	1	3.4E-01	1.8E+00	8.9E-02	2.2E-01

Notes:

B(a)P = benzo(a)pyrene
CHHLs = California Human Health Screening Levels
EPC = exposure point concentration
mg/kg = milligram(s) per kilogram
ELCR = excess lifetime cancer risk
HI = hazard index
NT = No toxicity value available to estimate an HI or SSCG
NA = not available
PCB = polychlorinated biphenyl compound
SSCG = site-specific cleanup goal
TR = target cancer risk
THI = target hazard index
RSLs = Regional Screening Levels

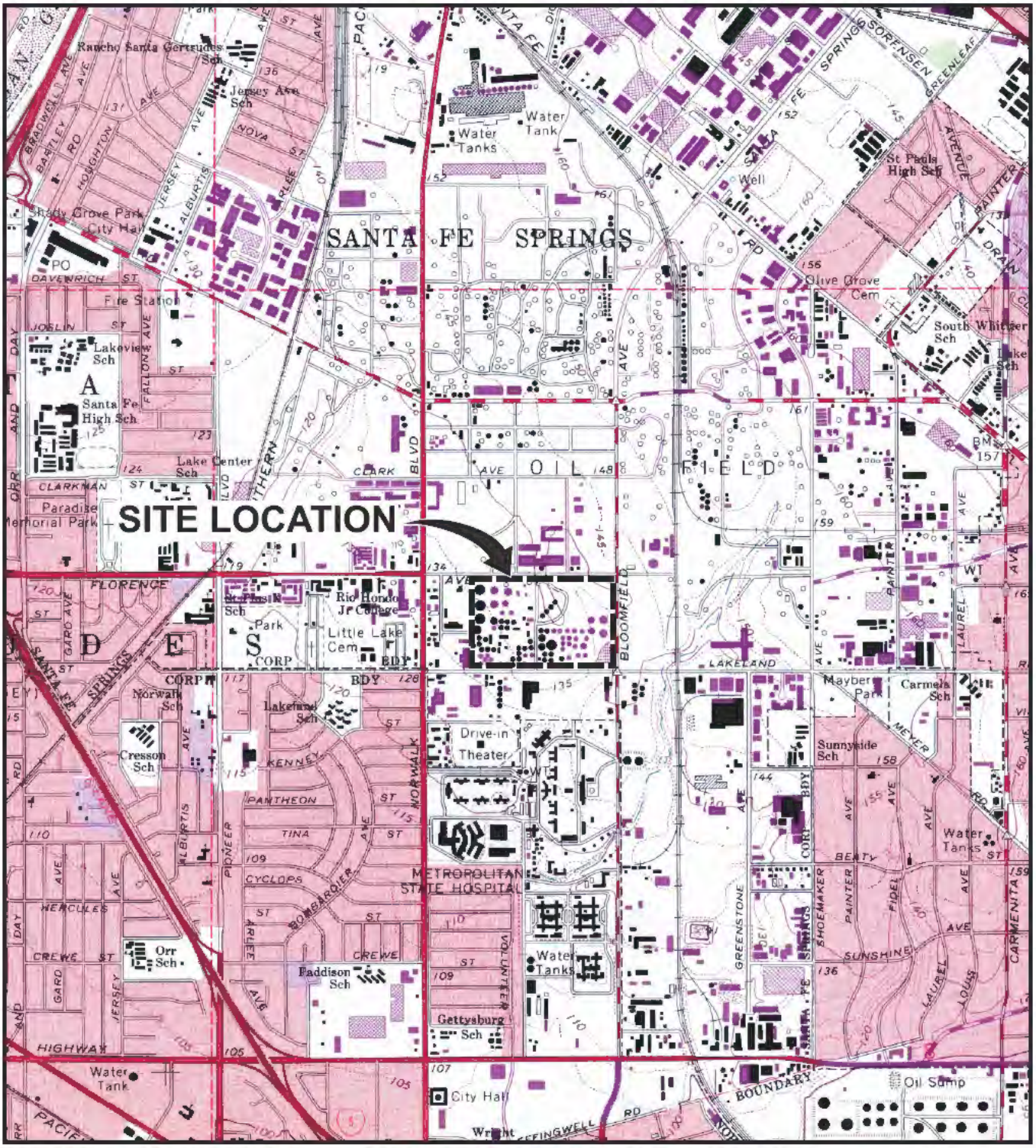
[a] The lower of the cancer and the noncancer values was selected as the SSCG.
[b] Cancer SSCG = EPC * ELCR-1 * TR (Section 8)
[c] Noncancer SSCG = EPC * HI-1 * THI (Section 8)
[d] CHHSL listed for all "PCBs"
[e] The resident ELCR =child ELCR + adult ELCR. The HI presented above reflects the higher of the child and the adult estimate.

References:

CalEPA. 2005 Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties. January.
USEPA. 2008. Regional Screening Levels. September. http://www.epa.gov/region09/superfund/prg/index.html

ARCADIS

Figures



REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., WHITTIER, CA. 1965, PHOTOREVISED 1981.

2000' 0 2000'

Approximate Scale: 1" = 2000'

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FORMER CENCO REFINERY
SANTA FE SPRINGS, CALIFORNIA

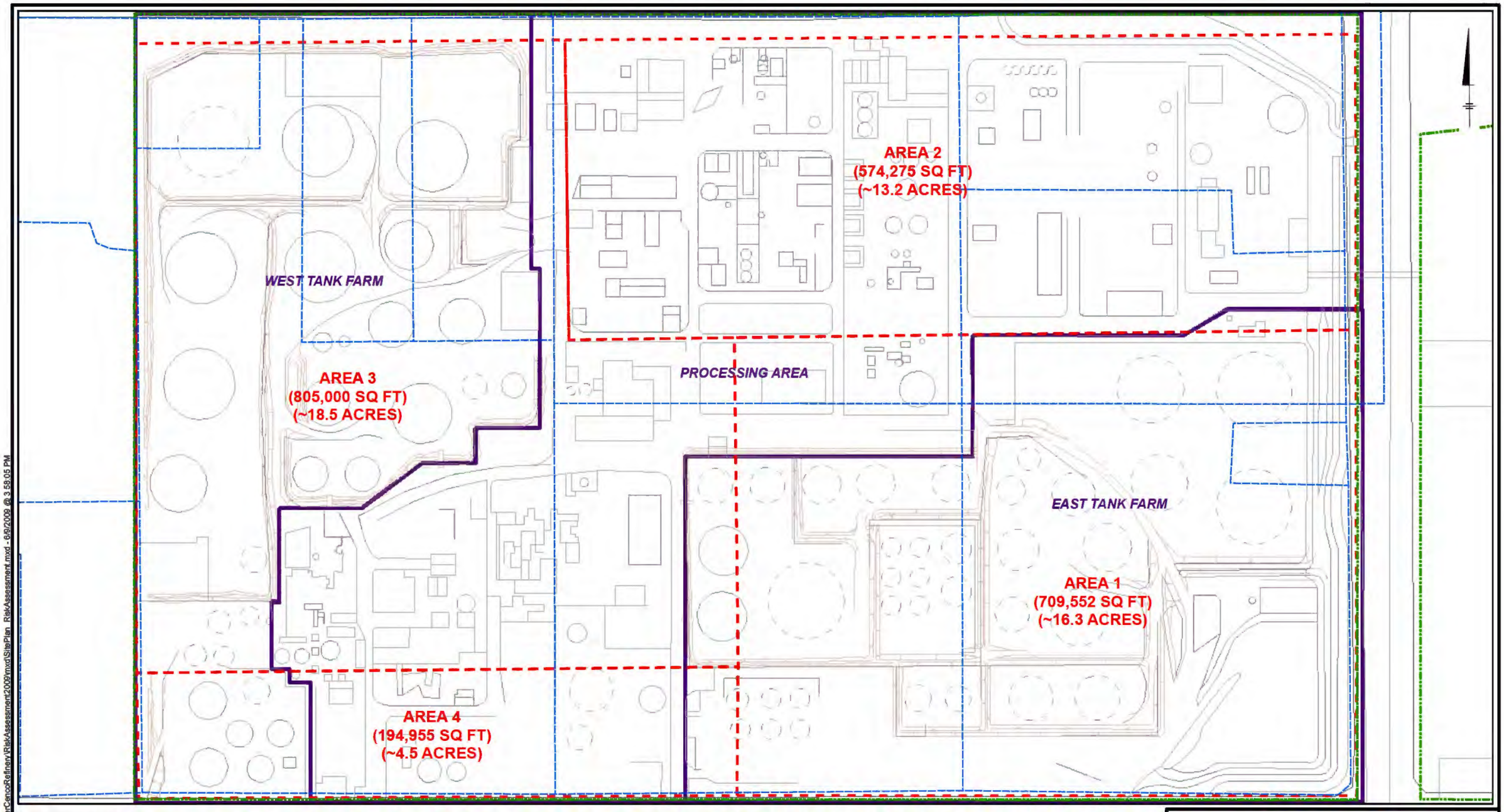
BASELINE HUMAN HEALTH RISK ASSESSMENT

SITE LOCATION MAP

ARCADIS

FIGURE
1-1

06/10/09 SYRACUSE, NY-ENV/CAD-DHOWES, K SARTOR
B0054217/0000/00002/CDR/54217N02 CDR



LEGEND:

- CENCO PROPERTY
- PARCEL DIVISION
- TENTATIVE BOUNDARY OF PLANNED REDEVELOPMENT
- BERM
- OPERATIONAL AREA
- EXISTING TANK
- FORMER TANK

0 150 300 Feet

GRAPHIC SCALE

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SANTA FE SPRINGS, CALIFORNIA
BASELINE HUMAN HEALTH RISK ASSESSMENT

SITE MAP

ARCADIS

FIGURE
2-1

SYR-85 JCR
Isola & Assoc. (54211.6)
Q:\Isola and Associates\Santa Fe Springs\Former Cenco Refinery\RiskAssessment2009\mxd\SitePlan_RiskAssessment.mxd - 6/9/2009 @ 3:58:05 PM

LEGEND:

- CENCO PROPERTY
- TENTATIVE BOUNDARY OF PLANNED REDEVELOPMENT
- OPERATIONAL AREA

NOTE:

1. AERIAL IMAGERY DATED JULY 31, 2007 DOWNLOADED FROM GOOGLE PRO.

0 200 400 Feet

GRAPHIC SCALE

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SANTA FE SPRINGS, CALIFORNIA

BASELINE HUMAN HEALTH RISK ASSESSMENT

SURROUNDING LAND USE

ARCADIS

FIGURE 2-2

SYR-85 KEW JCR
Isola & Assoc. (B0054219.0000.00001)
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4/1/08 ROCH-85 EAL SYR-AIT JCR
Isola and Ascociates - Former Cenco Refinery
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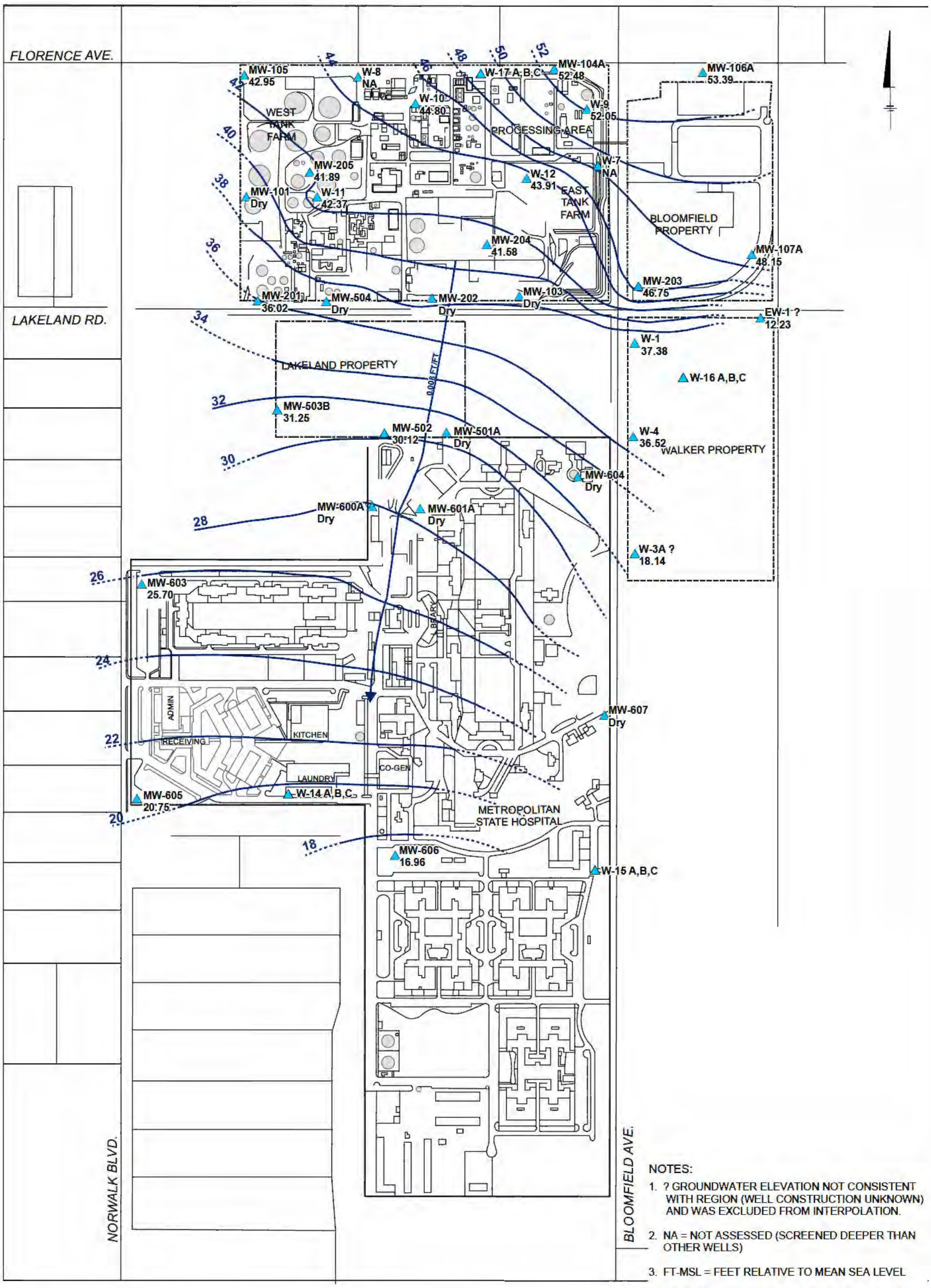

NOTES:

1. ? GROUNDWATER ELEVATION NOT CONSISTENT WITH REGION (WELL CONSTRUCTION UNKNOWN) AND WAS EXCLUDED FROM INTERPOLATION.
2. NA = NOT ASSESSED (SCREENED DEEPER THAN OTHER WELLS)
3. FT-MSL = FEET RELATIVE TO MEAN SEA LEVEL
4. WATER LEVELS MEASURED ON JANUARY 12 AND JANUARY 13, 2009.

LEGEND:

- ▲ MW-605 20.75 — MONITORING WELL LOCATION ID GROUNDWATER ELEVATION (FT-MSL)
- 24 — GROUNDWATER ELEVATION CONTOUR (FT-MSL) (DASHED WHERE INFERRED)
- CENCO PROPERTY
- FORMER LAKELAND PROPERTY
- METROPOLITAN STATE HOSPITAL
- WALKER PROPERTY BOUNDARY

0 500 1,000 Feet
GRAPHIC SCALE

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SANTA FE SPRINGS, CALIFORNIA
BASELINE HUMAN HEALTH RISK ASSESSMENT

GROUNDWATER SURFACE ELEVATIONS JANUARY 2009

ARCADIS

FIGURE 3-1

FLORENCE AVE

AREA 1

AREA 2

AREA 3

AREA 4

BLOOMFILED AVE

LAKELAND ROAD

LEGEND:

- SOIL SAMPLE LOCATION USED TO CONDUCT THE BHHRA
- CENCO PROPERTY
- PARCEL DIVISION
- ROAD
- TENTATIVE BOUNDARY OF PLANNED REDEVELOPMENT
- BERM
- EXISTING TANK
- FORMER TANK

0 80 160 Feet

GRAPHIC SCALE

ISOLA LAW GROUP, LLP
FORMER CENCO REFINERY
SANTA FE SPRINGS, CALIFORNIA

BASELINE HUMAN HEALTH RISK ASSESSMENT

SOIL SAMPLE LOCATIONS USED TO CONDUCT THE BHHRA

ARCADIS

FIGURE
5-1

CITY: SYR DIV: AIT DB: JCR
ISOLA-Cenco
Q:\Isola\and\Associates\SantaFeSprings\FormerCencoRefinery\RiskAssessment2009\mxd\AllSoilSampleLocations_Dsize.mxd

FLORENCE AVE

LAKELAND ROAD

BLOOMFILED AVE

AREA 1

AREA 2

AREA 3

AREA 4

LEGEND:

- SOIL GAS SAMPLE LOCATION USED TO CONDUCT THE BHHRA
- CENCO PROPERTY
- PARCEL DIVISION
- ROAD
- TENTATIVE BOUNDARY OF PLANNED REDEVELOPMENT
- BERM
- EXISTING TANK
- FORMER TANK

0 80 160 Feet

GRAPHIC SCALE

ISOLA LAW GROUP, LLP
FORMER CENCO REFINERY
SANTA FE SPRINGS, CALIFORNIA

BASELINE HUMAN HEALTH RISK ASSESSMENT

SOIL GAS SAMPLE LOCATIONS USED TO CONDUCT THE BHHRA

ARCADIS

FIGURE 5-2

CITY: SYR DIV: AIT DB: KEW JCR
ISOLA-Cenco (B0054219.0000.00001)
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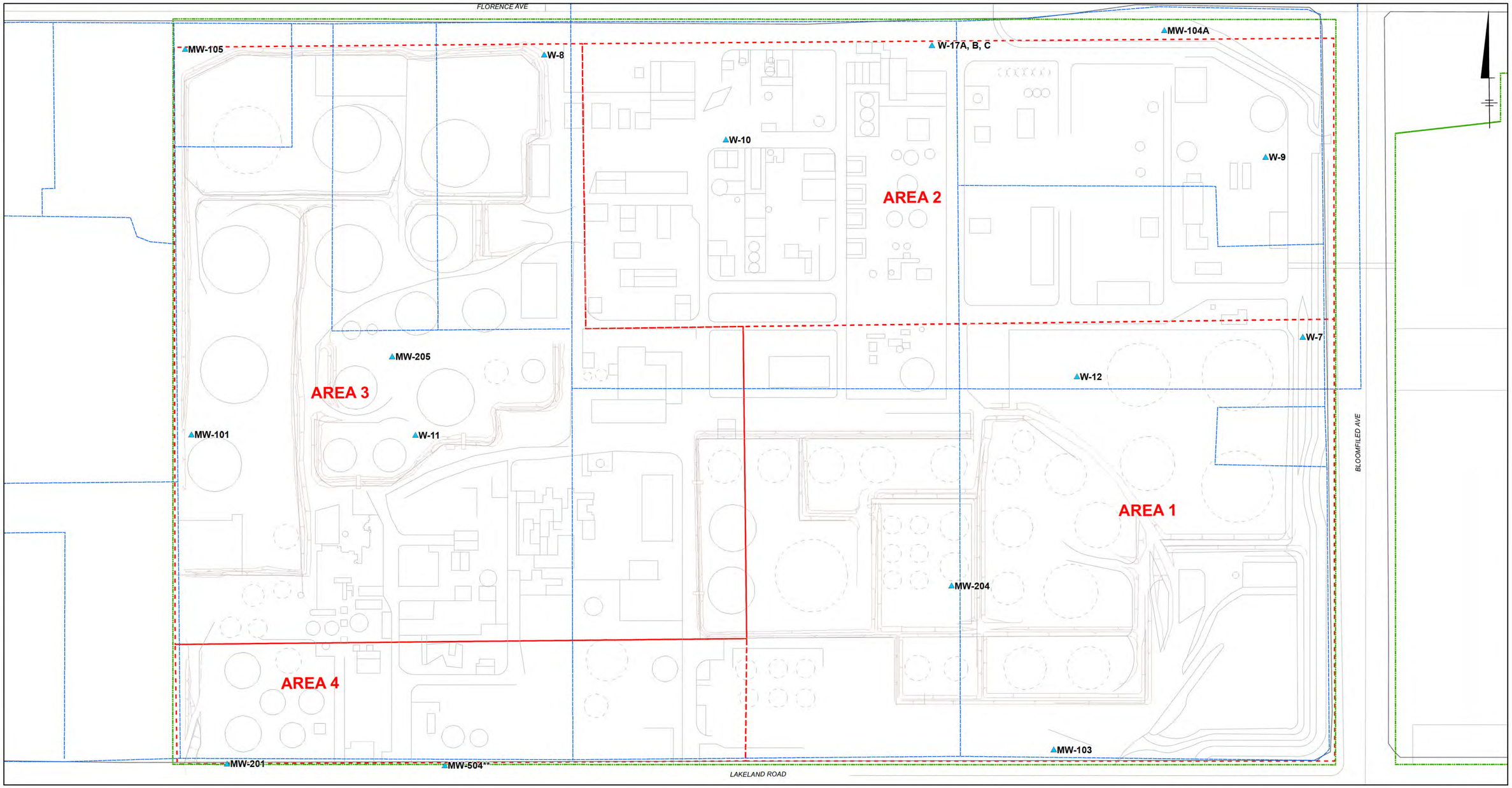

LEGEND:

- GROUNDWATER SAMPLE LOCATION USED TO CONDUCT THE BHHRA
- CENCO PROPERTY
- PARCEL DIVISION
- ROAD
- TENTATIVE BOUNDARY OF PLANNED REDEVELOPMENT
- BERM
- EXISTING TANK
- FORMER TANK

0 80 160 Feet
GRAPHIC SCALE

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SANTA FE SPRINGS, CALIFORNIA

BASELINE HUMAN HEALTH RISK ASSESSMENT

GROUNDWATER SAMPLE LOCATIONS USED TO CONDUCT THE BHHRA

ARCADIS

FIGURE 5-3

CITY: SYR DIV: AIT DB: KEW JCR
ISOLA-Cenco (B0054219.0000.000001)
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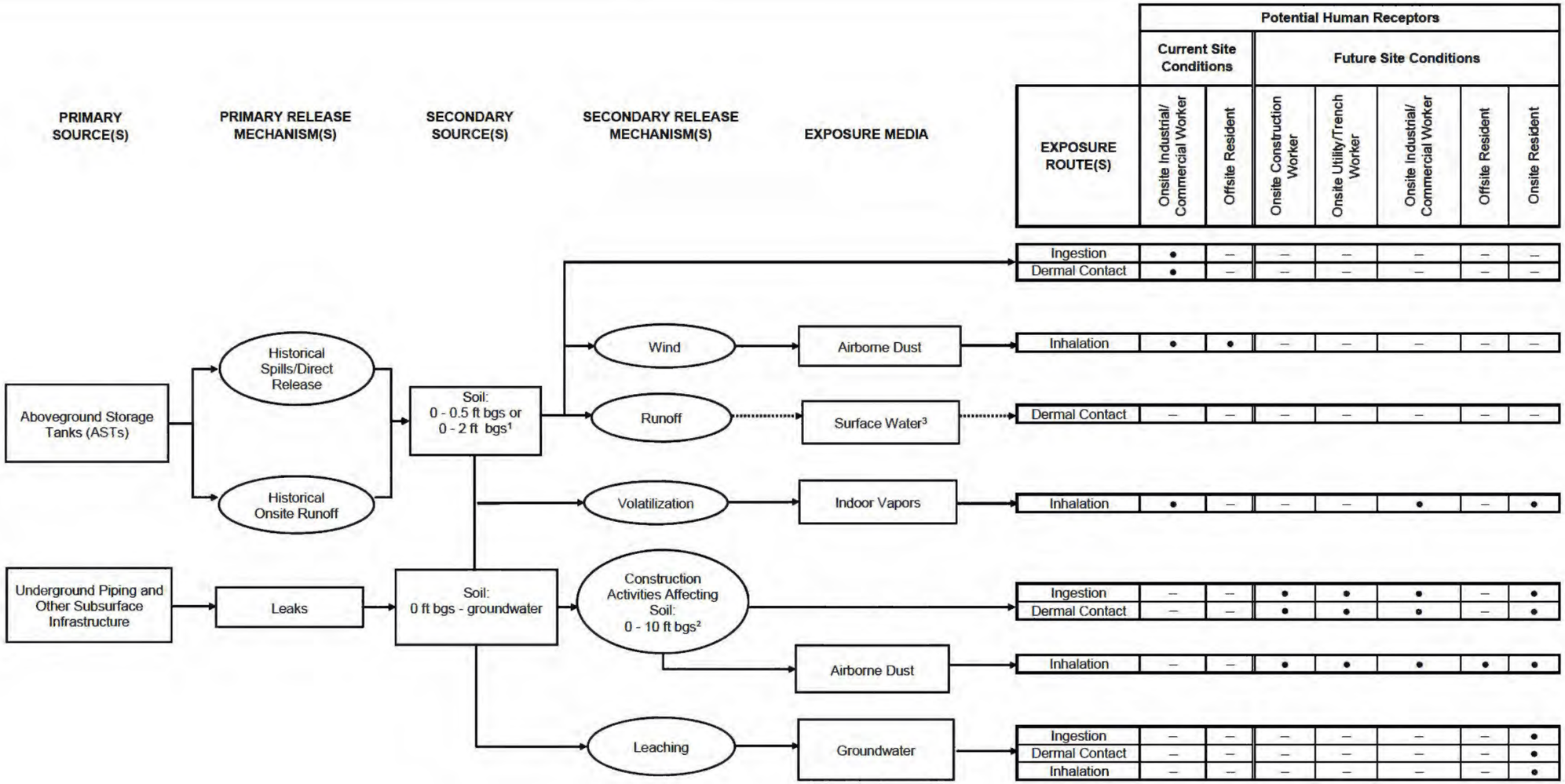

Notes:

→ = Potentially complete exposure pathway

⇢ = Potentially incomplete or insignificant exposure pathway/release mechanism

• = Complete exposure pathway

– = Incomplete exposure pathway

bgs = below ground surface

BHHRA = baseline human health risk assessment

1 For all areas, the 0 to 0.5 ft and 0 to 2 ft bgs soil sample intervals were subject to a risk-based screening evaluation, and the soil sample interval reflecting the highest risk was conservatively used in the BHHRA

2 Accounts for excavation activities down to 10 feet bgs and soil redistribution across the site during redevelopment/construction activities

3 There is no surface water body related to refinery operations on the site

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BASELINE HUMAN HEALTH RISK ASSESSMENT

CONCEPTUAL SITE MODEL

ARCADIS

FIGURE 6-1

5/10/2009
Figure 6-1_Conceptual Site Model.xlsx

ARCADIS

Appendices

ARCADIS

Appendix A

Soil, Soil Gas, and Groundwater Data Used to Conduct BHHRA

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Appendix B

Memorandum Confirming Soil Moisture Value Used to Convert Wet Weight Data to Dry Weight

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MEMO

To:
Don Indermill
S. Steven Hariri

Copies:
David Isola
Paris Hajali
Steve Auckerland
Steven Huntley

From:
Leah M. Levy

Date:
March 12, 2008

ARCADIS Project No.:
B54213.00003

Subject:
Data Adjustment for Percent Moisture, Baseline Risk Assessment, Former CENCO Refinery Site, Santa Fe Springs, California

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ARCADIS has prepared this memorandum regarding the proposed data adjustment in the Baseline Risk Assessment (BRA) Report for the former CENCO Refinery Site located in Santa Fe Springs, California.

Introduction

Inconsistent laboratory analysis and reporting of soil data on dry weight and wet weight bases has been identified. Risk assessments are typically performed using soil data reported on a dry weight basis. This memorandum describes the nature of the issue, presents a recommended solution, and requests concurrence from the Regional Water Quality Control Board (RWQCB) on the recommended solution before ARCADIS proceeds further with preparation of the BRA Report. This concurrence is necessary to help ensure timely approval of the BRA Report upon submittal and prevent the necessity for duplication of risk assessment calculations.

Description

The BRA Report for the former CENCO Refinery site is currently being prepared. It was recently recognized that wet weight and dry weight soil concentrations were reported as follows:

Dates Collected	Depth Collected (bgs)	Basis
11/2007 - 1/2008	0 – 0.5 ft.	All dry weight
2005 - 2006	2 ft	All wet weight
2005 - 2008	5 - 10 ft and deeper	Mixed, either wet or dry

The laboratory that reported the data in wet weight was contacted to determine if percent moisture data was collected but not reported. No percent moisture data are available.

Proposed Solution

The risk assessment will benefit from using the maximum amount of data available to the fullest extent possible. Therefore, data evaluations were conducted to consider how wet weight data should be handled to make maximum appropriate use of all information.

The percent moisture data for samples reported on a dry weight basis are presented in Table 1, with the results sorted by sample collection depth. There are no recognizable differences in moisture levels by depth. The similarities of the various measures of central tendency within each sample depth suggest the data are normally distributed, as expected. The percent moisture levels range from about 1 to 25 percent (%). Seasonality can not be assessed because all samples were collected during the winter months of a single season.

The potential spatial variation in soil moisture (in the horizontal direction) was also assessed. Table 2 provides a ranked list of percent moisture values for samples collected in the 0-6 inch interval. Since sampling was generally conducted using a systemic grid approach, samples with similar numbers are frequently closer together. Also, an assessment of differences by sample collection date can be evaluated. The rank listing in Table 2 does not suggest a readily discernable spatial distribution or a difference by sample collection date. Moreover, the data appear to be uniformly distributed throughout the 1 to 25% range, further suggesting that identifiable areas of dissimilar percent moisture levels are not likely to exist. Mapping percent moisture data is not deemed worthwhile.

Recommended Path Forward

ARCADIS recommends that the available percent moisture data be relied upon to adjust sample results reported as wet weight to dry weight. The adjustment should be 25%, the most health-protective adjustment supported by the available data presented in Table 1. This adjustment will increase sample

concentrations for results reported in wet weight, minimize the potential for under representing site concentrations, and allow for full use of all data for quantitative risk assessment.

The uncertainty assessment section of the risk assessment will acknowledge that percent moisture levels in one or more specific samples reported on a wet weight basis may have exceeded 25% while recognizing that the overall wet weight to dry weight adjustment is believed to support a health-protective assessment of exposure and risk. A limited sensitivity analysis will be performed to evaluate how different assumptions might lead to different conclusions about site risk, if deemed necessary to support informed risk management decisions.

Actual site remediation is expected to consider risk-based cleanup values determined by the risk assessment. Achievement of these standards will be determined by future confirmation sampling that will utilize dry weight sample results. Therefore, the uncertainty created from the wet weight data will not have an adverse effect on the overall remediation and redevelopment project.

Closing

If the approach described above is acceptable, please provide your concurrence at your earliest convenience. ARCADIS plans to submit the draft BRA Report to the RWQCB and the Department of Toxic Substances Control (DTSC) in April 2008. Please contact the undersigned if you have any questions or comments on this matter. Thank you for your time and effort on this project.

Sincerely,

ARCADIS

Leah M. Levy
Project Scientist

Table 1. Percent Moisture Values for November 2007 and January 2008 Data

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Former CENCO Refinery
Santa Fe Springs, California

Depth Interval	Detection Frequency	Minimum Detect	Maximum Detect	Max Detect Location	Median Value	Arithmetic Average	Geometric Mean	Standard Deviation
0 - 6 in.	95/95	1.6	17.1	S195	6.90	7.39	6.71	3.22
5 ft bgs	54/54	3.9	17.4	B281	12.2	11.8	11.4	2.71
10 ft bgs	31/31	1.6	25.3	B266	12.4	12.1	10.9	4.65
> 10 ft	146/146	1.95	25.8	B274	5.75	7.84	6.40	5.45

Table 2. Ranked Percent Moisture Values for 0-6 in. bgs. Samples

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Former CENCO Refinery
Santa Fe Springs, California

Location	Depth (ft)	Date Collected	% Moisture
S195	0 - 0.5	11/26/07	17.1
S146	0 - 0.5	11/29/07	14.8
S196	0 - 0.5	11/26/07	14.7
S125	0 - 0.5	01/29/08	14.1
S132	0 - 0.5	01/03/08	13.9
S271	0 - 0.5	01/04/08	13.6
S213	0 - 0.5	11/28/07	13
S233	0 - 0.5	11/28/07	12.9
S187	0 - 0.5	01/04/08	12.6
S133	0 - 0.5	11/29/07	12.5
S296	0 - 0.5	11/28/07	11.6
S225	0 - 0.5	11/28/07	11.1
S294	0 - 0.5	11/26/07	11.1
S177	0 - 0.5	11/28/07	10.8
S237	0 - 0.5	11/29/07	10.7
S163	0 - 0.5	11/29/07	10.5
S286	0 - 0.5	11/26/07	10.3
S287	0 - 0.5	11/26/07	10.3
S203	0 - 0.5	11/28/07	10.2
S136	0 - 0.5	11/29/07	10.1
S204	0 - 0.5	11/28/07	10
S212	0 - 0.5	11/26/07	9.6
S228	0 - 0.5	11/28/07	9.6
S126	0 - 0.5	01/07/08	9.5
S179	0 - 0.5	11/28/07	9.3
S274	0 - 0.5	11/29/07	9.3
S202	0 - 0.5	11/28/07	9.2
S288	0 - 0.5	11/26/07	9.2
S124	0 - 0.5	11/29/07	8.9
S193	0 - 0.5	11/26/07	8.7
S123	0 - 0.5	11/29/07	8.3
S227	0 - 0.5	11/29/07	8.3
S148	0 - 0.5	11/29/07	8
S192	0 - 0.5	11/26/07	8
S285	0 - 0.5	11/28/07	8
S138	0 - 0.5	11/29/07	7.9
S165	0 - 0.5	11/29/07	7.8
S197	0 - 0.5	11/26/07	7.7
S293	0 - 0.5	11/26/07	7.7
S221	0 - 0.5	11/28/07	7.6
S276	0 - 0.5	11/29/07	7.4
S178	0 - 0.5	11/28/07	7.2
S210	0 - 0.5	11/26/07	7.2
S211	0 - 0.5	11/26/07	7.2
S289	0 - 0.5	11/26/07	7.1
S155	0 - 0.5	11/29/07	7
S169	0 - 0.5	11/29/07	7
S209	0 - 0.5	11/26/07	6.9
S137	0 - 0.5	11/29/07	6.8
S201	0 - 0.5	11/26/07	6.8
S216	0 - 0.5	11/28/07	6.8

Table 2. Ranked Percent Moisture Values for 0-6 in. bgs. Samples

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Former CENCO Refinery
Santa Fe Springs, California

Location	Depth (ft)	Date Collected	% Moisture
S134	0 - 0.5	01/07/08	6.6
S161	0 - 0.5	11/29/07	6.6
S226	0 - 0.5	11/28/07	6.4
S167	0 - 0.5	11/29/07	6.2
S208	0 - 0.5	11/26/07	6
S230	0 - 0.5	11/28/07	6
S235	0 - 0.5	11/28/07	5.9
S168	0 - 0.5	11/29/07	5.8
S273	0 - 0.5	11/28/07	5.8
S214	0 - 0.5	11/28/07	5.7
S176	0 - 0.5	11/28/07	5.6
S222	0 - 0.5	11/28/07	5.6
S189	0 - 0.5	11/26/07	5.5
S223	0 - 0.5	11/28/07	5.4
S122	0 - 0.5	01/29/08	5.3
S198	0 - 0.5	11/26/07	5.3
S205	0 - 0.5	11/28/07	5.3
S215	0 - 0.5	11/28/07	5.1
S234	0 - 0.5	11/28/07	5.1
S153	0 - 0.5	11/29/07	5
S152	0 - 0.5	11/29/07	4.9
S200	0 - 0.5	11/26/07	4.9
S166	0 - 0.5	11/29/07	4.5
S188	0 - 0.5	11/26/07	4.5
S231	0 - 0.5	11/28/07	4.3
S272	0 - 0.5	11/28/07	4.3
S190	0 - 0.5	11/26/07	4.2
S290	0 - 0.5	11/26/07	4.2
S131	0 - 0.5	01/07/08	4.1
S164	0 - 0.5	11/29/07	4
S194	0 - 0.5	11/26/07	4
S217	0 - 0.5	11/28/07	4
S154	0 - 0.5	11/29/07	3.9
S236	0 - 0.5	11/28/07	3.9
S180	0 - 0.5	11/28/07	3.7
S191	0 - 0.5	11/26/07	3.7
S220	0 - 0.5	11/28/07	3.7
S229	0 - 0.5	11/28/07	3.7
S206	0 - 0.5	11/28/07	3.6
S224	0 - 0.5	11/28/07	3.5
S207	0 - 0.5	11/28/07	3.1
S232	0 - 0.5	11/28/07	3
S219	0 - 0.5	11/28/07	2.4
S218	0 - 0.5	11/28/07	1.6

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Appendix C

Surface Soil Depth Interval Evaluation

Table C-1
Surface Soil Depth Interval Evaluation
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Volatile Organic Compounds (VOCs)								
1,1,1,2-Tetrachloroethane	–	–	2.00E+00	c	–	–	–	–
1,1,1-Trichloroethane	–	–	9.00E+03	ns	–	–	–	–
1,1,2,2-Tetrachloroethane	0.012	0.012	5.90E-01	c	–	–	2.03E-08	2.03E-08
1,1,2-Trichloroethane	0.0077	0.0077	1.10E+00	c	–	–	7.00E-09	7.00E-09
1,2,3-Trichlorobenzene	0.009	0.009	8.70E+01	n	1.03E-04	1.03E-04	–	–
1,2,3-Trichloropropane	–	–	9.10E-02	c	–	–	–	–
1,2,4-Trichlorobenzene	–	–	8.70E+01	n	–	–	–	–
1,2,4-Trimethylbenzene	1.248	2.162	6.70E+01	n	1.86E-02	3.23E-02	–	–
1,2-Dichlorobenzene	–	–	2.00E+03	ns	–	–	–	–
1,2-Dichloroethane	–	–	4.50E-01	c	–	–	–	–
1,2-Dichloropropane	0.0021	0.0021	9.30E-01	c*	–	–	2.26E-09	2.26E-09
1,3,5-Trimethylbenzene	0.4133	0.7494	4.70E+01	n	8.79E-03	1.59E-02	–	–
1,4-Dichlorobenzene	–	–	2.60E+00	c	–	–	–	–
2-Butanone	0.02188	0.02143	2.80E+04	ns	7.81E-07	7.65E-07	–	–
2-Chlorotoluene	0.0028	0.0028	1.60E+03	ns	1.75E-06	1.75E-06	–	–
2-Hexanone	–	–	NA		–	–	–	–
4-Chlorotoluene	0.0021	0.0021	5.50E+03	ns	3.82E-07	3.82E-07	–	–
4-Methyl-2-Pentanone	0.012	0.012	5.30E+03	ns	2.26E-06	2.26E-06	–	–
Acetone	0.08309	0.07997	6.10E+04	n	1.36E-06	1.31E-06	–	–
Acetonitrile	–	–	8.70E+02	n	–	–	–	–
Benzene	0.003509	0.01774	1.10E+00	c*	–	–	3.19E-09	1.61E-08
Bromobenzene	–	–	9.40E+01	n	–	–	–	–
Bromodichloromethane	–	–	1.00E+01	c	–	–	–	–
Bromoform	–	–	6.10E+01	c*	–	–	–	–
c-1,2-Dichloroethene	–	–	7.80E+02	n	–	–	–	–
Carbon Disulfide	0.034	0.034	6.70E+02	ns	5.07E-05	5.07E-05	–	–
Chloroethane	–	–	1.50E+04	ns	–	–	–	–
Chloroform	–	–	3.00E-01	c	–	–	–	–
Chloromethane	–	–	1.70E+00	c*	–	–	–	–
Diisopropyl Ether (DIPE)	–	–	1.20E+03	n	–	–	–	–
Ethanol	1.6	1.6	NA		–	–	–	–
Ethylbenzene	0.1257	0.1446	5.70E+00	c	–	–	2.21E-08	2.54E-08
Iodomethane	–	–	7.90E+00	n	–	–	–	–
Isopropylbenzene	0.007177	0.3548	2.20E+03	ns	3.26E-06	1.61E-04	–	–
Methylene Chloride	–	–	1.10E+01	c	–	–	–	–
Methyl-t-Butyl Ether (MTBE)	0.014	0.01029	3.90E+01	c	–	–	3.59E-10	2.64E-10
n-Butylbenzene	0.1475	0.399	5.70E+00	c	–	–	2.59E-08	7.00E-08
n-Propylbenzene	0.0408	0.5772	NA		–	–	–	–
o-Xylene	0.2156	0.2022	5.30E+03	ns	4.07E-05	3.82E-05	–	–
p/m-Xylene	0.4993	0.4963	6.00E+02	ns	8.32E-04	8.27E-04	–	–
p-Isopropyltoluene	0.07953	0.09387	2.20E+03	ns	3.62E-05	4.27E-05	–	–
sec-Butylbenzene	0.03048	0.2021	5.70E+00	c	–	–	5.35E-09	3.55E-08
Styrene	–	–	6.50E+03	ns	–	–	–	–
t-1,2-Dichloroethene	–	–	1.10E+02	n	–	–	–	–
Tert-Butyl Alcohol (TBA)	0.034	0.01367	2.30E+04	ns	1.48E-06	5.94E-07	–	–
tert-Butylbenzene	–	–	5.70E+00	c	–	–	–	–
Tetrachloroethene	–	–	5.70E-01	c	–	–	–	–
Toluene	0.0478	0.09518	5.00E+03	ns	9.56E-06	1.90E-05	–	–
Trichloroethene	–	–	2.80E+00	c	–	–	–	–

Table C-1
Surface Soil Depth Interval Evaluation
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Vinyl Acetate	–	–	9.90E+02	n	–	–	–	–
Vinyl Chloride	–	–	6.00E-02	c	–	–	–	–
Xylenes, total	0.6943	0.682	6.00E+02	ns	1.16E-03	1.14E-03	–	–
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	6.381	19.043	2.20E+01	c	–	–	2.90E-07	8.66E-07
2-Methylnaphthalene	6.135	23.979	3.10E+02	n	1.98E-02	7.74E-02	–	–
Acenaphthene	1.407	2.504	3.40E+03	n	4.14E-04	7.36E-04	–	–
Acenaphthylene	0.144	0.1272	3.40E+03	n	4.24E-05	3.74E-05	–	–
Anthracene	0.2247	0.2259	1.70E+04	n	1.32E-05	1.33E-05	–	–
Benzo(a)anthracene	0.3308	0.7265	1.50E-01	c	–	–	2.21E-06	4.84E-06
Benzo(b)fluoranthene	0.1647	0.2004	1.50E-01	c	–	–	1.10E-06	1.34E-06
Benzo(ghi)perylene	0.154	0.1564	1.70E+03	n	9.06E-05	9.20E-05	–	–
Benzo(k)fluoranthene	0.1423	0.1247	1.50E+00	c	–	–	9.49E-08	8.31E-08
Chrysene	0.8325	1.922	1.50E+01	c	–	–	5.55E-08	1.28E-07
Dibenzo(a,h)anthracene	0.08977	0.08396	1.50E-02	c	–	–	5.98E-06	5.60E-06
Fluoranthene	0.2423	0.3207	2.30E+03	n	1.05E-04	1.39E-04	–	–
Fluorene	1.466	2.588	2.30E+03	n	6.37E-04	1.13E-03	–	–
Indeno(1,2,3-cd)pyrene	0.1013	0.09275	1.50E-01	c	–	–	6.75E-07	6.18E-07
Naphthalene	0.6315	1.032	3.90E+00	c*	–	–	1.62E-07	2.65E-07
Phenanthrene	2.589	6.504	1.70E+04	n	1.52E-04	3.83E-04	–	–
Pyrene	1.302	3.867	1.70E+03	n	7.66E-04	2.27E-03	–	–
Pesticides and Herbicides								
4,4-DDD	–	–	2.00E+00	c	–	–	–	–
4,4-DDE	–	–	1.40E+00	c	–	–	–	–
4,4-DDT	–	–	1.70E+00	c*	–	–	–	–
Aldrin	–	–	2.90E-02	c*	–	–	–	–
Chlordane	–	–	1.60E+00	c*	–	–	–	–
Dieldrin	–	–	3.00E-02	c	–	–	–	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	–	–	2.20E-01	c**	–	–	–	–
PCB-1260	–	–	2.20E-01	c	–	–	–	–
Inorganic Compounds								
Antimony	1.302	1.292	3.10E+01	n	4.20E-02	4.17E-02	–	–
Arsenic	5.45	5.483	3.90E-01	c*	–	–	1.40E-05	1.41E-05
Barium	202.2	202.6	1.50E+04	n	1.35E-02	1.35E-02	–	–
Beryllium	0.581	0.577	1.60E+02	n	3.63E-03	3.61E-03	–	–
Cadmium	0.757	0.752	7.00E+01	n	1.08E-02	1.07E-02	–	–
Chromium	78.81	71.61	2.80E+02	c	–	–	2.81E-07	2.56E-07
Chromium, Hexavalent	1.2	1.2	3.90E+01	c**	–	–	3.08E-08	3.08E-08
Cobalt	11.82	11.77	2.30E+01	n	5.14E-01	5.12E-01	–	–
Copper	154.7	136.4	3.10E+03	n	4.99E-02	4.40E-02	–	–
Lead	196	217	4.00E+02	n<	4.90E-01	5.43E-01	–	–
Mercury	0.269	0.246	6.70E+00	ns	4.01E-02	3.67E-02	–	–
Molybdenum	10.33	8.637	3.90E+02	n	2.65E-02	2.21E-02	–	–
Nickel	19.77	19.52	1.60E+03	n	1.24E-02	1.22E-02	–	–
Selenium	0.977	1.084	3.90E+02	n	2.51E-03	2.78E-03	–	–
Silver	–	–	3.90E+02	n	–	–	–	–
Thallium	–	–	5.10E+00	n	–	–	–	–
Vanadium	41.06	40.75	5.50E+02	n	7.47E-02	7.41E-02	–	–
Zinc	273.7	251.3	2.30E+04	n	1.19E-02	1.09E-02	–	–

Table C-1
Surface Soil Depth Interval Evaluation
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)	Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Total				1	1	4.E-05	5.E-05

Notes:
mg/kg = milligram per kilogram

[a] The screening levels used were risk screening levels for the residential scenario from USEPA (2008a).
c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit;
s = Concentration may exceed saturation concentration (Csat).

[b] Tier 1 Hazard Quotient (HQ) = EPC / RSL.

[c] Tier 1 Excess Lifetime Cancer Risk (ELCR) = EPC/ RSL x 10^{-6}.

Table C-2
Surface Soil Depth Interval Evaluation
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Volatile Organic Compounds (VOCs)								
1,1,1,2-Tetrachloroethane	–	–	2.00E+00	c	–	–	–	–
1,1,1-Trichloroethane	–	–	9.00E+03	ns	–	–	–	–
1,1,2,2-Tetrachloroethane	–	–	5.90E-01	c	–	–	–	–
1,1,2-Trichloroethane	–	–	1.10E+00	c	–	–	–	–
1,2,3-Trichlorobenzene	–	–	8.70E+01	n	–	–	–	–
1,2,3-Trichloropropane	–	–	9.10E-02	c	–	–	–	–
1,2,4-Trichlorobenzene	–	–	8.70E+01	n	–	–	–	–
1,2,4-Trimethylbenzene	17.119	24.884	6.70E+01	n	2.56E-01	3.71E-01	–	–
1,2-Dichlorobenzene	–	–	2.00E+03	ns	–	–	–	–
1,2-Dichloroethane	–	–	4.50E-01	c	–	–	–	–
1,2-Dichloropropane	–	–	9.30E-01	c*	–	–	–	–
1,3,5-Trimethylbenzene	6.679	8.223	4.70E+01	n	1.42E-01	1.75E-01	–	–
1,4-Dichlorobenzene	–	–	2.60E+00	c	–	–	–	–
2-Butanone	0.03856	0.03463	2.80E+04	ns	1.38E-06	1.24E-06	–	–
2-Chlorotoluene	–	–	1.60E+03	ns	–	–	–	–
2-Hexanone	–	–	NA		–	–	–	–
4-Chlorotoluene	–	–	5.50E+03	ns	–	–	–	–
4-Methyl-2-Pentanone	–	–	5.30E+03	ns	–	–	–	–
Acetone	0.08581	0.09159	6.10E+04	n	1.41E-06	1.50E-06	–	–
Acetonitrile	–	–	8.70E+02	n	–	–	–	–
Benzene	3.21	11.698	1.10E+00	c*	–	–	2.92E-06	1.06E-05
Bromobenzene	–	–	9.40E+01	n	–	–	–	–
Bromodichloromethane	–	–	1.00E+01	c	–	–	–	–
Bromoform	–	–	6.10E+01	c*	–	–	–	–
c-1,2-Dichloroethene	–	–	7.80E+02	n	–	–	–	–
Carbon Disulfide	0.045	0.045	6.70E+02	ns	6.72E-05	6.72E-05	–	–
Chloroethane	–	–	1.50E+04	ns	–	–	–	–
Chloroform	0.06	0.06	3.00E-01	c	–	–	2.00E-07	2.00E-07
Chloromethane	–	–	1.70E+00	c*	–	–	–	–
Diisopropyl Ether (DIPE)	–	–	1.20E+03	n	–	–	–	–
Ethanol	2.6	2.6	NA		–	–	–	–
Ethylbenzene	4.054	5.405	5.70E+00	c	–	–	7.11E-07	9.48E-07
Iodomethane	–	–	7.90E+00	n	–	–	–	–
Isopropylbenzene	7.6	0.9125	2.20E+03	ns	3.45E-03	4.15E-04	–	–
Methylene Chloride	0.47	0.47	1.10E+01	c	–	–	4.27E-08	4.27E-08
Methyl-t-Butyl Ether (MTBE)	0.0026	0.0026	3.90E+01	c	–	–	6.67E-11	6.67E-11
n-Butylbenzene	1.156	2.18	5.70E+00	c	–	–	2.03E-07	3.82E-07
n-Propylbenzene	2.731	3.51	NA		–	–	–	–
o-Xylene	2.294	1.816	5.30E+03	ns	4.33E-04	3.43E-04	–	–
p/m-Xylene	10.713	12.654	6.00E+02	ns	1.79E-02	2.11E-02	–	–
p-Isopropyltoluene	0.333	0.4786	2.20E+03	ns	1.51E-04	2.18E-04	–	–
sec-Butylbenzene	0.4579	0.6564	5.70E+00	c	–	–	8.03E-08	1.15E-07
Styrene	–	–	6.50E+03	ns	–	–	–	–
t-1,2-Dichloroethene	–	–	1.10E+02	n	–	–	–	–
Tert-Butyl Alcohol (TBA)	0.089	0.089	2.30E+04	ns	3.87E-06	3.87E-06	–	–
tert-Butylbenzene	–	–	5.70E+00	c	–	–	–	–
Tetrachloroethene	0.0075	0.0075	5.70E-01	c	–	–	1.32E-08	1.32E-08
Toluene	0.003155	0.003033	5.00E+03	ns	6.31E-07	6.07E-07	–	–
Trichloroethene	–	–	2.80E+00	c	–	–	–	–
Vinyl Acetate	–	–	9.90E+02	n	–	–	–	–

Table C-2
Surface Soil Depth Interval Evaluation
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Vinyl Chloride	–	–	6.00E-02	c	–	–	–	–
Xylenes, total	12.96	14.368	6.00E+02	ns	2.16E-02	2.39E-02	–	–
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	1.121	2.742	2.20E+01	c	–	–	5.10E-08	1.25E-07
2-Methylnaphthalene	1.553	4.125	3.10E+02	n	5.01E-03	1.33E-02	–	–
Acenaphthene	1.3	0.3476	3.40E+03	n	3.82E-04	1.02E-04	–	–
Acenaphthylene	0.28	0.28	3.40E+03	n	8.24E-05	8.24E-05	–	–
Anthracene	0.63	0.4587	1.70E+04	n	3.71E-05	2.70E-05	–	–
Benzo(a)anthracene	0.1649	0.6496	1.50E-01	c	–	–	1.10E-06	4.33E-06
Benzo(b)fluoranthene	0.66	0.09629	1.50E-01	c	–	–	4.40E-06	6.42E-07
Benzo(ghi)perylene	0.1902	0.19029	1.70E+03	n	1.12E-04	1.12E-04	–	–
Benzo(k)fluoranthene	0.1591	0.1637	1.50E+00	c	–	–	1.06E-07	1.09E-07
Chrysene	0.543	0.9104	1.50E+01	c	–	–	3.62E-08	6.07E-08
Dibenzo(a,h)anthracene	0.24	0.24	1.50E-02	c	–	–	1.60E-05	1.60E-05
Fluoranthene	0.1959	0.3523	2.30E+03	n	8.52E-05	1.53E-04	–	–
Fluorene	0.5083	0.5942	2.30E+03	n	2.21E-04	2.58E-04	–	–
Indeno(1,2,3-cd)pyrene	0.09108	0.09388	1.50E-01	c	–	–	6.07E-07	6.26E-07
Naphthalene	0.3497	2.837	3.90E+00	c*	–	–	8.97E-08	7.27E-07
Phenanthrene	0.8049	3.629	1.70E+04	n	4.73E-05	2.13E-04	–	–
Pyrene	0.5885	1.34	1.70E+03	n	3.46E-04	7.88E-04	–	–
Pesticides and Herbicides								
4,4-DDD	–	–	2.00E+00	c	–	–	–	–
4,4-DDE	–	–	1.40E+00	c	–	–	–	–
4,4-DDT	–	–	1.70E+00	c*	–	–	–	–
Aldrin	–	–	2.90E-02	c*	–	–	–	–
Chlordane	–	–	1.60E+00	c*	–	–	–	–
Dieldrin	0.019	0.019	3.00E-02	c	–	–	6.33E-07	6.33E-07
Polychlorinated Biphenyls (PCBs)								
PCB-1254	0.056	0.085	2.20E-01	c**	–	–	2.55E-07	3.86E-07
PCB-1260	–	–	2.20E-01	c	–	–	–	–
Inorganic Compounds								
Antimony	1.252	1.51	3.10E+01	n	4.04E-02	4.87E-02	–	–
Arsenic	8.491	8.425	3.90E-01	c*	–	–	2.18E-05	2.16E-05
Barium	186.6	202.6	1.50E+04	n	1.24E-02	1.35E-02	–	–
Beryllium	0.78	0.832	1.60E+02	n	4.88E-03	5.20E-03	–	–
Cadmium	2.78	1.391	7.00E+01	n	3.97E-02	1.99E-02	–	–
Chromium	48.02	64.74	2.80E+02	c	–	–	1.72E-07	2.31E-07
Chromium, Hexavalent	–	–	3.90E+01	c**	–	–	–	–
Cobalt	15.21	15.84	2.30E+01	n	6.61E-01	6.89E-01	–	–
Copper	152.8	342.7	3.10E+03	n	4.93E-02	1.11E-01	–	–
Lead	180	137	4.00E+02	n<	4.50E-01	3.43E-01	–	–
Mercury	0.173	0.236	6.70E+00	ns	2.58E-02	3.52E-02	–	–
Molybdenum	5.478	7.842	3.90E+02	n	1.40E-02	2.01E-02	–	–
Nickel	32.95	320.6	1.60E+03	n	2.06E-02	2.00E-01	–	–
Selenium	1.708	1.888	3.90E+02	n	4.38E-03	4.84E-03	–	–
Silver	2.49	2.49	3.90E+02	n	6.38E-03	6.38E-03	–	–
Thallium	–	–	5.10E+00	n	–	–	–	–
Vanadium	50.88	48.81	5.50E+02	n	9.25E-02	8.87E-02	–	–
Zinc	299.3	312	2.30E+04	n	1.30E-02	1.36E-02	–	–

Table C-2
Surface Soil Depth Interval Evaluation
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)	Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Total				2	2	6.E-05	8.E-05

Notes:
mg/kg = milligram per kilogram

[a] The screening levels used were risk screening levels for the residential scenario from USEPA (2008a).
[b] Tier 1 Hazard Quotient (HQ) = EPC / RSL.
[c] Tier 1 Excess Lifetime Cancer Risk (ELCR) = EPC/ RSL x 10^{-6}.

Table C-3
Surface Soil Depth Interval Evaluation
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Volatile Organic Compounds (VOCs)								
1,1,1,2-Tetrachloroethane	–	–	2.00E+00	c	–	–	–	–
1,1,1-Trichloroethane	0.0038	0.0038	9.00E+03	ns	4.22E-07	4.22E-07	–	–
1,1,2,2-Tetrachloroethane	–	–	5.90E-01	c	–	–	–	–
1,1,2-Trichloroethane	0.0026	0.0026	1.10E+00	c	–	–	2.36E-09	2.36E-09
1,2,3-Trichlorobenzene	–	–	8.70E+01	n	–	–	–	–
1,2,3-Trichloropropane	–	0.55	9.10E-02	c	–	–	–	6.04E-06
1,2,4-Trichlorobenzene	0.17	0.17	8.70E+01	n	1.95E-03	1.95E-03	–	–
1,2,4-Trimethylbenzene	0.6818	3.342	6.70E+01	n	1.02E-02	4.99E-02	–	–
1,2-Dichlorobenzene	2.9	2.9	2.00E+03	ns	1.45E-03	1.45E-03	–	–
1,2-Dichloroethane	–	–	4.50E-01	c	–	–	–	–
1,2-Dichloropropane	0.02	0.022	9.30E-01	c*	–	–	2.15E-08	2.37E-08
1,3,5-Trimethylbenzene	0.1678	0.6089	4.70E+01	n	3.57E-03	1.30E-02	–	–
1,4-Dichlorobenzene	0.4	0.4	2.60E+00	c	–	–	1.54E-07	1.54E-07
2-Butanone	0.03776	0.03599	2.80E+04	ns	1.35E-06	1.29E-06	–	–
2-Chlorotoluene	–	–	1.60E+03	ns	–	–	–	–
2-Hexanone	–	–	NA		–	–	–	–
4-Chlorotoluene	–	–	5.50E+03	ns	–	–	–	–
4-Methyl-2-Pentanone	–	–	5.30E+03	ns	–	–	–	–
Acetone	0.1178	0.1271	6.10E+04	n	1.93E-06	2.08E-06	–	–
Acetonitrile	–	–	8.70E+02	n	–	–	–	–
Benzene	0.3559	0.3296	1.10E+00	c*	–	–	3.24E-07	3.00E-07
Bromobenzene	–	–	9.40E+01	n	–	–	–	–
Bromodichloromethane	0.14	0.00693	1.00E+01	c	–	–	1.40E-08	6.93E-10
Bromoform	–	–	6.10E+01	c*	–	–	–	–
c-1,2-Dichloroethene	0.0019	0.0019	7.80E+02	n	2.44E-06	2.44E-06	–	–
Carbon Disulfide	0.043	0.01151	6.70E+02	ns	6.42E-05	1.72E-05	–	–
Chloroethane	–	–	1.50E+04	ns	–	–	–	–
Chloroform	0.0132	0.01048	3.00E-01	c	–	–	4.40E-08	3.49E-08
Chloromethane	–	–	1.70E+00	c*	–	–	–	–
Diisopropyl Ether (DIPE)	–	–	1.20E+03	n	–	–	–	–
Ethanol	–	–	NA		–	–	–	–
Ethylbenzene	0.1016	1.258	5.70E+00	c	–	–	1.78E-08	2.21E-07
Iodomethane	–	–	7.90E+00	n	–	–	–	–
Isopropylbenzene	0.1626	0.2534	2.20E+03	ns	7.39E-05	1.15E-04	–	–
Methylene Chloride	0.57	0.58	1.10E+01	c	–	–	5.18E-08	5.27E-08
Methyl-t-Butyl Ether (MTBE)	0.23	0.01395	3.90E+01	c	–	–	5.90E-09	3.58E-10
n-Butylbenzene	0.1657	0.4063	5.70E+00	c	–	–	2.91E-08	7.13E-08
n-Propylbenzene	0.2258	0.4089	NA		–	–	–	–
o-Xylene	0.4514	2.137	5.30E+03	ns	8.52E-05	4.03E-04	–	–
p/m-Xylene	0.5988	4.671	6.00E+02	ns	9.98E-04	7.79E-03	–	–
p-Isopropyltoluene	0.08358	0.7433	2.20E+03	ns	3.80E-05	3.38E-04	–	–
sec-Butylbenzene	0.1743	0.2294	5.70E+00	c	–	–	3.06E-08	4.02E-08
Styrene	–	–	6.50E+03	ns	–	–	–	–
t-1,2-Dichloroethene	–	–	1.10E+02	n	–	–	–	–
Tert-Butyl Alcohol (TBA)	0.04336	0.04334	2.30E+04	ns	1.89E-06	1.88E-06	–	–
tert-Butylbenzene	0.69	0.02569	5.70E+00	c	–	–	1.21E-07	4.51E-09
Tetrachloroethene	0.002	0.002	5.70E-01	c	–	–	3.51E-09	3.51E-09
Toluene	0.3869	1.01	5.00E+03	ns	7.74E-05	2.02E-04	–	–
Trichloroethene	0.0026	0.0026	2.80E+00	c	–	–	9.29E-10	9.29E-10

Table C-3
Surface Soil Depth Interval Evaluation
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Vinyl Acetate	–	–	9.90E+02	n	–	–	–	–
Vinyl Chloride	–	0.0015	6.00E-02	c	–	–	–	2.50E-08
Xylenes, total	1.045	6.795	6.00E+02	ns	1.74E-03	1.13E-02	–	–
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	4.948	19.299	2.20E+01	c	–	–	2.25E-07	8.77E-07
2-Methylnaphthalene	4.975	26.869	3.10E+02	n	1.60E-02	8.67E-02	–	–
Acenaphthene	0.6966	0.5539	3.40E+03	n	2.05E-04	1.63E-04	–	–
Acenaphthylene	6.2	0.4209	3.40E+03	n	1.82E-03	1.24E-04	–	–
Anthracene	0.5387	0.3834	1.70E+04	n	3.17E-05	2.26E-05	–	–
Benzo(a)anthracene	0.553	0.4181	1.50E-01	c	–	–	3.69E-06	2.79E-06
Benzo(b)fluoranthene	0.3382	0.3023	1.50E-01	c	–	–	2.25E-06	2.02E-06
Benzo(ghi)perylene	0.2635	0.2284	1.70E+03	n	1.55E-04	1.34E-04	–	–
Benzo(k)fluoranthene	0.4342	0.3039	1.50E+00	c	–	–	2.89E-07	2.03E-07
Chrysene	0.6649	0.5379	1.50E+01	c	–	–	4.43E-08	3.59E-08
Dibenzo(a,h)anthracene	3.5	0.4718	1.50E-02	c	–	–	2.33E-04	3.15E-05
Fluoranthene	0.7619	0.5649	2.30E+03	n	3.31E-04	2.46E-04	–	–
Fluorene	1.037	2.073	2.30E+03	n	4.51E-04	9.01E-04	–	–
Indeno(1,2,3-cd)pyrene	0.328	0.2742	1.50E-01	c	–	–	2.19E-06	1.83E-06
Naphthalene	1.421	4.189	3.90E+00	c*	–	–	3.64E-07	1.07E-06
Phenanthrene	0.863	1.864	1.70E+04	n	5.08E-05	1.10E-04	–	–
Pyrene	1.483	0.8123	1.70E+03	n	8.72E-04	4.78E-04	–	–
Pesticides and Herbicides								
4,4-DDD	–	–	2.00E+00	c	–	–	–	–
4,4-DDE	0.0057	0.013	1.40E+00	c	–	–	4.07E-09	9.29E-09
4,4-DDT	–	–	1.70E+00	c*	–	–	–	–
Aldrin	–	0.18	2.90E-02	c*	–	–	–	6.21E-06
Chlordane	–	1.5	1.60E+00	c*	–	–	–	9.38E-07
Dieldrin	–	0.025	3.00E-02	c	–	–	–	8.33E-07
Polychlorinated Biphenyls (PCBs)								
PCB-1254	–	1.9	2.20E-01	c**	–	–	–	8.64E-06
PCB-1260	–	–	2.20E-01	c	–	–	–	–
Inorganic Compounds								
Antimony	1.398	1.325	3.10E+01	n	4.51E-02	4.27E-02	–	–
Arsenic	7.604	7.252	3.90E-01	c*	–	–	1.95E-05	1.86E-05
Barium	222.9	205.9	1.50E+04	n	1.49E-02	1.37E-02	–	–
Beryllium	0.537	0.655	1.60E+02	n	3.36E-03	4.09E-03	–	–
Cadmium	0.834	0.787	7.00E+01	n	1.19E-02	1.12E-02	–	–
Chromium	204.4	169.7	2.80E+02	c	–	–	7.30E-07	6.06E-07
Chromium, Hexavalent	2.8	2.8	3.90E+01	c**	–	–	7.18E-08	7.18E-08
Cobalt	12.91	12.67	2.30E+01	n	5.61E-01	5.51E-01	–	–
Copper	147.7	138.9	3.10E+03	n	4.76E-02	4.48E-02	–	–
Lead	406	687	4.00E+02	n<	1.02E+00	1.72E+00	–	–
Mercury	2.74	3.246	6.70E+00	ns	4.09E-01	4.84E-01	–	–
Molybdenum	6.744	5.815	3.90E+02	n	1.73E-02	1.49E-02	–	–
Nickel	22.75	23.23	1.60E+03	n	1.42E-02	1.45E-02	–	–
Selenium	0.943	0.955	3.90E+02	n	2.42E-03	2.45E-03	–	–
Silver	–	0.933	3.90E+02	n	–	2.39E-03	–	–
Thallium	0.841	0.841	5.10E+00	n	1.65E-01	1.65E-01	–	–
Vanadium	38.21	44.31	5.50E+02	n	6.95E-02	8.06E-02	–	–
Zinc	256.3	221.3	2.30E+04	n	1.11E-02	9.62E-03	–	–

Table C-3
Surface Soil Depth Interval Evaluation
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)	Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Total				2	3	3.E-04	1.E-04

Notes:
mg/kg = milligram per kilogram

[a] The screening levels used were risk screening levels for the residential scenario from USEPA (2008a).
[b] Tier 1 Hazard Quotient (HQ) = EPC / RSL.
[c] Tier 1 Excess Lifetime Cancer Risk (ELCR) = EPC/ RSL x 10^{-6}.

Table C-4
Surface Soil Depth Interval Evaluation
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Volatile Organic Compounds (VOCs)								
1,1,1,2-Tetrachloroethane	–	–	2.00E+00	c	–	–	–	–
1,1,1-Trichloroethane	–	–	9.00E+03	ns	–	–	–	–
1,1,2,2-Tetrachloroethane	–	–	5.90E-01	c	–	–	–	–
1,1,2-Trichloroethane	–	–	1.10E+00	c	–	–	–	–
1,2,3-Trichlorobenzene	–	–	8.70E+01	n	–	–	–	–
1,2,3-Trichloropropane	–	–	9.10E-02	c	–	–	–	–
1,2,4-Trichlorobenzene	–	–	8.70E+01	n	–	–	–	–
1,2,4-Trimethylbenzene	1.124	9.308	6.70E+01	n	1.68E-02	1.39E-01	–	–
1,2-Dichlorobenzene	0.0074	0.0074	2.00E+03	ns	3.70E-06	3.70E-06	–	–
1,2-Dichloroethane	–	–	4.50E-01	c	–	–	–	–
1,2-Dichloropropane	–	2	9.30E-01	c*	–	–	–	2.15E-06
1,3,5-Trimethylbenzene	2.1	2.1	4.70E+01	n	4.47E-02	4.47E-02	–	–
1,4-Dichlorobenzene	0.0052	0.0052	2.60E+00	c	–	–	2.00E-09	2.00E-09
2-Butanone	0.04143	0.03605	2.80E+04	ns	1.48E-06	1.29E-06	–	–
2-Chlorotoluene	–	–	1.60E+03	ns	–	–	–	–
2-Hexanone	–	–	NA		–	–	–	–
4-Chlorotoluene	–	–	5.50E+03	ns	–	–	–	–
4-Methyl-2-Pentanone	–	–	5.30E+03	ns	–	–	–	–
Acetone	0.1199	0.1133	6.10E+04	n	1.97E-06	1.86E-06	–	–
Acetonitrile	–	–	8.70E+02	n	–	–	–	–
Benzene	0.4239	0.5842	1.10E+00	c*	–	–	3.85E-07	5.31E-07
Bromobenzene	–	–	9.40E+01	n	–	–	–	–
Bromodichloromethane	–	–	1.00E+01	c	–	–	–	–
Bromoform	–	–	6.10E+01	c*	–	–	–	–
c-1,2-Dichloroethene	–	–	7.80E+02	n	–	–	–	–
Carbon Disulfide	0.019	0.019	6.70E+02	ns	2.84E-05	2.84E-05	–	–
Chloroethane	–	–	1.50E+04	ns	–	–	–	–
Chloroform	1.5	0.2646	3.00E-01	c	–	–	5.00E-06	8.82E-07
Chloromethane	–	–	1.70E+00	c*	–	–	–	–
Diisopropyl Ether (DIPE)	–	–	1.20E+03	n	–	–	–	–
Ethanol	–	–	NA		–	–	–	–
Ethylbenzene	0.91	0.5959	5.70E+00	c	–	–	1.60E-07	1.05E-07
Iodomethane	–	–	7.90E+00	n	–	–	–	–
Isopropylbenzene	0.48	0.174	2.20E+03	ns	2.18E-04	7.91E-05	–	–
Methylene Chloride	–	–	1.10E+01	c	–	–	–	–
Methyl-t-Butyl Ether (MTBE)	–	–	3.90E+01	c	–	–	–	–
n-Butylbenzene	0.2338	0.4973	5.70E+00	c	–	–	4.10E-08	8.72E-08
n-Propylbenzene	0.84	0.289	NA		–	–	–	–
o-Xylene	0.2514	0.1973	5.30E+03	ns	4.74E-05	3.72E-05	–	–
p/m-Xylene	0.4458	0.4353	6.00E+02	ns	7.43E-04	7.26E-04	–	–
p-Isopropyltoluene	0.3	3.2	2.20E+03	ns	1.36E-04	1.45E-03	–	–
sec-Butylbenzene	0.69	0.191	5.70E+00	c	–	–	1.21E-07	3.35E-08
Styrene	–	0.0017	6.50E+03	ns	–	2.62E-07	–	–
t-1,2-Dichloroethene	–	–	1.10E+02	n	–	–	–	–
Tert-Butyl Alcohol (TBA)	0.031	0.082	2.30E+04	ns	1.35E-06	3.57E-06	–	–
tert-Butylbenzene	0.2	0.28	5.70E+00	c	–	–	3.51E-08	4.91E-08
Tetrachloroethene	0.04	0.04	5.70E-01	c	–	–	7.02E-08	7.02E-08
Toluene	0.63	0.2236	5.00E+03	ns	1.26E-04	4.47E-05	–	–
Trichloroethene	–	–	2.80E+00	c	–	–	–	–

Table C-4
Surface Soil Depth Interval Evaluation
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC) 0-0.5 ft interval (mg/kg)	Exposure Point Concentration (EPC) 0-2 ft Interval (mg/kg)	Residential Regional Screening Level (RSL) [a] (mg/kg)		Tier I - HQ [b] 0-0.5 ft interval (unitless)	Tier I - HQ [b] 0-2 ft Interval (unitless)	Tier I - ELCR [c] 0-0.5 ft interval (unitless)	Tier I - ELCR [c] 0-2 ft Interval (unitless)
Vinyl Acetate	–	–	9.90E+02	n	–	–	–	–
Vinyl Chloride	–	–	6.00E-02	c	–	–	–	–
Xylenes, total	0.6961	0.627	6.00E+02	ns	1.16E-03	1.05E-03	–	–
Semivolatile Organic Compounds (SVOCs)								
1-Methylnaphthalene	27.469	27.318	2.20E+01	c	–	–	1.25E-06	1.24E-06
2-Methylnaphthalene	35.666	35.577	3.10E+02	n	1.15E-01	1.15E-01	–	–
Acenaphthene	48	3.847	3.40E+03	n	1.41E-02	1.13E-03	–	–
Acenaphthylene	0.38	0.38	3.40E+03	n	1.12E-04	1.12E-04	–	–
Anthracene	0.1673	0.152	1.70E+04	n	9.84E-06	8.94E-06	–	–
Benzo(a)anthracene	0.57	0.169	1.50E-01	c	–	–	3.80E-06	1.13E-06
Benzo(b)fluoranthene	0.1695	0.154	1.50E-01	c	–	–	1.13E-06	1.03E-06
Benzo(ghi)perylene	0.1502	0.2768	1.70E+03	n	8.84E-05	1.63E-04	–	–
Benzo(k)fluoranthene	0.52	0.52	1.50E+00	c	–	–	3.47E-07	3.47E-07
Chrysene	0.2562	0.3712	1.50E+01	c	–	–	1.71E-08	2.47E-08
Dibenzo(a,h)anthracene	0.62	0.62	1.50E-02	c	–	–	4.13E-05	4.13E-05
Fluoranthene	0.221	0.4011	2.30E+03	n	9.61E-05	1.74E-04	–	–
Fluorene	23.898	4.244	2.30E+03	n	1.04E-02	1.85E-03	–	–
Indeno(1,2,3-cd)pyrene	0.145	0.123	1.50E-01	c	–	–	9.67E-07	8.20E-07
Naphthalene	2.135	0.247	3.90E+00	c*	–	–	5.47E-07	6.33E-08
Phenanthrene	83.642	58.628	1.70E+04	n	4.92E-03	3.45E-03	–	–
Pyrene	7.614	5.537	1.70E+03	n	4.48E-03	3.26E-03	–	–
Pesticides and Herbicides								
4,4-DDD	–	–	2.00E+00	c	–	–	–	–
4,4-DDE	–	–	1.40E+00	c	–	–	–	–
4,4-DDT	–	–	1.70E+00	c*	–	–	–	–
Aldrin	–	–	2.90E-02	c*	–	–	–	–
Chlordane	–	–	1.60E+00	c*	–	–	–	–
Dieldrin	–	–	3.00E-02	c	–	–	–	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	0.74	0.74	2.20E-01	c**	–	–	3.36E-06	3.36E-06
PCB-1260	–	–	2.20E-01	c	–	–	–	–
Inorganic Compounds								
Antimony	13.4	2.087	3.10E+01	n	4.32E-01	6.73E-02	–	–
Arsenic	7.38	7.188	3.90E-01	c*	–	–	1.89E-05	1.84E-05
Barium	212.4	199.5	1.50E+04	n	1.42E-02	1.33E-02	–	–
Beryllium	0.616	0.643	1.60E+02	n	3.85E-03	4.02E-03	–	–
Cadmium	0.823	0.74	7.00E+01	n	1.18E-02	1.06E-02	–	–
Chromium	57.07	0.06603	2.80E+02	c	–	–	2.04E-07	2.36E-10
Chromium, Hexavalent	–	–	3.90E+01	c**	–	–	–	–
Cobalt	11.97	12.34	2.30E+01	n	5.20E-01	5.37E-01	–	–
Copper	129.3	101.6	3.10E+03	n	4.17E-02	3.28E-02	–	–
Lead	244	216	4.00E+02	n<	6.10E-01	5.40E-01	–	–
Mercury	56.09	26.25	6.70E+00	ns	8.37E+00	3.92E+00	–	–
Molybdenum	3.498	2.678	3.90E+02	n	8.97E-03	6.87E-03	–	–
Nickel	22.57	22.44	1.60E+03	n	1.41E-02	1.40E-02	–	–
Selenium	1.22	1.22	3.90E+02	n	3.13E-03	3.13E-03	–	–
Silver	–	–	3.90E+02	n	–	–	–	–
Thallium	4.71	3.479	5.10E+00	n	9.24E-01	6.82E-01	–	–
Vanadium	42.99	44.48	5.50E+02	n	7.82E-02	8.09E-02	–	–
Zinc	1810	1301	2.30E+04	n	7.87E-02	5.66E-02	–	–

Table C-4
Surface Soil Depth Interval Evaluation
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentration (EPC)		Residential Regional Screening Level (RSL) [a]	Tier I - HQ [b]		Tier I - ELCR [c]	
	0-0.5 ft interval (mg/kg)	0-2 ft Interval (mg/kg)	(mg/kg)	0-0.5 ft interval (unitless)	0-2 ft Interval (unitless)	0-0.5 ft interval (unitless)	0-2 ft Interval (unitless)
Total				10	6	9.E-05	9.E-05

Notes:
mg/kg = milligram per kilogram

[a] The screening levels used were risk screening levels for the residential scenario from USEPA (2008a).
[b] Tier 1 Hazard Quotient (HQ) = EPC / RSL.
[c] Tier 1 Excess Lifetime Cancer Risk (ELCR) = EPC/ RSL x 10^{-6}.

ARCADIS

Appendix D

Description of ProUCL 4.0 and the ProUCL 4.0 Output Results (On CD)

ARCADIS

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ProUCL Generated Output for Detected Constituents in Soil and Soil Gas: Area 4	334
ProUCL Generated Output for Detected Constituents in Groundwater	435

Result (1,2,4-trimethylbenzene)			
General Statistics			
Number of Valid Data	115	Number of Detected Data	17
Number of Distinct Detected Data	16	Number of Non-Detect Data	98
		Percent Non-Detects	85.22%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3	Minimum Detected	1.099
Maximum Detected	27000	Maximum Detected	10.2
Mean of Detected	3047	Mean of Detected	5.146
SD of Detected	7060	SD of Detected	2.714
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	240	Maximum Non-Detect	5.481
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	109
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.78%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.51	Lilliefors Test Statistic	0.934
5% Lilliefors Critical Value	0.892	5% Lilliefors Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	453.2	Mean	0.632
SD	2859	SD	2.283
95% DL/2 (t) UCL	895.3	95% H-Stat (DL/2) UCL	36.07
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.879
		SD in Log Scale	5.518
		Mean in Original Scale	450.5
		SD in Original Scale	2859
		95% Percentile Bootstrap UCL	934.3
		95% BCA Bootstrap UCL	1204
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.243	**Data appear Lognormal at 5% Significance Level**	
Theta Star	12542		
nu star	8.26		
A-D Test Statistic	1.281	**Nonparametric Statistics**	
5% A-D Critical Value	0.863	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.863	Mean	453.1
5% K-S Critical Value	0.229	SD	2846
Data not Gamma Distributed at 5% Significance Level		SE of Mean	273.6
		95% KM (t) UCL	906.8
Assuming Gamma Distribution		95% KM (z) UCL	903.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	889.9
Minimum	3	95% KM (bootstrap t) UCL	2035
Maximum	27000	95% KM (BCA) UCL	921.3
Mean	2927	95% KM (Percentile Bootstrap) UCL	918.3
Median	3068	95% KM (Chebyshev) UCL	1646
SD	2666	97.5% KM (Chebyshev) UCL	2162
k star	1.269	99% KM (Chebyshev) UCL	3175
Theta star	2307		
Nu star	291.9	**Potential UCLs to Use**	
AppChi2	253.3	97.5% KM (Chebyshev) UCL	2162
95% Gamma Approximate UCL	3373		
95% Adjusted Gamma UCL	3379		
Note: DL/2 is not a recommended method.			

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	115	Number of Detected Data	18
Number of Distinct Detected Data	17	Number of Non-Detect Data	97
		Percent Non-Detects	84.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	9300	Maximum Detected	9.138
Mean of Detected	1055	Mean of Detected	4.236
SD of Detected	2327	SD of Detected	2.803
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	240	Maximum Non-Detect	5.481
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	107
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.04%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.527	Lilliefors Test Statistic	0.926
5% Lilliefors Critical Value	0.897	5% Lilliefors Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	167.8	Mean	0.539
SD	977.1	SD	2.084
95% DL/2 (t) UCL	318.9	95% H-Stat (DL/2) UCL	20.24
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.734
		SD in Log Scale	5.619
		Mean in Original Scale	165.1
		SD in Original Scale	977.4
		95% Percentile Bootstrap UCL	328.9
		95% BCA Bootstrap UCL	426.1
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.253	**Data appear Lognormal at 5% Significance Level**	
Theta Star	4169		
nu star	9.108		
A-D Test Statistic	0.975	**Nonparametric Statistics**	
5% A-D Critical Value	0.859	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.859	Mean	166.4
5% K-S Critical Value	0.223	SD	972.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	93.36
		95% KM (t) UCL	321.2
Assuming Gamma Distribution		95% KM (z) UCL	320
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	316.5
Minimum	1.5	95% KM (bootstrap t) UCL	821.5
Maximum	9300	95% KM (BCA) UCL	339.8
Mean	1684	95% KM (Percentile Bootstrap) UCL	328.7
Median	826.7	95% KM (Chebyshev) UCL	573.3
SD	2157	97.5% KM (Chebyshev) UCL	749.4
k star	0.567	99% KM (Chebyshev) UCL	1095
Theta star	2969		
Nu star	130.4	**Potential UCLs to Use**	
AppChi2	105	97.5% KM (Chebyshev) UCL	749.4
95% Gamma Approximate UCL	2091		
95% Adjusted Gamma UCL	2096		

Note: DL/2 is not a recommended method.

Result (1-methylnaphthalene)

General Statistics

Number of Valid Data	115	Number of Detected Data	37
Number of Distinct Detected Data	33	Number of Non-Detect Data	78
		Percent Non-Detects	67.83%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	24	Minimum Detected	3.178
Maximum Detected	270000	Maximum Detected	12.51
Mean of Detected	11564	Mean of Detected	6.135
SD of Detected	45319	SD of Detected	2.457
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	103
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.57%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.283	Lilliefors Test Statistic	0.92
5% Lilliefors Critical Value	0.936	5% Lilliefors Critical Value	0.936
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3752	Mean	4.215
SD	26034	SD	2.079
95% DL/2 (t) UCL	7778	95% H-Stat (DL/2) UCL	817.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.551
		SD in Log Scale	4.028
		Mean in Original Scale	3724
		SD in Original Scale	26038
		95% Percentile Bootstrap UCL	8389
		95% BCA Bootstrap UCL	12441
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.224	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	51575		
nu star	16.59		
A-D Test Statistic	3.799	**Nonparametric Statistics**	
5% A-D Critical Value	0.89	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.89	Mean	3739
5% K-S Critical Value	0.16	SD	25923
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2451
		95% KM (t) UCL	7803
Assuming Gamma Distribution		95% KM (z) UCL	7770
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7764
Minimum	24	95% KM (bootstrap t) UCL	29765
Maximum	270000	95% KM (BCA) UCL	8558
Mean	11699	95% KM (Percentile Bootstrap) UCL	8291
Median	11420	95% KM (Chebyshev) UCL	14421
SD	25472	97.5% KM (Chebyshev) UCL	19043
k star	0.587	99% KM (Chebyshev) UCL	28123
Theta star	19945		
Nu star	134.9	**Potential UCLs to Use**	
AppChi2	109.1	97.5% KM (Chebyshev) UCL	19043
95% Gamma Approximate UCL	14470		
95% Adjusted Gamma UCL	14508		

Note: DL/2 is not a recommended method.

Result (2-butanone)

General Statistics

Number of Valid Data	115	Number of Detected Data	47
Number of Distinct Detected Data	28	Number of Non-Detect Data	68
		Percent Non-Detects	59.13%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	11	Minimum Detected	2.398
Maximum Detected	91	Maximum Detected	4.511
Mean of Detected	28.32	Mean of Detected	3.242
SD of Detected	14.57	SD of Detected	0.443
Minimum Non-Detect	8	Minimum Non-Detect	2.079
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.823	Lilliefors Test Statistic	0.975
5% Lilliefors Critical Value	0.946	5% Lilliefors Critical Value	0.946
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	120.2	Mean	2.968
SD	552.8	SD	1.36
95% DL/2 (t) UCL	205.7	95% H-Stat (DL/2) UCL	71.84
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.67
		SD in Log Scale	0.607
		Mean in Original Scale	17.62
		SD in Original Scale	13.09
		95% Percentile Bootstrap UCL	19.7
		95% BCA Bootstrap UCL	20.01
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.754	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	5.956		
nu star	446.9		
A-D Test Statistic	0.584	**Nonparametric Statistics**	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	19.3
5% K-S Critical Value	0.13	SD	12.79
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.28
		95% KM (t) UCL	21.43
Assuming Gamma Distribution		95% KM (z) UCL	21.41
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	21.15
Minimum	11	95% KM (bootstrap t) UCL	21.83
Maximum	91	95% KM (BCA) UCL	22.52
Mean	28.35	95% KM (Percentile Bootstrap) UCL	21.75
Median	28.69	95% KM (Chebyshev) UCL	24.88
SD	9.567	97.5% KM (Chebyshev) UCL	27.3
k star	10.88	99% KM (Chebyshev) UCL	32.04
Theta star	2.606		
Nu star	2502	**Potential UCLs to Use**	
AppChi2	2387	95% KM (t) UCL	21.43
95% Gamma Approximate UCL	29.72		
95% Adjusted Gamma UCL	29.74		

Note: DL/2 is not a recommended method.

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	115	Number of Detected Data	42
Number of Distinct Detected Data	38	Number of Non-Detect Data	73
		Percent Non-Detects	63.48%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	350000	Maximum Detected	12.77
Mean of Detected	12204	Mean of Detected	5.978
SD of Detected	54543	SD of Detected	2.374
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	2200	Maximum Non-Detect	7.696
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	106
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.17%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.244	Lilliefors Test Statistic	0.87
5% Lilliefors Critical Value	0.942	5% Lilliefors Critical Value	0.942
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4495	Mean	4.298
SD	33233	SD	2.096
95% DL/2 (t) UCL	9635	95% H-Stat (DL/2) UCL	849.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.143
		SD in Log Scale	3.698
		Mean in Original Scale	4460
		SD in Original Scale	33238
		95% Percentile Bootstrap UCL	10078
		95% BCA Bootstrap UCL	14714
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.213	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	57257		
nu star	17.9		
A-D Test Statistic	5.32	**Nonparametric Statistics**	
5% A-D Critical Value	0.898	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.898	Mean	4475
5% K-S Critical Value	0.151	SD	33091
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3123
		95% KM (t) UCL	9654
Assuming Gamma Distribution		95% KM (z) UCL	9612
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9615
Minimum	22	95% KM (bootstrap t) UCL	39589
Maximum	350000	95% KM (BCA) UCL	10788
Mean	12426	95% KM (Percentile Bootstrap) UCL	10626
Median	10463	95% KM (Chebyshev) UCL	18089
SD	32860	97.5% KM (Chebyshev) UCL	23979
k star	0.491	99% KM (Chebyshev) UCL	35550
Theta star	25289		
Nu star	113	**Potential UCLs to Use**	
AppChi2	89.47	97.5% KM (Chebyshev) UCL	23979
95% Gamma Approximate UCL	15695		
95% Adjusted Gamma UCL	15742		

Note: DL/2 is not a recommended method.

Result (acenaphthene)

General Statistics

Number of Valid Data	115	Number of Detected Data	16
Number of Distinct Detected Data	15	Number of Non-Detect Data	99
		Percent Non-Detects	86.09%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	43	Minimum Detected	3.761
Maximum Detected	26000	Maximum Detected	10.17
Mean of Detected	4083	Mean of Detected	6.239
SD of Detected	7834	SD of Detected	2.128
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	111
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.52%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.594	Lilliefors Test Statistic	0.869
5% Lilliefors Critical Value	0.887	5% Lilliefors Critical Value	0.887
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	612.8	Mean	3.743
SD	3169	SD	1.591
95% DL/2 (t) UCL	1103	95% H-Stat (DL/2) UCL	190.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.268
		SD in Log Scale	4.313
		Mean in Original Scale	569.6
		SD in Original Scale	3176
		95% Percentile Bootstrap UCL	1107
		95% BCA Bootstrap UCL	1293
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.308	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	13268		
nu star	9.848		
A-D Test Statistic	1.683	**Nonparametric Statistics**	
5% A-D Critical Value	0.832	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.832	Mean	606.3
5% K-S Critical Value	0.232	SD	3156
Data not Gamma Distributed at 5% Significance Level		SE of Mean	303.9
		95% KM (t) UCL	1110
Assuming Gamma Distribution		95% KM (z) UCL	1106
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1095
Minimum	1E-09	95% KM (bootstrap t) UCL	1850
Maximum	102685	95% KM (BCA) UCL	1228
Mean	19151	95% KM (Percentile Bootstrap) UCL	1145
Median	7645	95% KM (Chebyshev) UCL	1931
SD	25384	97.5% KM (Chebyshev) UCL	2504
k star	0.115	99% KM (Chebyshev) UCL	3630
Theta star	165834		
Nu star	26.56	**Potential UCLs to Use**	
AppChi2	15.81	97.5% KM (Chebyshev) UCL	2504
95% Gamma Approximate UCL	32169		
95% Adjusted Gamma UCL	32385		

Note: DL/2 is not a recommended method.

Result (acenaphthylene)

General Statistics

Number of Valid Data	115	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	109
		Percent Non-Detects	94.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	38	Minimum Detected	3.638
Maximum Detected	3400	Maximum Detected	8.132
Mean of Detected	706.8	Mean of Detected	5.351
SD of Detected	1324	SD of Detected	1.633
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.571	Lilliefors Test Statistic	0.889
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	199.6	Mean	3.59
SD	1116	SD	1.32
95% DL/2 (t) UCL	372.2	95% H-Stat (DL/2) UCL	112.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.636
		SD in Log Scale	3.421
		Mean in Original Scale	37.69
		SD in Original Scale	318.9
		95% Percentile Bootstrap UCL	97.07
		95% BCA Bootstrap UCL	152.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.372	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	1900		
nu star	4.464		
A-D Test Statistic	0.69	**Nonparametric Statistics**	
5% A-D Critical Value	0.735	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.735	Mean	73.6
5% K-S Critical Value	0.348	SD	315
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	32.33
		95% KM (t) UCL	127.2
Assuming Gamma Distribution		95% KM (z) UCL	126.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	118.8
Minimum	1E-09	95% KM (bootstrap t) UCL	387.3
Maximum	3400	95% KM (BCA) UCL	N/A
Mean	334.9	95% KM (Percentile Bootstrap) UCL	268.6
Median	209.8	95% KM (Chebyshev) UCL	214.5
SD	433.5	97.5% KM (Chebyshev) UCL	275.5
k star	0.0861	99% KM (Chebyshev) UCL	395.3
Theta star	3887		
Nu star	19.81	**Potential UCLs to Use**	
AppChi2	10.71	95% KM (t) UCL	127.2
95% Gamma Approximate UCL	619.3		
95% Adjusted Gamma UCL	624.3		

Note: DL/2 is not a recommended method.

Result (acetone)

General Statistics

Number of Valid Data	115	Number of Detected Data	57
Number of Distinct Detected Data	40	Number of Non-Detect Data	58
		Percent Non-Detects	50.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	180	Maximum Detected	5.193
Mean of Detected	86.18	Mean of Detected	4.334
SD of Detected	41.32	SD of Detected	0.517
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	28000	Maximum Non-Detect	10.24
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.124	Lilliefors Test Statistic	0.0949
5% Lilliefors Critical Value	0.117	5% Lilliefors Critical Value	0.117
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	559.8	Mean	4.994
SD	1450	SD	1.589
95% DL/2 (t) UCL	784	95% H-Stat (DL/2) UCL	1318
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.098
		SD in Log Scale	0.514
		Mean in Original Scale	68.65
		SD in Original Scale	36.55
		95% Percentile Bootstrap UCL	74.56
		95% BCA Bootstrap UCL	74.42
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.026	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	21.41		
nu star	458.9		
A-D Test Statistic	0.514	**Nonparametric Statistics**	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	71.69
5% K-S Critical Value	0.118	SD	43.13
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4.995
		95% KM (t) UCL	79.97
Assuming Gamma Distribution		95% KM (z) UCL	79.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	79.52
Minimum	1E-09	95% KM (bootstrap t) UCL	80.35
Maximum	180	95% KM (BCA) UCL	80.6
Mean	87.88	95% KM (Percentile Bootstrap) UCL	79.84
Median	80	95% KM (Chebyshev) UCL	93.46
SD	37.7	97.5% KM (Chebyshev) UCL	102.9
k star	1.697	99% KM (Chebyshev) UCL	121.4
Theta star	51.8		
Nu star	390.2	**Potential UCLs to Use**	
AppChi2	345.4	95% KM (t) UCL	79.97
95% Gamma Approximate UCL	99.27		
95% Adjusted Gamma UCL	99.42		

Note: DL/2 is not a recommended method.

Result (anthracene)

General Statistics

Number of Valid Data	115	Number of Detected Data	17
Number of Distinct Detected Data	16	Number of Non-Detect Data	98
		Percent Non-Detects	85.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	26	Minimum Detected	3.258
Maximum Detected	4000	Maximum Detected	8.294
Mean of Detected	817.8	Mean of Detected	5.875
SD of Detected	1089	SD of Detected	1.406
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.722	Lilliefors Test Statistic	0.972
5% Lilliefors Critical Value	0.892	5% Lilliefors Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	274.2	Mean	3.787
SD	1170	SD	1.545
95% DL/2 (t) UCL	455.1	95% H-Stat (DL/2) UCL	177.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.264
		SD in Log Scale	2.687
		Mean in Original Scale	126.2
		SD in Original Scale	500.1
		95% Percentile Bootstrap UCL	211.3
		95% BCA Bootstrap UCL	243.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.635	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1288		
nu star	21.58		
A-D Test Statistic	0.547	**Nonparametric Statistics**	
5% A-D Critical Value	0.779	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.779	Mean	146.3
5% K-S Critical Value	0.218	SD	496.5
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	48.04
		95% KM (t) UCL	225.9
Assuming Gamma Distribution		95% KM (z) UCL	225.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	212.6
Minimum	1E-09	95% KM (bootstrap t) UCL	268.3
Maximum	4945	95% KM (BCA) UCL	290.5
Mean	1612	95% KM (Percentile Bootstrap) UCL	249.9
Median	1399	95% KM (Chebyshev) UCL	355.7
SD	1425	97.5% KM (Chebyshev) UCL	446.3
k star	0.208	99% KM (Chebyshev) UCL	624.3
Theta star	7764		
Nu star	47.76	**Potential UCLs to Use**	
AppChi2	32.9	95% KM (t) UCL	225.9
95% Gamma Approximate UCL	2341		
95% Adjusted Gamma UCL	2352		

Note: DL/2 is not a recommended method.

Result (antimony)

General Statistics

Number of Valid Data	115	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	103
		Percent Non-Detects	89.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.974	Minimum Detected	-0.0263
Maximum Detected	4.96	Maximum Detected	1.601
Mean of Detected	2.59	Mean of Detected	0.783
SD of Detected	1.472	SD of Detected	0.628
Minimum Non-Detect	0.762	Minimum Non-Detect	-0.272
Maximum Non-Detect	0.905	Maximum Non-Detect	-0.0998
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	103
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.57%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.897	Lilliefors Test Statistic	0.885
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.635	Mean	-0.724
SD	0.811	SD	0.553
95% DL/2 (t) UCL	0.76	95% H-Stat (DL/2) UCL	0.565
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.048
		SD in Log Scale	1.148
		Mean in Original Scale	0.37
		SD in Original Scale	0.89
		95% Percentile Bootstrap UCL	0.513
		95% BCA Bootstrap UCL	0.542
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.395	**Data appear Normal at 5% Significance Level**	
Theta Star	1.081		
nu star	57.47		
A-D Test Statistic	0.496	**Nonparametric Statistics**	
5% A-D Critical Value	0.739	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.739	Mean	1.143
5% K-S Critical Value	0.247	SD	0.672
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0654
		95% KM (t) UCL	1.251
Assuming Gamma Distribution		95% KM (z) UCL	1.25
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.229
Minimum	0.974	95% KM (bootstrap t) UCL	1.284
Maximum	4.96	95% KM (BCA) UCL	1.412
Mean	2.58	95% KM (Percentile Bootstrap) UCL	1.288
Median	2.573	95% KM (Chebyshev) UCL	1.428
SD	0.463	97.5% KM (Chebyshev) UCL	1.551
k star	27.23	99% KM (Chebyshev) UCL	1.794
Theta star	0.0947		
Nu star	6264	**Potential UCLs to Use**	
AppChi2	6081	95% KM (t) UCL	1.251
95% Gamma Approximate UCL	2.658	95% KM (Percentile Bootstrap) UCL	1.288
95% Adjusted Gamma UCL	2.659		

Note: DL/2 is not a recommended method.

Result (arsenic)

General Statistics

Number of Valid Data	115	Number of Detected Data	105
Number of Distinct Detected Data	100	Number of Non-Detect Data	10
		Percent Non-Detects	8.70%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.07	Minimum Detected	0.0677
Maximum Detected	13.5	Maximum Detected	2.603
Mean of Detected	5.346	Mean of Detected	1.521
SD of Detected	2.896	SD of Detected	0.587
Minimum Non-Detect	0.762	Minimum Non-Detect	-0.272
Maximum Non-Detect	0.872	Maximum Non-Detect	-0.137
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	10
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	105
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	8.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.117	Lilliefors Test Statistic	0.0751
5% Lilliefors Critical Value	0.0865	5% Lilliefors Critical Value	0.0865
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.916	Mean	1.31
SD	3.099	SD	0.885
95% DL/2 (t) UCL	5.395	95% H-Stat (DL/2) UCL	5.499
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	4.819	Mean in Log Scale	1.409
SD	3.266	SD in Log Scale	0.668
95% MLE (t) UCL	5.324	Mean in Original Scale	4.991
95% MLE (Tiku) UCL	5.322	SD in Original Scale	2.997
		95% Percentile Bootstrap UCL	5.456
		95% BCA Bootstrap UCL	5.439
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.281	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1.629		
nu star	689		
A-D Test Statistic	0.227	**Nonparametric Statistics**	
5% A-D Critical Value	0.758	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.758	Mean	4.974
5% K-S Critical Value	0.0887	SD	3.006
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.282
		95% KM (t) UCL	5.441
Assuming Gamma Distribution		95% KM (z) UCL	5.437
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.437
Minimum	0.0152	95% KM (bootstrap t) UCL	5.485
Maximum	13.5	95% KM (BCA) UCL	5.462
Mean	4.882	95% KM (Percentile Bootstrap) UCL	5.439
Median	4.64	95% KM (Chebyshev) UCL	6.202
SD	3.151	97.5% KM (Chebyshev) UCL	6.733
k star	1.004	99% KM (Chebyshev) UCL	7.776
Theta star	4.861		
Nu star	231	**Potential UCLs to Use**	
AppChi2	196.8	95% KM (BCA) UCL	5.462
95% Gamma Approximate UCL	5.73		
95% Adjusted Gamma UCL	5.742		

Note: DL/2 is not a recommended method.

Result (barium)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	85

Raw Statistics		**Log-transformed Statistics**	
Minimum	31.9	Minimum of Log Data	3.463
Maximum	566	Maximum of Log Data	6.339
Mean	188	Mean of log Data	5.138
Median	174	SD of log Data	0.447
SD	92.36		
Coefficient of Variation	0.491		
Skewness	2.167		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.222	Lilliefors Test Statistic	0.134
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	202.3	95% H-UCL	203.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	224
95% Adjusted-CLT UCL	204	97.5% Chebyshev (MVUE) UCL	239.4
95% Modified-t UCL	202.6	99% Chebyshev (MVUE) UCL	269.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.122	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	36.7		
nu star	1178		
Approximate Chi Square Value (.05)	1099	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	202.2
Adjusted Chi Square Value	1099	95% Jackknife UCL	202.3
		95% Standard Bootstrap UCL	202.5
Anderson-Darling Test Statistic	4.004	95% Bootstrap-t UCL	205.3
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	204.7
Kolmogorov-Smirnov Test Statistic	0.161	95% Percentile Bootstrap UCL	202.8
Kolmogorov-Smirnov 5% Critical Value	0.0857	95% BCA Bootstrap UCL	204.5
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	225.5
		97.5% Chebyshev(Mean, Sd) UCL	241.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	273.7
95% Approximate Gamma UCL	201.5		
95% Adjusted Gamma UCL	201.6		
Potential UCL to Use		Use 95% Student's-t UCL	202.3
		or 95% Modified-t UCL	202.6

Result (benzene)

General Statistics

Number of Valid Data	115	Number of Detected Data	25
Number of Distinct Detected Data	21	Number of Non-Detect Data	90
		Percent Non-Detects	78.26%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.61	Minimum Detected	-0.494
Maximum Detected	280	Maximum Detected	5.635
Mean of Detected	22.15	Mean of Detected	1.232
SD of Detected	61.36	SD of Detected	1.625
Minimum Non-Detect	0.42	Minimum Non-Detect	-0.868
Maximum Non-Detect	560	Maximum Non-Detect	6.328
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.4	Lilliefors Test Statistic	0.83
5% Lilliefors Critical Value	0.918	5% Lilliefors Critical Value	0.918
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	9.696	Mean	-0.184
SD	40.13	SD	1.615
95% DL/2 (t) UCL	15.9	95% H-Stat (DL/2) UCL	3.818
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.786
		SD in Log Scale	2.458
		Mean in Original Scale	4.842
		SD in Original Scale	29.61
		95% Percentile Bootstrap UCL	9.512
		95% BCA Bootstrap UCL	12.13
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.342	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	64.68		
nu star	17.12		
A-D Test Statistic	3.712	**Nonparametric Statistics**	
5% A-D Critical Value	0.839	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.839	Mean	5.396
5% K-S Critical Value	0.188	SD	29.57
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.831
		95% KM (t) UCL	10.09
Assuming Gamma Distribution		95% KM (z) UCL	10.05
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9.995
Minimum	0.61	95% KM (bootstrap t) UCL	42.44
Maximum	280	95% KM (BCA) UCL	10.96
Mean	22.94	95% KM (Percentile Bootstrap) UCL	10.15
Median	18.74	95% KM (Chebyshev) UCL	17.74
SD	29.55	97.5% KM (Chebyshev) UCL	23.07
k star	1.166	99% KM (Chebyshev) UCL	33.56
Theta star	19.67		
Nu star	268.2	**Potential UCLs to Use**	
AppChi2	231.3	95% KM (Chebyshev) UCL	17.74
95% Gamma Approximate UCL	26.6		
95% Adjusted Gamma UCL	26.65		

Note: DL/2 is not a recommended method.

Result (benzo(a)anthracene)

General Statistics

Number of Valid Data	115	Number of Detected Data	41
Number of Distinct Detected Data	35	Number of Non-Detect Data	74
		Percent Non-Detects	64.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	21	Minimum Detected	3.045
Maximum Detected	7200	Maximum Detected	8.882
Mean of Detected	804.3	Mean of Detected	5.468
SD of Detected	1594	SD of Detected	1.507
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.528	Lilliefors Test Statistic	0.942
5% Lilliefors Critical Value	0.941	5% Lilliefors Critical Value	0.941
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	418.1	Mean	4.122
SD	1453	SD	1.676
95% DL/2 (t) UCL	642.9	95% H-Stat (DL/2) UCL	313.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.923
		SD in Log Scale	2.397
		Mean in Original Scale	293.4
		SD in Original Scale	1018
		95% Percentile Bootstrap UCL	464.9
		95% BCA Bootstrap UCL	497.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.495	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1623		
nu star	40.63		
A-D Test Statistic	2.481	**Nonparametric Statistics**	
5% A-D Critical Value	0.812	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.812	Mean	306.8
5% K-S Critical Value	0.146	SD	1015
Data not Gamma Distributed at 5% Significance Level		SE of Mean	96.29
		95% KM (t) UCL	466.4
Assuming Gamma Distribution		95% KM (z) UCL	465.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	459.6
Minimum	21	95% KM (bootstrap t) UCL	612.6
Maximum	7200	95% KM (BCA) UCL	490.2
Mean	873.4	95% KM (Percentile Bootstrap) UCL	482.7
Median	600	95% KM (Chebyshev) UCL	726.5
SD	1062	97.5% KM (Chebyshev) UCL	908.1
k star	0.974	99% KM (Chebyshev) UCL	1265
Theta star	896.5		
Nu star	224.1	**Potential UCLs to Use**	
AppChi2	190.4	95% KM (Chebyshev) UCL	726.5
95% Gamma Approximate UCL	1028		
95% Adjusted Gamma UCL	1030		

Note: DL/2 is not a recommended method.

Result (benzo(a)pyrene)

General Statistics

Number of Valid Data	115	Number of Detected Data	43
Number of Distinct Detected Data	35	Number of Non-Detect Data	72
		Percent Non-Detects	62.61%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	26	Minimum Detected	3.258
Maximum Detected	5200	Maximum Detected	8.556
Mean of Detected	490.7	Mean of Detected	5.289
SD of Detected	904.9	SD of Detected	1.292
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.529	Lilliefors Test Statistic	0.958
5% Lilliefors Critical Value	0.943	5% Lilliefors Critical Value	0.943
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	333.5	Mean	4.169
SD	1211	SD	1.61
95% DL/2 (t) UCL	520.8	95% H-Stat (DL/2) UCL	278.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.336
		SD in Log Scale	1.942
		Mean in Original Scale	193.3
		SD in Original Scale	596
		95% Percentile Bootstrap UCL	290.8
		95% BCA Bootstrap UCL	330.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.639	**Data appear Lognormal at 5% Significance Level**	
Theta Star	767.9		
nu star	54.96		
A-D Test Statistic	1.912	**Nonparametric Statistics**	
5% A-D Critical Value	0.797	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.797	Mean	208.1
5% K-S Critical Value	0.141	SD	593.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	56.46
		95% KM (t) UCL	301.7
Assuming Gamma Distribution		95% KM (z) UCL	300.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	299.1
Minimum	1E-09	95% KM (bootstrap t) UCL	368.6
Maximum	5200	95% KM (BCA) UCL	309.7
Mean	543.8	95% KM (Percentile Bootstrap) UCL	309.8
Median	330.1	95% KM (Chebyshev) UCL	454.2
SD	692	97.5% KM (Chebyshev) UCL	560.7
k star	0.22	99% KM (Chebyshev) UCL	769.9
Theta star	2475		
Nu star	50.52	**Potential UCLs to Use**	
AppChi2	35.2	95% KM (BCA) UCL	309.7
95% Gamma Approximate UCL	780.5		
95% Adjusted Gamma UCL	784.1		

Note: DL/2 is not a recommended method.

Result (benzo(b)fluoranthene)

General Statistics

Number of Valid Data	115	Number of Detected Data	31
Number of Distinct Detected Data	29	Number of Non-Detect Data	84
		Percent Non-Detects	73.04%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	21	Minimum Detected	3.045
Maximum Detected	2900	Maximum Detected	7.972
Mean of Detected	394.2	Mean of Detected	5.06
SD of Detected	675.4	SD of Detected	1.314
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.567	Lilliefors Test Statistic	0.949
5% Lilliefors Critical Value	0.929	5% Lilliefors Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	265.6	Mean	3.975
SD	1132	SD	1.483
95% DL/2 (t) UCL	440.6	95% H-Stat (DL/2) UCL	207.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.582
		SD in Log Scale	2.012
		Mean in Original Scale	114.5
		SD in Original Scale	386.4
		95% Percentile Bootstrap UCL	178.1
		95% BCA Bootstrap UCL	196.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.622	**Data appear Lognormal at 5% Significance Level**	
Theta Star	634.2		
nu star	38.54		
A-D Test Statistic	1.54	**Nonparametric Statistics**	
5% A-D Critical Value	0.795	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.795	Mean	128.1
5% K-S Critical Value	0.165	SD	384.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	36.75
		95% KM (t) UCL	189.1
Assuming Gamma Distribution		95% KM (z) UCL	188.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	188.4
Minimum	21	95% KM (bootstrap t) UCL	235.4
Maximum	2900	95% KM (BCA) UCL	210.1
Mean	474.5	95% KM (Percentile Bootstrap) UCL	193.8
Median	361.5	95% KM (Chebyshev) UCL	288.3
SD	459.4	97.5% KM (Chebyshev) UCL	357.6
k star	1.16	99% KM (Chebyshev) UCL	493.8
Theta star	409.2		
Nu star	266.7	**Potential UCLs to Use**	
AppChi2	229.9	95% KM (BCA) UCL	210.1
95% Gamma Approximate UCL	550.5		
95% Adjusted Gamma UCL	551.6		

Note: DL/2 is not a recommended method.

Result (benzo(ghi)perylene)

General Statistics

Number of Valid Data	115	Number of Detected Data	45
Number of Distinct Detected Data	39	Number of Non-Detect Data	70
		Percent Non-Detects	60.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	1400	Maximum Detected	7.244
Mean of Detected	241.1	Mean of Detected	4.804
SD of Detected	330.4	SD of Detected	1.157
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.654	Lilliefors Test Statistic	0.946
5% Lilliefors Critical Value	0.945	5% Lilliefors Critical Value	0.945
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	249.6	Mean	4.109
SD	1091	SD	1.419
95% DL/2 (t) UCL	418.4	95% H-Stat (DL/2) UCL	206.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.33
		SD in Log Scale	1.6
		Mean in Original Scale	105
		SD in Original Scale	233.2
		95% Percentile Bootstrap UCL	143
		95% BCA Bootstrap UCL	151.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.82	**Data appear Lognormal at 5% Significance Level**	
Theta Star	294		
nu star	73.82		
A-D Test Statistic	1.4	**Nonparametric Statistics**	
5% A-D Critical Value	0.784	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.784	Mean	116
5% K-S Critical Value	0.136	SD	232.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	22.39
		95% KM (t) UCL	153.1
Assuming Gamma Distribution		95% KM (z) UCL	152.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	152.5
Minimum	1E-09	95% KM (bootstrap t) UCL	169.6
Maximum	1400	95% KM (BCA) UCL	151.2
Mean	246	95% KM (Percentile Bootstrap) UCL	154.4
Median	163.3	95% KM (Chebyshev) UCL	213.6
SD	257.9	97.5% KM (Chebyshev) UCL	255.8
k star	0.31	99% KM (Chebyshev) UCL	338.8
Theta star	793.1		
Nu star	71.36	**Potential UCLs to Use**	
AppChi2	52.91	95% KM (BCA) UCL	151.2
95% Gamma Approximate UCL	331.8		
95% Adjusted Gamma UCL	333.1		

Note: DL/2 is not a recommended method.

Result (benzo(k)fluoranthene)

General Statistics

Number of Valid Data	115	Number of Detected Data	18
Number of Distinct Detected Data	15	Number of Non-Detect Data	97
		Percent Non-Detects	84.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	27	Minimum Detected	3.296
Maximum Detected	2000	Maximum Detected	7.601
Mean of Detected	365.1	Mean of Detected	5.05
SD of Detected	564.1	SD of Detected	1.311
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.61	Lilliefors Test Statistic	0.933
5% Lilliefors Critical Value	0.897	5% Lilliefors Critical Value	0.897
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	225.7	Mean	3.806
SD	1100	SD	1.418
95% DL/2 (t) UCL	395.8	95% H-Stat (DL/2) UCL	163.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.396
		SD in Log Scale	2.263
		Mean in Original Scale	62.47
		SD in Original Scale	254.3
		95% Percentile Bootstrap UCL	103.2
		95% BCA Bootstrap UCL	121.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.629	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	580.7		
nu star	22.63		
A-D Test Statistic	0.922	**Nonparametric Statistics**	
5% A-D Critical Value	0.782	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.782	Mean	83.9
5% K-S Critical Value	0.212	SD	252.5
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	24.62
		95% KM (t) UCL	124.7
Assuming Gamma Distribution		95% KM (z) UCL	124.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	123
Minimum	1E-09	95% KM (bootstrap t) UCL	189.9
Maximum	2030	95% KM (BCA) UCL	140.4
Mean	573.7	95% KM (Percentile Bootstrap) UCL	129.6
Median	435	95% KM (Chebyshev) UCL	191.2
SD	564.3	97.5% KM (Chebyshev) UCL	237.6
k star	0.169	99% KM (Chebyshev) UCL	328.9
Theta star	3403		
Nu star	38.78	**Potential UCLs to Use**	
AppChi2	25.52	95% KM (t) UCL	124.7
95% Gamma Approximate UCL	871.9		
95% Adjusted Gamma UCL	876.6		

Note: DL/2 is not a recommended method.

Result (beryllium)

General Statistics

Number of Valid Data	115	Number of Detected Data	109
Number of Distinct Detected Data	99	Number of Non-Detect Data	6
		Percent Non-Detects	5.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.274	Minimum Detected	-1.295
Maximum Detected	1.13	Maximum Detected	0.122
Mean of Detected	0.564	Mean of Detected	-0.617
SD of Detected	0.169	SD of Detected	0.301
Minimum Non-Detect	0.26	Minimum Non-Detect	-1.347
Maximum Non-Detect	0.277	Maximum Non-Detect	-1.284
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	7
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	108
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	6.09%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.0876	Lilliefors Test Statistic	0.0551
5% Lilliefors Critical Value	0.0849	5% Lilliefors Critical Value	0.0849
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.542	Mean	-0.689
SD	0.19	SD	0.427
95% DL/2 (t) UCL	0.571	95% H-Stat (DL/2) UCL	0.581
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.544	Mean in Log Scale	-0.653
SD	0.185	SD in Log Scale	0.332
95% MLE (t) UCL	0.573	Mean in Original Scale	0.549
95% MLE (Tiku) UCL	0.573	SD in Original Scale	0.177
		95% Percentile Bootstrap UCL	0.575
		95% BCA Bootstrap UCL	0.574
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	11.18	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.0505		
nu star	2436		
A-D Test Statistic	0.212	**Nonparametric Statistics**	
5% A-D Critical Value	0.752	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.752	Mean	0.549
5% K-S Critical Value	0.0871	SD	0.176
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0165
		95% KM (t) UCL	0.576
Assuming Gamma Distribution		95% KM (z) UCL	0.576
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.576
Minimum	0.168	95% KM (bootstrap t) UCL	0.577
Maximum	1.13	95% KM (BCA) UCL	0.576
Mean	0.544	95% KM (Percentile Bootstrap) UCL	0.577
Median	0.531	95% KM (Chebyshev) UCL	0.621
SD	0.186	97.5% KM (Chebyshev) UCL	0.652
k star	7.543	99% KM (Chebyshev) UCL	0.713
Theta star	0.0721		
Nu star	1735	**Potential UCLs to Use**	
AppChi2	1639	95% KM (BCA) UCL	0.576
95% Gamma Approximate UCL	0.576		
95% Adjusted Gamma UCL	0.576		

Note: DL/2 is not a recommended method.

Result (cadmium)

General Statistics

Number of Valid Data	115	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	101
		Percent Non-Detects	87.83%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.6	Minimum Detected	-0.511
Maximum Detected	1.97	Maximum Detected	0.678
Mean of Detected	1.237	Mean of Detected	0.139
SD of Detected	0.461	SD of Detected	0.413
Minimum Non-Detect	0.508	Minimum Non-Detect	-0.677
Maximum Non-Detect	0.603	Maximum Non-Detect	-0.506
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	102
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	13
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.944	Lilliefors Test Statistic	0.91
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.389	Mean	-1.129
SD	0.353	SD	0.496
95% DL/2 (t) UCL	0.444	95% H-Stat (DL/2) UCL	0.369
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.513
		SD in Log Scale	0.749
		Mean in Original Scale	0.319
		SD in Original Scale	0.384
		95% Percentile Bootstrap UCL	0.379
		95% BCA Bootstrap UCL	0.394

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.509	**Data appear Normal at 5% Significance Level**	
Theta Star	0.225		
nu star	154.2		
A-D Test Statistic	0.392	**Nonparametric Statistics**	
5% A-D Critical Value	0.737	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.737	Mean	0.678
5% K-S Critical Value	0.229	SD	0.26
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0251
		95% KM (t) UCL	0.719
Assuming Gamma Distribution		95% KM (z) UCL	0.719
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.715
Minimum	0.6	95% KM (bootstrap t) UCL	0.729
Maximum	1.97	95% KM (BCA) UCL	0.977
Mean	1.232	95% KM (Percentile Bootstrap) UCL	0.77
Median	1.227	95% KM (Chebyshev) UCL	0.787
SD	0.159	97.5% KM (Chebyshev) UCL	0.834
k star	52.41	99% KM (Chebyshev) UCL	0.927
Theta star	0.0235		
Nu star	12055	**Potential UCLs to Use**	
AppChi2	11800	95% KM (t) UCL	0.719
95% Gamma Approximate UCL	1.259	95% KM (Percentile Bootstrap) UCL	0.77
95% Adjusted Gamma UCL	1.259		

Note: DL/2 is not a recommended method.

Result (chromium)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	104

Raw Statistics		**Log-transformed Statistics**	
Minimum	6.52	Minimum of Log Data	1.875
Maximum	415	Maximum of Log Data	6.028
Mean	46.57	Mean of log Data	3.467
Median	30.3	SD of log Data	0.773
SD	61.62		
Coefficient of Variation	1.323		
Skewness	4.344		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.295	Lilliefors Test Statistic	0.144
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	56.09	95% H-UCL	49.98
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	58.35
95% Adjusted-CLT UCL	58.5	97.5% Chebyshev (MVUE) UCL	64.96
95% Modified-t UCL	56.48	99% Chebyshev (MVUE) UCL	77.94
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.45	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	32.11		
nu star	333.6		
Approximate Chi Square Value (.05)	292.3	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	56.02
Adjusted Chi Square Value	291.8	95% Jackknife UCL	56.09
		95% Standard Bootstrap UCL	55.61
Anderson-Darling Test Statistic	5.89	95% Bootstrap-t UCL	60.41
Anderson-Darling 5% Critical Value	0.77	95% Hall's Bootstrap UCL	60.33
Kolmogorov-Smirnov Test Statistic	0.216	95% Percentile Bootstrap UCL	57.39
Kolmogorov-Smirnov 5% Critical Value	0.0872	95% BCA Bootstrap UCL	58.91
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	71.61
		97.5% Chebyshev(Mean, Sd) UCL	82.45
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	103.7
95% Approximate Gamma UCL	53.15		
95% Adjusted Gamma UCL	53.24		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	71.61

Result (chrysene)

General Statistics

Number of Valid Data	115	Number of Detected Data	75
Number of Distinct Detected Data	56	Number of Non-Detect Data	40
		Percent Non-Detects	34.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	23	Minimum Detected	3.135
Maximum Detected	20000	Maximum Detected	9.903
Mean of Detected	947.3	Mean of Detected	5.413
SD of Detected	2658	SD of Detected	1.566
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.364	Lilliefors Test Statistic	0.0981
5% Lilliefors Critical Value	0.102	5% Lilliefors Critical Value	0.102
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	736.5	Mean	4.723
SD	2407	SD	1.797
95% DL/2 (t) UCL	1109	95% H-Stat (DL/2) UCL	768.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.356
		SD in Log Scale	2.034
		Mean in Original Scale	624.4
		SD in Original Scale	2187
		95% Percentile Bootstrap UCL	988.2
		95% BCA Bootstrap UCL	1173
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.439	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2156		
nu star	65.91		
A-D Test Statistic	4.801	**Nonparametric Statistics**	
5% A-D Critical Value	0.83	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.83	Mean	635.6
5% K-S Critical Value	0.11	SD	2185
Data not Gamma Distributed at 5% Significance Level		SE of Mean	206
		95% KM (t) UCL	977.3
Assuming Gamma Distribution		95% KM (z) UCL	974.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	976.5
Minimum	23	95% KM (bootstrap t) UCL	1426
Maximum	20000	95% KM (BCA) UCL	1029
Mean	867.2	95% KM (Percentile Bootstrap) UCL	995.6
Median	564.1	95% KM (Chebyshev) UCL	1534
SD	2147	97.5% KM (Chebyshev) UCL	1922
k star	0.628	99% KM (Chebyshev) UCL	2685
Theta star	1382		
Nu star	144.4	**Potential UCLs to Use**	
AppChi2	117.6	97.5% KM (Chebyshev) UCL	1922
95% Gamma Approximate UCL	1065		
95% Adjusted Gamma UCL	1067		

Note: DL/2 is not a recommended method.

Result (cobalt)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	80

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.76	Minimum of Log Data	1.324
Maximum	28.7	Maximum of Log Data	3.357
Mean	11.23	Mean of log Data	2.367
Median	11.4	SD of log Data	0.341
SD	3.446		
Coefficient of Variation	0.307		
Skewness	0.727		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.097	Lilliefors Test Statistic	0.163
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	11.76	95% H-UCL	11.95
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	12.9
95% Adjusted-CLT UCL	11.78	97.5% Chebyshev (MVUE) UCL	13.6
95% Modified-t UCL	11.77	99% Chebyshev (MVUE) UCL	14.97
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	9.521	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.179		
nu star	2190		
Approximate Chi Square Value (.05)	2082	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	11.76
Adjusted Chi Square Value	2081	95% Jackknife UCL	11.76
		95% Standard Bootstrap UCL	11.75
Anderson-Darling Test Statistic	2.641	95% Bootstrap-t UCL	11.79
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	11.79
Kolmogorov-Smirnov Test Statistic	0.141	95% Percentile Bootstrap UCL	11.74
Kolmogorov-Smirnov 5% Critical Value	0.0855	95% BCA Bootstrap UCL	11.71
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	12.63
		97.5% Chebyshev(Mean, Sd) UCL	13.24
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	14.43
95% Approximate Gamma UCL	11.81		
95% Adjusted Gamma UCL	11.82		
Potential UCL to Use		Use 95% Student's-t UCL	11.76
		or 95% Modified-t UCL	11.77

Result (copper)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	107

Raw Statistics		**Log-transformed Statistics**	
Minimum	6.22	Minimum of Log Data	1.828
Maximum	1640	Maximum of Log Data	7.402
Mean	69.52	Mean of log Data	3.674
Median	32.9	SD of log Data	0.842
SD	164.5		
Coefficient of Variation	2.366		
Skewness	8.038		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.35	Lilliefors Test Statistic	0.173
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	94.96	95% H-UCL	66.03
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	77.89
95% Adjusted-CLT UCL	107	97.5% Chebyshev (MVUE) UCL	87.4
95% Modified-t UCL	96.88	99% Chebyshev (MVUE) UCL	106.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.994	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	69.92		
nu star	228.7		
Approximate Chi Square Value (.05)	194.7	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	94.75
Adjusted Chi Square Value	194.3	95% Jackknife UCL	94.96
		95% Standard Bootstrap UCL	94.96
Anderson-Darling Test Statistic	11.28	95% Bootstrap-t UCL	130.8
Anderson-Darling 5% Critical Value	0.783	95% Hall's Bootstrap UCL	184.8
Kolmogorov-Smirnov Test Statistic	0.263	95% Percentile Bootstrap UCL	96.93
Kolmogorov-Smirnov 5% Critical Value	0.0881	95% BCA Bootstrap UCL	114.2
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	136.4
		97.5% Chebyshev(Mean, Sd) UCL	165.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	222.2
95% Approximate Gamma UCL	81.66		
95% Adjusted Gamma UCL	81.83		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	136.4

Result (dibenzo(a,h)anthracene)

General Statistics

Number of Valid Data	115	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	105
		Percent Non-Detects	91.30%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	51	Minimum Detected	3.932
Maximum Detected	530	Maximum Detected	6.273
Mean of Detected	259.5	Mean of Detected	5.294
SD of Detected	171.3	SD of Detected	0.842
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.927	Lilliefors Test Statistic	0.904
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	191.9	Mean	3.655
SD	1079	SD	1.358
95% DL/2 (t) UCL	358.7	95% H-Stat (DL/2) UCL	126.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.934
		SD in Log Scale	1.658
		Mean in Original Scale	32.13
		SD in Original Scale	86.24
		95% Percentile Bootstrap UCL	45.98
		95% BCA Bootstrap UCL	49.42
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.494	**Data appear Normal at 5% Significance Level**	
Theta Star	173.7		
nu star	29.89		
A-D Test Statistic	0.314	**Nonparametric Statistics**	
5% A-D Critical Value	0.735	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.735	Mean	70.76
5% K-S Critical Value	0.27	SD	78.21
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	7.96
		95% KM (t) UCL	83.96
Assuming Gamma Distribution		95% KM (z) UCL	83.85
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	81.53
Minimum	51	95% KM (bootstrap t) UCL	87.09
Maximum	578.5	95% KM (BCA) UCL	193.6
Mean	376.5	95% KM (Percentile Bootstrap) UCL	144.1
Median	391.7	95% KM (Chebyshev) UCL	105.5
SD	125.7	97.5% KM (Chebyshev) UCL	120.5
k star	6.471	99% KM (Chebyshev) UCL	150
Theta star	58.18		
Nu star	1488	**Potential UCLs to Use**	
AppChi2	1400	95% KM (t) UCL	83.96
95% Gamma Approximate UCL	400.3	95% KM (Percentile Bootstrap) UCL	144.1
95% Adjusted Gamma UCL	400.6		

Note: DL/2 is not a recommended method.

Result (ethylbenzene)

General Statistics

Number of Valid Data	115	Number of Detected Data	20
Number of Distinct Detected Data	18	Number of Non-Detect Data	95
		Percent Non-Detects	82.61%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	1100	Maximum Detected	7.003
Mean of Detected	228.4	Mean of Detected	3.238
SD of Detected	371.8	SD of Detected	2.502
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	120	Maximum Non-Detect	4.787
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	107
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.04%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.665	Lilliefors Test Statistic	0.885
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	41.2	Mean	-0.101
SD	174.7	SD	2.031
95% DL/2 (t) UCL	68.21	95% H-Stat (DL/2) UCL	8.954
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.818
		SD in Log Scale	4.324
		Mean in Original Scale	39.73
		SD in Original Scale	174.9
		95% Percentile Bootstrap UCL	68.74
		95% BCA Bootstrap UCL	77.48
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.299	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	764.4		
nu star	11.95		
A-D Test Statistic	1.272	**Nonparametric Statistics**	
5% A-D Critical Value	0.842	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.842	Mean	40.65
5% K-S Critical Value	0.21	SD	173.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	16.64
		95% KM (t) UCL	68.25
Assuming Gamma Distribution		95% KM (z) UCL	68.03
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	67.59
Minimum	1.1	95% KM (bootstrap t) UCL	84.94
Maximum	1100	95% KM (BCA) UCL	71.48
Mean	233.2	95% KM (Percentile Bootstrap) UCL	69.6
Median	204.8	95% KM (Chebyshev) UCL	113.2
SD	170.2	97.5% KM (Chebyshev) UCL	144.6
k star	1.279	99% KM (Chebyshev) UCL	206.2
Theta star	182.4		
Nu star	294.1	**Potential UCLs to Use**	
AppChi2	255.4	97.5% KM (Chebyshev) UCL	144.6
95% Gamma Approximate UCL	268.6		
95% Adjusted Gamma UCL	269.1		

Note: DL/2 is not a recommended method.

Result (fluoranthene)

General Statistics

Number of Valid Data	115	Number of Detected Data	40
Number of Distinct Detected Data	30	Number of Non-Detect Data	75
		Percent Non-Detects	65.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	4200	Maximum Detected	8.343
Mean of Detected	538.8	Mean of Detected	5.157
SD of Detected	1057	SD of Detected	1.41
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.505	Lilliefors Test Statistic	0.927
5% Lilliefors Critical Value	0.94	5% Lilliefors Critical Value	0.94
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	329.8	Mean	4.069
SD	1245	SD	1.558
95% DL/2 (t) UCL	522.4	95% H-Stat (DL/2) UCL	226.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.917
		SD in Log Scale	2.121
		Mean in Original Scale	194.9
		SD in Original Scale	667.8
		95% Percentile Bootstrap UCL	307.8
		95% BCA Bootstrap UCL	336.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.528	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1021		
nu star	42.23		
A-D Test Statistic	2.969	**Nonparametric Statistics**	
5% A-D Critical Value	0.808	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.808	Mean	208.7
5% K-S Critical Value	0.147	SD	665
Data not Gamma Distributed at 5% Significance Level		SE of Mean	63.16
		95% KM (t) UCL	313.5
Assuming Gamma Distribution		95% KM (z) UCL	312.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	312.1
Minimum	1E-09	95% KM (bootstrap t) UCL	379.7
Maximum	4200	95% KM (BCA) UCL	316.1
Mean	653.4	95% KM (Percentile Bootstrap) UCL	328.6
Median	250	95% KM (Chebyshev) UCL	484
SD	877.6	97.5% KM (Chebyshev) UCL	603.1
k star	0.156	99% KM (Chebyshev) UCL	837.1
Theta star	4178		
Nu star	35.97	**Potential UCLs to Use**	
AppChi2	23.24	95% KM (BCA) UCL	316.1
95% Gamma Approximate UCL	1011		
95% Adjusted Gamma UCL	1017		

Note: DL/2 is not a recommended method.

Result (fluorene)

General Statistics

Number of Valid Data	115	Number of Detected Data	25
Number of Distinct Detected Data	25	Number of Non-Detect Data	90
		Percent Non-Detects	78.26%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	42000	Maximum Detected	10.65
Mean of Detected	3399	Mean of Detected	6.119
SD of Detected	9160	SD of Detected	1.897
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	109
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.78%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.416	Lilliefors Test Statistic	0.944
5% Lilliefors Critical Value	0.918	5% Lilliefors Critical Value	0.918
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	777.5	Mean	3.902
SD	4427	SD	1.713
95% DL/2 (t) UCL	1462	95% H-Stat (DL/2) UCL	265.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.928
		SD in Log Scale	3.593
		Mean in Original Scale	742
		SD in Original Scale	4432
		95% Percentile Bootstrap UCL	1518
		95% BCA Bootstrap UCL	1920
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.323	**Data appear Lognormal at 5% Significance Level**	
Theta Star	10535		
nu star	16.13		
A-D Test Statistic	2.469	**Nonparametric Statistics**	
5% A-D Critical Value	0.844	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.844	Mean	758.2
5% K-S Critical Value	0.189	SD	4410
Data not Gamma Distributed at 5% Significance Level		SE of Mean	419.7
		95% KM (t) UCL	1454
Assuming Gamma Distribution		95% KM (z) UCL	1449
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1435
Minimum	22	95% KM (bootstrap t) UCL	3236
Maximum	42000	95% KM (BCA) UCL	1584
Mean	3607	95% KM (Percentile Bootstrap) UCL	1582
Median	2361	95% KM (Chebyshev) UCL	2588
SD	4586	97.5% KM (Chebyshev) UCL	3379
k star	1.032	99% KM (Chebyshev) UCL	4934
Theta star	3495		
Nu star	237.4	**Potential UCLs to Use**	
AppChi2	202.7	95% KM (Chebyshev) UCL	2588
95% Gamma Approximate UCL	4224		
95% Adjusted Gamma UCL	4233		

Note: DL/2 is not a recommended method.

Result (indeno(1,2,3-cd)pyrene)

General Statistics

Number of Valid Data	115	Number of Detected Data	17
Number of Distinct Detected Data	14	Number of Non-Detect Data	98
		Percent Non-Detects	85.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	24	Minimum Detected	3.178
Maximum Detected	1400	Maximum Detected	7.244
Mean of Detected	263.8	Mean of Detected	4.67
SD of Detected	437.6	SD of Detected	1.308
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.561	Lilliefors Test Statistic	0.9
5% Lilliefors Critical Value	0.892	5% Lilliefors Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	208.6	Mean	3.753
SD	1089	SD	1.361
95% DL/2 (t) UCL	377	95% H-Stat (DL/2) UCL	144.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.103
		SD in Log Scale	2.182
		Mean in Original Scale	43.16
		SD in Original Scale	188.3
		95% Percentile Bootstrap UCL	75.94
		95% BCA Bootstrap UCL	89.77
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.593	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	445.1		
nu star	20.15		
A-D Test Statistic	1.186	**Nonparametric Statistics**	
5% A-D Critical Value	0.783	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.783	Mean	62.51
5% K-S Critical Value	0.218	SD	186.6
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	18.24
		95% KM (t) UCL	92.75
Assuming Gamma Distribution		95% KM (z) UCL	92.51
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	91.27
Minimum	1E-09	95% KM (bootstrap t) UCL	164.3
Maximum	1983	95% KM (BCA) UCL	100.8
Mean	539.3	95% KM (Percentile Bootstrap) UCL	98.14
Median	374.3	95% KM (Chebyshev) UCL	142
SD	532.8	97.5% KM (Chebyshev) UCL	176.4
k star	0.182	99% KM (Chebyshev) UCL	244
Theta star	2961		
Nu star	41.9	**Potential UCLs to Use**	
AppChi2	28.06	95% KM (t) UCL	92.75
95% Gamma Approximate UCL	805.3		
95% Adjusted Gamma UCL	809.4		

Note: DL/2 is not a recommended method.

Result (isopropylbenzene)

General Statistics

Number of Valid Data	115	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	101
		Percent Non-Detects	87.83%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.53	Minimum Detected	-0.635
Maximum Detected	5400	Maximum Detected	8.594
Mean of Detected	421.5	Mean of Detected	2.713
SD of Detected	1434	SD of Detected	2.514
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	170	Maximum Non-Detect	5.136
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	113
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.26%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.324	Lilliefors Test Statistic	0.914
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	53.66	Mean	-0.334
SD	503.5	SD	1.74
95% DL/2 (t) UCL	131.5	95% H-Stat (DL/2) UCL	4.32
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.534
		SD in Log Scale	4.17
		Mean in Original Scale	51.31
		SD in Original Scale	503.6
		95% Percentile Bootstrap UCL	144.9
		95% BCA Bootstrap UCL	200.1
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.219	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1925		
nu star	6.129		
A-D Test Statistic	1.803	**Nonparametric Statistics**	
5% A-D Critical Value	0.866	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.866	Mean	51.84
5% K-S Critical Value	0.252	SD	501.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	48.52
		95% KM (t) UCL	132.3
Assuming Gamma Distribution		95% KM (z) UCL	131.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	129.1
Minimum	1E-09	95% KM (bootstrap t) UCL	1925
Maximum	5400	95% KM (BCA) UCL	148.7
Mean	388.9	95% KM (Percentile Bootstrap) UCL	145.4
Median	471.8	95% KM (Chebyshev) UCL	263.3
SD	545.5	97.5% KM (Chebyshev) UCL	354.8
k star	0.124	99% KM (Chebyshev) UCL	534.6
Theta star	3134		
Nu star	28.55	**Potential UCLs to Use**	
AppChi2	17.35	97.5% KM (Chebyshev) UCL	354.8
95% Gamma Approximate UCL	639.8		
95% Adjusted Gamma UCL	643.9		

Note: DL/2 is not a recommended method.

Result (lead)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	109

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.01	Minimum of Log Data	1.102
Maximum	4240	Maximum of Log Data	8.352
Mean	216.5	Mean of log Data	4
Median	43.3	SD of log Data	1.534
SD	568.9		
Coefficient of Variation	2.627		
Skewness	5.437		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.354	Lilliefors Test Statistic	0.124
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	304.5	95% H-UCL	262.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	325.5
95% Adjusted-CLT UCL	332.6	97.5% Chebyshev (MVUE) UCL	391.4
95% Modified-t UCL	309	99% Chebyshev (MVUE) UCL	520.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.46	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	471.1		
nu star	105.7		
Approximate Chi Square Value (.05)	83	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	303.8
Adjusted Chi Square Value	82.74	95% Jackknife UCL	304.5
		95% Standard Bootstrap UCL	301.7
Anderson-Darling Test Statistic	7.776	95% Bootstrap-t UCL	386.2
Anderson-Darling 5% Critical Value	0.827	95% Hall's Bootstrap UCL	701.9
Kolmogorov-Smirnov Test Statistic	0.231	95% Percentile Bootstrap UCL	312
Kolmogorov-Smirnov 5% Critical Value	0.0909	95% BCA Bootstrap UCL	340.8
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	447.8
		97.5% Chebyshev(Mean, Sd) UCL	547.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	744.4
95% Approximate Gamma UCL	275.8		
95% Adjusted Gamma UCL	276.7		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	547.9

Result (mercury)

General Statistics

Number of Valid Data	115	Number of Detected Data	60
Number of Distinct Detected Data	52	Number of Non-Detect Data	55
		Percent Non-Detects	47.83%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0948	Minimum Detected	-2.356
Maximum Detected	2.51	Maximum Detected	0.92
Mean of Detected	0.294	Mean of Detected	-1.571
SD of Detected	0.384	SD of Detected	0.712
Minimum Non-Detect	0.0849	Minimum Non-Detect	-2.466
Maximum Non-Detect	0.101	Maximum Non-Detect	-2.293
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	60
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	55
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	52.17%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.302	Lilliefors Test Statistic	0.16
5% Lilliefors Critical Value	0.114	5% Lilliefors Critical Value	0.114
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.175	Mean	-2.297
SD	0.303	SD	0.918
95% DL/2 (t) UCL	0.222	95% H-Stat (DL/2) UCL	0.145
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.416
		SD in Log Scale	1.036
		Mean in Original Scale	0.171
		SD in Original Scale	0.305
		95% Percentile Bootstrap UCL	0.219
		95% BCA Bootstrap UCL	0.239
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.513	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.195		
nu star	181.5		
A-D Test Statistic	4.557	**Nonparametric Statistics**	
5% A-D Critical Value	0.768	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.768	Mean	0.199
5% K-S Critical Value	0.117	SD	0.293
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0275
		95% KM (t) UCL	0.245
Assuming Gamma Distribution		95% KM (z) UCL	0.244
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.244
Minimum	0.0699	95% KM (bootstrap t) UCL	0.285
Maximum	2.51	95% KM (BCA) UCL	0.253
Mean	0.281	95% KM (Percentile Bootstrap) UCL	0.249
Median	0.258	95% KM (Chebyshev) UCL	0.319
SD	0.284	97.5% KM (Chebyshev) UCL	0.371
k star	2.404	99% KM (Chebyshev) UCL	0.473
Theta star	0.117		
Nu star	552.9	**Potential UCLs to Use**	
AppChi2	499.3	95% KM (t) UCL	0.245
95% Gamma Approximate UCL	0.311	95% KM (% Bootstrap) UCL	0.249
95% Adjusted Gamma UCL	0.311		

Note: DL/2 is not a recommended method.

Result (methyl-t-butyl ether (mtbe))

General Statistics

Number of Valid Data	115	Number of Detected Data	7
Number of Distinct Detected Data	6	Number of Non-Detect Data	108
		Percent Non-Detects	93.91%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.9	Minimum Detected	0.642
Maximum Detected	320	Maximum Detected	5.768
Mean of Detected	55.07	Mean of Detected	2.292
SD of Detected	117.6	SD of Detected	1.908
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.538	Lilliefors Test Statistic	0.872
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	14.47	Mean	0.294
SD	62.45	SD	1.535
95% DL/2 (t) UCL	24.12	95% H-Stat (DL/2) UCL	5.88
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-7.191
		SD in Log Scale	3.747
		Mean in Original Scale	3.36
		SD in Original Scale	30.04
		95% Percentile Bootstrap UCL	8.849
		95% BCA Bootstrap UCL	14.39
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.316	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	174.5		
nu star	4.418		
A-D Test Statistic	0.777	**Nonparametric Statistics**	
5% A-D Critical Value	0.77	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.77	Mean	5.236
5% K-S Critical Value	0.332	SD	29.99
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	3.049
		95% KM (t) UCL	10.29
Assuming Gamma Distribution		95% KM (z) UCL	10.25
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9.938
Minimum	1E-09	95% KM (bootstrap t) UCL	75.8
Maximum	320	95% KM (BCA) UCL	13.3
Mean	49.75	95% KM (Percentile Bootstrap) UCL	11.67
Median	55.69	95% KM (Chebyshev) UCL	18.53
SD	42.46	97.5% KM (Chebyshev) UCL	24.28
k star	0.156	99% KM (Chebyshev) UCL	35.57
Theta star	318.6		
Nu star	35.91	**Potential UCLs to Use**	
AppChi2	23.19	95% KM (t) UCL	10.29
95% Gamma Approximate UCL	77.01		
95% Adjusted Gamma UCL	77.44		

Note: DL/2 is not a recommended method.

Result (molybdenum)

General Statistics

Number of Valid Data	115	Number of Detected Data	61
Number of Distinct Detected Data	57	Number of Non-Detect Data	54
		Percent Non-Detects	46.96%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.271	Minimum Detected	-1.306
Maximum Detected	112	Maximum Detected	4.718
Mean of Detected	5.754	Mean of Detected	0.23
SD of Detected	18.04	SD of Detected	1.418
Minimum Non-Detect	0.254	Minimum Non-Detect	-1.37
Maximum Non-Detect	0.302	Maximum Non-Detect	-1.197
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	59
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	56
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	51.30%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.381	Lilliefors Test Statistic	0.181
5% Lilliefors Critical Value	0.113	5% Lilliefors Critical Value	0.113
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.117	Mean	-0.811
SD	13.39	SD	1.514
95% DL/2 (t) UCL	5.187	95% H-Stat (DL/2) UCL	1.326
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.409
		SD in Log Scale	2.069
		Mean in Original Scale	3.073
		SD in Original Scale	13.4
		95% Percentile Bootstrap UCL	5.322
		95% BCA Bootstrap UCL	6.131
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.418	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	13.77		
nu star	51		
A-D Test Statistic	7.515	**Nonparametric Statistics**	
5% A-D Critical Value	0.833	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.833	Mean	3.18
5% K-S Critical Value	0.122	SD	13.32
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.252
		95% KM (t) UCL	5.256
Assuming Gamma Distribution		95% KM (z) UCL	5.239
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.247
Minimum	1E-09	95% KM (bootstrap t) UCL	10.98
Maximum	112	95% KM (BCA) UCL	5.645
Mean	4.543	95% KM (Percentile Bootstrap) UCL	5.489
Median	0.893	95% KM (Chebyshev) UCL	8.637
SD	13.42	97.5% KM (Chebyshev) UCL	11
k star	0.183	99% KM (Chebyshev) UCL	15.64
Theta star	24.79		
Nu star	42.15	**Potential UCLs to Use**	
AppChi2	28.27	95% KM (Chebyshev) UCL	8.637
95% Gamma Approximate UCL	6.775		
95% Adjusted Gamma UCL	6.81		

Note: DL/2 is not a recommended method.

Result (naphthalene)

General Statistics

Number of Valid Data	115	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	93
		Percent Non-Detects	80.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	15	Minimum Detected	2.708
Maximum Detected	7500	Maximum Detected	8.923
Mean of Detected	1427	Mean of Detected	5.226
SD of Detected	2626	SD of Detected	2.107
Minimum Non-Detect	4.2	Minimum Non-Detect	1.435
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	109
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.78%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.576	Lilliefors Test Statistic	0.86
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	293.8	Mean	2.686
SD	1258	SD	1.894
95% DL/2 (t) UCL	488.3	95% H-Stat (DL/2) UCL	118.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.768
		SD in Log Scale	3.572
		Mean in Original Scale	273.7
		SD in Original Scale	1260
		95% Percentile Bootstrap UCL	481.5
		95% BCA Bootstrap UCL	555
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.318	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	4493		
nu star	13.98		
A-D Test Statistic	2.237	**Nonparametric Statistics**	
5% A-D Critical Value	0.84	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.84	Mean	286.1
5% K-S Critical Value	0.2	SD	1252
Data not Gamma Distributed at 5% Significance Level		SE of Mean	119.5
		95% KM (t) UCL	484.3
Assuming Gamma Distribution		95% KM (z) UCL	482.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	477.6
Minimum	15	95% KM (bootstrap t) UCL	618.2
Maximum	7500	95% KM (BCA) UCL	518.6
Mean	1483	95% KM (Percentile Bootstrap) UCL	494.3
Median	1369	95% KM (Chebyshev) UCL	807
SD	1167	97.5% KM (Chebyshev) UCL	1032
k star	1.343	99% KM (Chebyshev) UCL	1475
Theta star	1104		
Nu star	309	**Potential UCLs to Use**	
AppChi2	269.2	97.5% KM (Chebyshev) UCL	1032
95% Gamma Approximate UCL	1702		
95% Adjusted Gamma UCL	1705		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)

General Statistics

Number of Valid Data	115	Number of Detected Data	15
Number of Distinct Detected Data	14	Number of Non-Detect Data	100
		Percent Non-Detects	86.96%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.68	Minimum Detected	-0.386
Maximum Detected	3500	Maximum Detected	8.161
Mean of Detected	694.2	Mean of Detected	3.65
SD of Detected	1302	SD of Detected	3.002
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	120	Maximum Non-Detect	4.787
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	108
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.91%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.573	Lilliefors Test Statistic	0.886
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	92.16	Mean	-0.231
SD	512.8	SD	2.039
95% DL/2 (t) UCL	171.5	95% H-Stat (DL/2) UCL	8.332
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-7.918
		SD in Log Scale	5.379
		Mean in Original Scale	90.55
		SD in Original Scale	513
		95% Percentile Bootstrap UCL	177.4
		95% BCA Bootstrap UCL	206.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.241	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2876		
nu star	7.242		
A-D Test Statistic	1.094	**Nonparametric Statistics**	
5% A-D Critical Value	0.858	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.858	Mean	91.15
5% K-S Critical Value	0.243	SD	510.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	49.29
		95% KM (t) UCL	172.9
Assuming Gamma Distribution		95% KM (z) UCL	172.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	169.5
Minimum	0.68	95% KM (bootstrap t) UCL	231.7
Maximum	3500	95% KM (BCA) UCL	188.8
Mean	682.4	95% KM (Percentile Bootstrap) UCL	178.3
Median	716.7	95% KM (Chebyshev) UCL	306
SD	465.1	97.5% KM (Chebyshev) UCL	399
k star	1.4	99% KM (Chebyshev) UCL	581.6
Theta star	487.5		
Nu star	322	**Potential UCLs to Use**	
AppChi2	281.4	97.5% KM (Chebyshev) UCL	399
95% Gamma Approximate UCL	780.7		
95% Adjusted Gamma UCL	782.1		

Note: DL/2 is not a recommended method.

Result (nickel)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	87

Raw Statistics		**Log-transformed Statistics**	
Minimum	5.47	Minimum of Log Data	1.699
Maximum	42.4	Maximum of Log Data	3.747
Mean	18.56	Mean of log Data	2.858
Median	18.8	SD of log Data	0.381
SD	6.152		
Coefficient of Variation	0.331		
Skewness	0.444		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0993	Lilliefors Test Statistic	0.173
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	19.51	95% H-UCL	19.95
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21.71
95% Adjusted-CLT UCL	19.53	97.5% Chebyshev (MVUE) UCL	23.01
95% Modified-t UCL	19.52	99% Chebyshev (MVUE) UCL	25.55
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.858	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2.362		
nu star	1807		
Approximate Chi Square Value (.05)	1710	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	19.51
Adjusted Chi Square Value	1708	95% Jackknife UCL	19.51
		95% Standard Bootstrap UCL	19.48
Anderson-Darling Test Statistic	2.617	95% Bootstrap-t UCL	19.52
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	19.55
Kolmogorov-Smirnov Test Statistic	0.149	95% Percentile Bootstrap UCL	19.51
Kolmogorov-Smirnov 5% Critical Value	0.0856	95% BCA Bootstrap UCL	19.48
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	21.06
		97.5% Chebyshev(Mean, Sd) UCL	22.14
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	24.27
95% Approximate Gamma UCL	19.62		
95% Adjusted Gamma UCL	19.64		
Potential UCL to Use		Use 95% Student's-t UCL	19.51
		or 95% Modified-t UCL	19.52

Result (n-propylbenzene)

General Statistics

Number of Valid Data	115	Number of Detected Data	17
Number of Distinct Detected Data	16	Number of Non-Detect Data	98
		Percent Non-Detects	85.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.56	Minimum Detected	-0.58
Maximum Detected	8600	Maximum Detected	9.06
Mean of Detected	634.3	Mean of Detected	3.022
SD of Detected	2071	SD of Detected	2.848
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	240	Maximum Non-Detect	5.481
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	112
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.39%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.34	Lilliefors Test Statistic	0.927
5% Lilliefors Critical Value	0.892	5% Lilliefors Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	95.9	Mean	-0.228
SD	807.9	SD	1.955
95% DL/2 (t) UCL	220.8	95% H-Stat (DL/2) UCL	7.322
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.377
		SD in Log Scale	4.643
		Mean in Original Scale	93.77
		SD in Original Scale	808.1
		95% Percentile Bootstrap UCL	237.5
		95% BCA Bootstrap UCL	389.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.214	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2961		
nu star	7.284		
A-D Test Statistic	1.52	**Nonparametric Statistics**	
5% A-D Critical Value	0.878	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.878	Mean	94.32
5% K-S Critical Value	0.231	SD	804.5
Data not Gamma Distributed at 5% Significance Level		SE of Mean	77.33
		95% KM (t) UCL	222.6
Assuming Gamma Distribution		95% KM (z) UCL	221.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	219.3
Minimum	1E-09	95% KM (bootstrap t) UCL	1757
Maximum	8600	95% KM (BCA) UCL	246.3
Mean	561.5	95% KM (Percentile Bootstrap) UCL	242.6
Median	652.6	95% KM (Chebyshev) UCL	431.4
SD	851.4	97.5% KM (Chebyshev) UCL	577.2
k star	0.125	99% KM (Chebyshev) UCL	863.7
Theta star	4494		
Nu star	28.73	**Potential UCLs to Use**	
AppChi2	17.5	97.5% KM (Chebyshev) UCL	577.2
95% Gamma Approximate UCL	921.9		
95% Adjusted Gamma UCL	927.8		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	115	Number of Detected Data	20
Number of Distinct Detected Data	19	Number of Non-Detect Data	95
		Percent Non-Detects	82.61%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.3	Minimum Detected	0.262
Maximum Detected	2300	Maximum Detected	7.741
Mean of Detected	282.2	Mean of Detected	3.198
SD of Detected	567.9	SD of Detected	2.505
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	560	Maximum Non-Detect	6.328
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	111
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.52%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.575	Lilliefors Test Statistic	0.885
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	52.87	Mean	-0.0842
SD	256.2	SD	2.077
95% DL/2 (t) UCL	92.49	95% H-Stat (DL/2) UCL	10.95
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1552	Mean in Log Scale	-4.753
SD	636.8	SD in Log Scale	4.264
95% MLE (t) UCL	1650	Mean in Original Scale	49.09
95% MLE (Tiku) UCL	2066	SD in Original Scale	255.5
		95% Percentile Bootstrap UCL	91.16
		95% BCA Bootstrap UCL	114.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.275	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1026		
nu star	11.01		
A-D Test Statistic	1.496	**Nonparametric Statistics**	
5% A-D Critical Value	0.851	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.851	Mean	50.24
5% K-S Critical Value	0.211	SD	254.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	24.33
		95% KM (t) UCL	90.59
Assuming Gamma Distribution		95% KM (z) UCL	90.26
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	89.66
Minimum	1.3	95% KM (bootstrap t) UCL	147.9
Maximum	2300	95% KM (BCA) UCL	94.25
Mean	288.1	95% KM (Percentile Bootstrap) UCL	93.82
Median	211.7	95% KM (Chebyshev) UCL	156.3
SD	298.1	97.5% KM (Chebyshev) UCL	202.2
k star	0.91	99% KM (Chebyshev) UCL	292.3
Theta star	316.5		
Nu star	209.3	**Potential UCLs to Use**	
AppChi2	176.8	97.5% KM (Chebyshev) UCL	202.2
95% Gamma Approximate UCL	341		
95% Adjusted Gamma UCL	341.7		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	115	Number of Detected Data	22
Number of Distinct Detected Data	21	Number of Non-Detect Data	93
		Percent Non-Detects	80.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	4700	Maximum Detected	8.455
Mean of Detected	697.9	Mean of Detected	3.847
SD of Detected	1267	SD of Detected	2.824
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	109
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.78%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.633	Lilliefors Test Statistic	0.889
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	140.3	Mean	0.632
SD	610.4	SD	2.177
95% DL/2 (t) UCL	234.7	95% H-Stat (DL/2) UCL	28.37
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.683
		SD in Log Scale	5.252
		Mean in Original Scale	133.5
		SD in Original Scale	609.6
		95% Percentile Bootstrap UCL	230.3
		95% BCA Bootstrap UCL	272.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.256	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2728		
nu star	11.25		
A-D Test Statistic	1.397	**Nonparametric Statistics**	
5% A-D Critical Value	0.865	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.865	Mean	134.6
5% K-S Critical Value	0.203	SD	606.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	57.91
		95% KM (t) UCL	230.6
Assuming Gamma Distribution		95% KM (z) UCL	229.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	228.1
Minimum	1.2	95% KM (bootstrap t) UCL	312.9
Maximum	4700	95% KM (BCA) UCL	237.8
Mean	697.6	95% KM (Percentile Bootstrap) UCL	235.3
Median	697.9	95% KM (Chebyshev) UCL	387
SD	543.7	97.5% KM (Chebyshev) UCL	496.3
k star	1.081	99% KM (Chebyshev) UCL	710.8
Theta star	645.2		
Nu star	248.7	**Potential UCLs to Use**	
AppChi2	213.2	97.5% KM (Chebyshev) UCL	496.3
95% Gamma Approximate UCL	813.8		
95% Adjusted Gamma UCL	815.4		

Note: DL/2 is not a recommended method.

Result (phenanthrene)

General Statistics

Number of Valid Data	115	Number of Detected Data	55
Number of Distinct Detected Data	45	Number of Non-Detect Data	60
		Percent Non-Detects	52.17%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	110000	Maximum Detected	11.61
Mean of Detected	4105	Mean of Detected	5.871
SD of Detected	15823	SD of Detected	1.939
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	102
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	13
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.457	Lilliefors Test Statistic	0.0824
5% Lilliefors Critical Value	0.119	5% Lilliefors Critical Value	0.119
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1987	Mean	4.495
SD	11079	SD	2.016
95% DL/2 (t) UCL	3701	95% H-Stat (DL/2) UCL	846.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.473
		SD in Log Scale	2.883
		Mean in Original Scale	1968
		SD in Original Scale	11083
		95% Percentile Bootstrap UCL	3872
		95% BCA Bootstrap UCL	5273
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.281	**Data appear Lognormal at 5% Significance Level**	
Theta Star	14621		
nu star	30.88		
A-D Test Statistic	6.322	**Nonparametric Statistics**	
5% A-D Critical Value	0.87	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.87	Mean	1978
5% K-S Critical Value	0.131	SD	11033
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1038
		95% KM (t) UCL	3700
Assuming Gamma Distribution		95% KM (z) UCL	3686
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3691
Minimum	22	95% KM (bootstrap t) UCL	8034
Maximum	110000	95% KM (BCA) UCL	4282
Mean	3558	95% KM (Percentile Bootstrap) UCL	3792
Median	1900	95% KM (Chebyshev) UCL	6504
SD	10974	97.5% KM (Chebyshev) UCL	8462
k star	0.504	99% KM (Chebyshev) UCL	12309
Theta star	7060		
Nu star	115.9	**Potential UCLs to Use**	
AppChi2	92.06	95% KM (Chebyshev) UCL	6504
95% Gamma Approximate UCL	4480		
95% Adjusted Gamma UCL	4493		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	115	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	104
		Percent Non-Detects	90.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.68	Minimum Detected	-0.386
Maximum Detected	2600	Maximum Detected	7.863
Mean of Detected	459.9	Mean of Detected	3.604
SD of Detected	921.6	SD of Detected	2.681
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	170	Maximum Non-Detect	5.136
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	112
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.39%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.559	Lilliefors Test Statistic	0.933
5% Lilliefors Critical Value	0.85	5% Lilliefors Critical Value	0.85
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	46.36	Mean	-0.342
SD	304.7	SD	1.818
95% DL/2 (t) UCL	93.48	95% H-Stat (DL/2) UCL	4.831
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-8.132
		SD in Log Scale	4.767
		Mean in Original Scale	43.99
		SD in Original Scale	304.9
		95% Percentile Bootstrap UCL	97.46
		95% BCA Bootstrap UCL	130.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.262	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1757		
nu star	5.758		
A-D Test Statistic	0.799	**Nonparametric Statistics**	
5% A-D Critical Value	0.829	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.829	Mean	44.65
5% K-S Critical Value	0.277	SD	303.5
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	29.68
		95% KM (t) UCL	93.87
Assuming Gamma Distribution		95% KM (z) UCL	93.47
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	89.64
Minimum	0.68	95% KM (bootstrap t) UCL	629.3
Maximum	2600	95% KM (BCA) UCL	109.4
Mean	478.1	95% KM (Percentile Bootstrap) UCL	101.3
Median	365.9	95% KM (Chebyshev) UCL	174
SD	382.1	97.5% KM (Chebyshev) UCL	230
k star	1.466	99% KM (Chebyshev) UCL	340
Theta star	326		
Nu star	337.3	**Potential UCLs to Use**	
AppChi2	295.7	95% KM (t) UCL	93.87
95% Gamma Approximate UCL	545.3		
95% Adjusted Gamma UCL	546.2		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	115	Number of Detected Data	70
Number of Distinct Detected Data	57	Number of Non-Detect Data	45
		Percent Non-Detects	39.13%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	30	Minimum Detected	3.401
Maximum Detected	31000	Maximum Detected	10.34
Mean of Detected	1959	Mean of Detected	5.717
SD of Detected	5722	SD of Detected	1.715
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	101
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.83%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.376	Lilliefors Test Statistic	0.11
5% Lilliefors Critical Value	0.106	5% Lilliefors Critical Value	0.106
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1216	Mean	4.803
SD	4548	SD	1.898
95% DL/2 (t) UCL	1919	95% H-Stat (DL/2) UCL	988.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.385
		SD in Log Scale	2.271
		Mean in Original Scale	1200
		SD in Original Scale	4552
		95% Percentile Bootstrap UCL	1947
		95% BCA Bootstrap UCL	2171
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.354	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	5542		
nu star	49.5		
A-D Test Statistic	6.786	**Nonparametric Statistics**	
5% A-D Critical Value	0.851	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.851	Mean	1210
5% K-S Critical Value	0.115	SD	4530
Data not Gamma Distributed at 5% Significance Level		SE of Mean	425.5
		95% KM (t) UCL	1916
Assuming Gamma Distribution		95% KM (z) UCL	1910
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1912
Minimum	1E-09	95% KM (bootstrap t) UCL	2504
Maximum	31000	95% KM (BCA) UCL	1993
Mean	1421	95% KM (Percentile Bootstrap) UCL	1942
Median	150	95% KM (Chebyshev) UCL	3065
SD	4560	97.5% KM (Chebyshev) UCL	3867
k star	0.109	99% KM (Chebyshev) UCL	5444
Theta star	13053		
Nu star	25.04	**Potential UCLs to Use**	
AppChi2	14.64	97.5% KM (Chebyshev) UCL	3867
95% Gamma Approximate UCL	2430		
95% Adjusted Gamma UCL	2447		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	115	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	102
		Percent Non-Detects	88.70%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.66	Minimum Detected	-0.416
Maximum Detected	2800	Maximum Detected	7.937
Mean of Detected	317.4	Mean of Detected	2.82
SD of Detected	786.7	SD of Detected	2.755
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	170	Maximum Non-Detect	5.136
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	112
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.39%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.474	Lilliefors Test Statistic	0.898
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	38.23	Mean	-0.355
SD	274.4	SD	1.763
95% DL/2 (t) UCL	80.66	95% H-Stat (DL/2) UCL	4.267
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-7.948
		SD in Log Scale	4.714
		Mean in Original Scale	35.88
		SD in Original Scale	274.5
		95% Percentile Bootstrap UCL	85.08
		95% BCA Bootstrap UCL	118.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.238	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1334		
nu star	6.188		
A-D Test Statistic	1.086	**Nonparametric Statistics**	
5% A-D Critical Value	0.852	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.852	Mean	36.52
5% K-S Critical Value	0.259	SD	273.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	26.52
		95% KM (t) UCL	80.49
Assuming Gamma Distribution		95% KM (z) UCL	80.13
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	78.9
Minimum	1E-09	95% KM (bootstrap t) UCL	524.8
Maximum	2800	95% KM (BCA) UCL	99.26
Mean	299.9	95% KM (Percentile Bootstrap) UCL	85.25
Median	352.6	95% KM (Chebyshev) UCL	152.1
SD	299.3	97.5% KM (Chebyshev) UCL	202.1
k star	0.219	99% KM (Chebyshev) UCL	300.4
Theta star	1368		
Nu star	50.42	**Potential UCLs to Use**	
AppChi2	35.11	97.5% KM (Chebyshev) UCL	202.1
95% Gamma Approximate UCL	430.7		
95% Adjusted Gamma UCL	432.7		

Note: DL/2 is not a recommended method.

Result (selenium)

General Statistics

Number of Valid Data	115	Number of Detected Data	14
Number of Distinct Detected Data	13	Number of Non-Detect Data	101
		Percent Non-Detects	87.83%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.863	Minimum Detected	-0.147
Maximum Detected	6.82	Maximum Detected	1.92
Mean of Detected	1.879	Mean of Detected	0.465
SD of Detected	1.51	SD of Detected	0.525
Minimum Non-Detect	0.762	Minimum Non-Detect	-0.272
Maximum Non-Detect	0.905	Maximum Non-Detect	-0.0998
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	102
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	13
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.594	Lilliefors Test Statistic	0.854
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.586	Mean	-0.734
SD	0.703	SD	0.483
95% DL/2 (t) UCL	0.695	95% H-Stat (DL/2) UCL	0.537
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.754
		SD in Log Scale	0.97
		Mean in Original Scale	0.355
		SD in Original Scale	0.768
		95% Percentile Bootstrap UCL	0.48
		95% BCA Bootstrap UCL	0.531
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.538	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.74		
nu star	71.06		
A-D Test Statistic	1.128	**Nonparametric Statistics**	
5% A-D Critical Value	0.742	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.742	Mean	0.987
5% K-S Critical Value	0.23	SD	0.607
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0587
		95% KM (t) UCL	1.084
Assuming Gamma Distribution		95% KM (z) UCL	1.083
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.073
Minimum	0.863	95% KM (bootstrap t) UCL	1.198
Maximum	6.82	95% KM (BCA) UCL	1.373
Mean	1.832	95% KM (Percentile Bootstrap) UCL	1.274
Median	1.793	95% KM (Chebyshev) UCL	1.243
SD	0.622	97.5% KM (Chebyshev) UCL	1.353
k star	12.63	99% KM (Chebyshev) UCL	1.571
Theta star	0.145		
Nu star	2904	**Potential UCLs to Use**	
AppChi2	2780	95% KM (t) UCL	1.084
95% Gamma Approximate UCL	1.914	95% KM (% Bootstrap) UCL	1.274
95% Adjusted Gamma UCL	1.915		

Note: DL/2 is not a recommended method.

Result (tert-butyl alcohol (tba))

General Statistics

Number of Valid Data	115	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	109
		Percent Non-Detects	94.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	12	Minimum Detected	2.485
Maximum Detected	44	Maximum Detected	3.784
Mean of Detected	27.33	Mean of Detected	3.231
SD of Detected	11.06	SD of Detected	0.449
Minimum Non-Detect	8	Minimum Non-Detect	2.079
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	115
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.995	Lilliefors Test Statistic	0.969
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	112.6	Mean	2.5
SD	554.1	SD	1.395
95% DL/2 (t) UCL	198.3	95% H-Stat (DL/2) UCL	44.48
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.914
		SD in Log Scale	0.884
		Mean in Original Scale	4.059
		SD in Original Scale	6.249
		95% Percentile Bootstrap UCL	5.082
		95% BCA Bootstrap UCL	5.362
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.43	**Data appear Normal at 5% Significance Level**	
Theta Star	7.969		
nu star	41.16		
A-D Test Statistic	0.166	**Nonparametric Statistics**	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	12.9
5% K-S Critical Value	0.333	SD	4.334
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.468
		95% KM (t) UCL	13.67
Assuming Gamma Distribution		95% KM (z) UCL	13.67
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	18.51
Minimum	12	95% KM (bootstrap t) UCL	13.62
Maximum	44	95% KM (BCA) UCL	29.2
Mean	27.21	95% KM (Percentile Bootstrap) UCL	24.74
Median	28.08	95% KM (Chebyshev) UCL	14.94
SD	4.835	97.5% KM (Chebyshev) UCL	15.82
k star	28.02	99% KM (Chebyshev) UCL	17.55
Theta star	0.971		
Nu star	6446	**Potential UCLs to Use**	
AppChi2	6260	95% KM (t) UCL	13.67
95% Gamma Approximate UCL	28.02	95% KM (Percentile Bootstrap) UCL	24.74
95% Adjusted Gamma UCL	28.03		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics

Number of Valid Data	115	Number of Detected Data	30
Number of Distinct Detected Data	22	Number of Non-Detect Data	85
		Percent Non-Detects	73.91%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.94	Minimum Detected	-0.0619
Maximum Detected	920	Maximum Detected	6.824
Mean of Detected	90.2	Mean of Detected	1.793
SD of Detected	224.7	SD of Detected	2.219
Minimum Non-Detect	0.42	Minimum Non-Detect	-0.868
Maximum Non-Detect	560	Maximum Non-Detect	6.328
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	113
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.26%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.461	Lilliefors Test Statistic	0.744
5% Lilliefors Critical Value	0.927	5% Lilliefors Critical Value	0.927
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	27.08	Mean	-0.105
SD	122.3	SD	1.854
95% DL/2 (t) UCL	45.99	95% H-Stat (DL/2) UCL	5.891
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.228
		SD in Log Scale	3.43
		Mean in Original Scale	23.54
		SD in Original Scale	120.1
		95% Percentile Bootstrap UCL	43.16
		95% BCA Bootstrap UCL	49.84
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.257	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	351.5		
nu star	15.4		
A-D Test Statistic	4.643	**Nonparametric Statistics**	
5% A-D Critical Value	0.871	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.871	Mean	24.32
5% K-S Critical Value	0.175	SD	119.5
Data not Gamma Distributed at 5% Significance Level		SE of Mean	11.35
		95% KM (t) UCL	43.14
Assuming Gamma Distribution		95% KM (z) UCL	42.99
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	42.88
Minimum	1E-09	95% KM (bootstrap t) UCL	63.53
Maximum	920	95% KM (BCA) UCL	44.32
Mean	88.43	95% KM (Percentile Bootstrap) UCL	43.53
Median	102.3	95% KM (Chebyshev) UCL	73.78
SD	117.9	97.5% KM (Chebyshev) UCL	95.18
k star	0.398	99% KM (Chebyshev) UCL	137.2
Theta star	222.1		
Nu star	91.58	**Potential UCLs to Use**	
AppChi2	70.51	97.5% KM (Chebyshev) UCL	95.18
95% Gamma Approximate UCL	114.9		
95% Adjusted Gamma UCL	115.2		

Note: DL/2 is not a recommended method.

Result (vanadium)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	100

Raw Statistics		**Log-transformed Statistics**	
Minimum	12.8	Minimum of Log Data	2.549
Maximum	103	Maximum of Log Data	4.635
Mean	38.8	Mean of log Data	3.609
Median	37.5	SD of log Data	0.317
SD	12.86		
Coefficient of Variation	0.331		
Skewness	1.812		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0929	Lilliefors Test Statistic	0.0849
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	40.79	95% H-UCL	40.89
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	43.93
95% Adjusted-CLT UCL	40.99	97.5% Chebyshev (MVUE) UCL	46.15
95% Modified-t UCL	40.82	99% Chebyshev (MVUE) UCL	50.5
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	10	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	3.879		
nu star	2301		
Approximate Chi Square Value (.05)	2190	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	40.77
Adjusted Chi Square Value	2189	95% Jackknife UCL	40.79
		95% Standard Bootstrap UCL	40.74
Anderson-Darling Test Statistic	0.845	95% Bootstrap-t UCL	41.03
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	41.41
Kolmogorov-Smirnov Test Statistic	0.0656	95% Percentile Bootstrap UCL	40.87
Kolmogorov-Smirnov 5% Critical Value	0.0855	95% BCA Bootstrap UCL	40.88
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	44.02
		97.5% Chebyshev(Mean, Sd) UCL	46.29
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	50.73
95% Approximate Gamma UCL	40.75		
95% Adjusted Gamma UCL	40.78		
Potential UCL to Use		Use 95% Approximate Gamma UCL	40.75

Result (xylenes, total)

General Statistics

Number of Valid Data	115	Number of Detected Data	23
Number of Distinct Detected Data	21	Number of Non-Detect Data	92
		Percent Non-Detects	80.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	7000	Maximum Detected	8.854
Mean of Detected	913.1	Mean of Detected	4.141
SD of Detected	1722	SD of Detected	2.781
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	109
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.78%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.609	Lilliefors Test Statistic	0.914
5% Lilliefors Critical Value	0.914	5% Lilliefors Critical Value	0.914
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	189.4	Mean	0.729
SD	840.8	SD	2.287
95% DL/2 (t) UCL	319.5	95% H-Stat (DL/2) UCL	40.16
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.005
		SD in Log Scale	5.122
		Mean in Original Scale	182.7
		SD in Original Scale	840.7
		95% Percentile Bootstrap UCL	325.3
		95% BCA Bootstrap UCL	389.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.258	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3541		
nu star	11.86		
A-D Test Statistic	1.431	**Nonparametric Statistics**	
5% A-D Critical Value	0.865	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.865	Mean	183.7
5% K-S Critical Value	0.198	SD	836.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	79.79
		95% KM (t) UCL	316.1
Assuming Gamma Distribution		95% KM (z) UCL	315
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	313.3
Minimum	1.2	95% KM (bootstrap t) UCL	447.3
Maximum	7000	95% KM (BCA) UCL	334.2
Mean	924.7	95% KM (Percentile Bootstrap) UCL	326.1
Median	907.6	95% KM (Chebyshev) UCL	531.5
SD	757.3	97.5% KM (Chebyshev) UCL	682
k star	1.047	99% KM (Chebyshev) UCL	977.6
Theta star	883.6		
Nu star	240.7	**Potential UCLs to Use**	
AppChi2	205.8	97.5% KM (Chebyshev) UCL	682
95% Gamma Approximate UCL	1082		
95% Adjusted Gamma UCL	1084		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	115	Number of Distinct Observations	105

Raw Statistics		**Log-transformed Statistics**	
Minimum	20.8	Minimum of Log Data	3.035
Maximum	1240	Maximum of Log Data	7.123
Mean	166.5	Mean of log Data	4.715
Median	96.7	SD of log Data	0.807
SD	208.6		
Coefficient of Variation	1.252		
Skewness	3.199		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.273	Lilliefors Test Statistic	0.133
Lilliefors Critical Value	0.0826	Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	198.8	95% H-UCL	180.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	211.5
95% Adjusted-CLT UCL	204.7	97.5% Chebyshev (MVUE) UCL	236.3
95% Modified-t UCL	199.8	99% Chebyshev (MVUE) UCL	285.2
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.361	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	122.4		
nu star	313		
Approximate Chi Square Value (.05)	273	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0479	95% CLT UCL	198.5
Adjusted Chi Square Value	272.5	95% Jackknife UCL	198.8
		95% Standard Bootstrap UCL	197.9
Anderson-Darling Test Statistic	6.438	95% Bootstrap-t UCL	207.2
Anderson-Darling 5% Critical Value	0.773	95% Hall's Bootstrap UCL	206.9
Kolmogorov-Smirnov Test Statistic	0.193	95% Percentile Bootstrap UCL	198.2
Kolmogorov-Smirnov 5% Critical Value	0.0874	95% BCA Bootstrap UCL	205.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	251.3
		97.5% Chebyshev(Mean, Sd) UCL	288
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	360
95% Approximate Gamma UCL	190.9		
95% Adjusted Gamma UCL	191.3		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	251.3

Result (1,2,4-trimethylbenzene)			
General Statistics			
Number of Valid Data	295	Number of Detected Data	54
Number of Distinct Detected Data	51	Number of Non-Detect Data	241
		Percent Non-Detects	81.69%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.375	Minimum Detected	0.318
Maximum Detected	486250	Maximum Detected	13.09
Mean of Detected	20099	Mean of Detected	5.456
SD of Detected	73240	SD of Detected	3.608
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	1263	Maximum Non-Detect	7.141
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	276
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	19
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.56%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.392	Lilliefors Test Statistic	0.119
5% Lilliefors Critical Value	0.121	5% Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3690	Mean	1.493
SD	32055	SD	2.658
95% DL/2 (t) UCL	6769	95% H-Stat (DL/2) UCL	165.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.327
		SD in Log Scale	7.068
		Mean in Original Scale	3679
		SD in Original Scale	32056
		95% Percentile Bootstrap UCL	7223
		95% BCA Bootstrap UCL	9094
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.172	**Data appear Lognormal at 5% Significance Level**	
Theta Star	116541		
nu star	18.63		
A-D Test Statistic	3.426	**Nonparametric Statistics**	
5% A-D Critical Value	0.93	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.93	Mean	3681
5% K-S Critical Value	0.135	SD	32002
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1881
		95% KM (t) UCL	6784
Assuming Gamma Distribution		95% KM (z) UCL	6774
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6760
Minimum	1.375	95% KM (bootstrap t) UCL	12920
Maximum	486250	95% KM (BCA) UCL	7274
Mean	22102	95% KM (Percentile Bootstrap) UCL	7174
Median	17459	95% KM (Chebyshev) UCL	11878
SD	32402	97.5% KM (Chebyshev) UCL	15426
k star	0.691	99% KM (Chebyshev) UCL	22394
Theta star	31972		
Nu star	407.9	**Potential UCLs to Use**	
AppChi2	362	97.5% KM (Chebyshev) UCL	15426
95% Gamma Approximate UCL	24899		
95% Adjusted Gamma UCL	24913		
Note: DL/2 is not a recommended method.			

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	295	Number of Detected Data	44
Number of Distinct Detected Data	40	Number of Non-Detect Data	251
		Percent Non-Detects	85.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	212500	Maximum Detected	12.27
Mean of Detected	9665	Mean of Detected	5.248
SD of Detected	34944	SD of Detected	3.322
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	1263	Maximum Non-Detect	7.141
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	281
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.25%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.316	Lilliefors Test Statistic	0.938
5% Lilliefors Critical Value	0.944	5% Lilliefors Critical Value	0.944
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1453	Mean	1.337
SD	13800	SD	2.376
95% DL/2 (t) UCL	2779	95% H-Stat (DL/2) UCL	70.73
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.968
		SD in Log Scale	6.768
		Mean in Original Scale	1442
		SD in Original Scale	13802
		95% Percentile Bootstrap UCL	2874
		95% BCA Bootstrap UCL	3664
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.191	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	50529		
nu star	16.83		
A-D Test Statistic	2.628	**Nonparametric Statistics**	
5% A-D Critical Value	0.912	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.912	Mean	1443
5% K-S Critical Value	0.148	SD	13778
Data not Gamma Distributed at 5% Significance Level		SE of Mean	811.5
		95% KM (t) UCL	2782
Assuming Gamma Distribution		95% KM (z) UCL	2778
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2769
Minimum	1.5	95% KM (bootstrap t) UCL	9947
Maximum	212500	95% KM (BCA) UCL	3053
Mean	11796	95% KM (Percentile Bootstrap) UCL	3040
Median	7671	95% KM (Chebyshev) UCL	4980
SD	15619	97.5% KM (Chebyshev) UCL	6511
k star	0.807	99% KM (Chebyshev) UCL	9517
Theta star	14623		
Nu star	475.9	**Potential UCLs to Use**	
AppChi2	426.3	97.5% KM (Chebyshev) UCL	6511
95% Gamma Approximate UCL	13167		
95% Adjusted Gamma UCL	13174		

Note: DL/2 is not a recommended method.

Result (1-methylnaphthalene)

General Statistics

Number of Valid Data	155	Number of Detected Data	50
Number of Distinct Detected Data	43	Number of Non-Detect Data	105
		Percent Non-Detects	67.74%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	24	Minimum Detected	3.178
Maximum Detected	270000	Maximum Detected	12.51
Mean of Detected	17894	Mean of Detected	6.499
SD of Detected	55674	SD of Detected	2.663
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	136
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	19
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.74%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.366	Lilliefors Test Statistic	0.916
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5801	Mean	4.253
SD	32501	SD	2.305
95% DL/2 (t) UCL	10121	95% H-Stat (DL/2) UCL	1243
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.29
		SD in Log Scale	4.564
		Mean in Original Scale	5775
		SD in Original Scale	32506
		95% Percentile Bootstrap UCL	10624
		95% BCA Bootstrap UCL	12660
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.22	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	81238		
nu star	22.03		
A-D Test Statistic	4.394	**Nonparametric Statistics**	
5% A-D Critical Value	0.898	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.898	Mean	5790
5% K-S Critical Value	0.138	SD	32398
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2629
		95% KM (t) UCL	10140
Assuming Gamma Distribution		95% KM (z) UCL	10114
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	10110
Minimum	24	95% KM (bootstrap t) UCL	15402
Maximum	270000	95% KM (BCA) UCL	10186
Mean	17431	95% KM (Percentile Bootstrap) UCL	10522
Median	17283	95% KM (Chebyshev) UCL	17248
SD	31456	97.5% KM (Chebyshev) UCL	22206
k star	0.574	99% KM (Chebyshev) UCL	31945
Theta star	30387		
Nu star	177.8	**Potential UCLs to Use**	
AppChi2	148	97.5% KM (Chebyshev) UCL	22206
95% Gamma Approximate UCL	20946		
95% Adjusted Gamma UCL	20982		

Note: DL/2 is not a recommended method.

Result (2-butanone)

General Statistics

Number of Valid Data	295	Number of Detected Data	50
Number of Distinct Detected Data	28	Number of Non-Detect Data	245
		Percent Non-Detects	83.05%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	11	Minimum Detected	2.398
Maximum Detected	91	Maximum Detected	4.511
Mean of Detected	28.18	Mean of Detected	3.239
SD of Detected	14.31	SD of Detected	0.437
Minimum Non-Detect	8	Minimum Non-Detect	2.079
Maximum Non-Detect	481250	Maximum Non-Detect	13.08
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.826	Lilliefors Test Statistic	0.976
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1706	Mean	3.844
SD	14830	SD	1.86
95% DL/2 (t) UCL	3130	95% H-Stat (DL/2) UCL	514.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.518
		SD in Log Scale	0.657
		Mean in Original Scale	15.52
		SD in Original Scale	11.97
		95% Percentile Bootstrap UCL	16.71
		95% BCA Bootstrap UCL	16.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.889	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	5.764		
nu star	488.9		
A-D Test Statistic	0.574	**Nonparametric Statistics**	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	17.8
5% K-S Critical Value	0.126	SD	11.7
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.023
		95% KM (t) UCL	19.48
Assuming Gamma Distribution		95% KM (z) UCL	19.48
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	19.21
Minimum	11	95% KM (bootstrap t) UCL	19.73
Maximum	91	95% KM (BCA) UCL	20.7
Mean	28.39	95% KM (Percentile Bootstrap) UCL	19.93
Median	28.58	95% KM (Chebyshev) UCL	22.26
SD	5.88	97.5% KM (Chebyshev) UCL	24.19
k star	29.04	99% KM (Chebyshev) UCL	27.98
Theta star	0.978		
Nu star	17135	**Potential UCLs to Use**	
AppChi2	16832	95% KM (t) UCL	19.48
95% Gamma Approximate UCL	28.91		
95% Adjusted Gamma UCL	28.91		

Note: DL/2 is not a recommended method.

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	155	Number of Detected Data	56
Number of Distinct Detected Data	51	Number of Non-Detect Data	99
		Percent Non-Detects	63.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	550000	Maximum Detected	13.22
Mean of Detected	24852	Mean of Detected	6.355
SD of Detected	91492	SD of Detected	2.693
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	2200	Maximum Non-Detect	7.696
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	139
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.68%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.41	Lilliefors Test Statistic	0.113
5% Lilliefors Critical Value	0.118	5% Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	9012	Mean	4.343
SD	55968	SD	2.363
95% DL/2 (t) UCL	16451	95% H-Stat (DL/2) UCL	1568
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.739
		SD in Log Scale	4.39
		Mean in Original Scale	8982
		SD in Original Scale	55973
		95% Percentile Bootstrap UCL	17122
		95% BCA Bootstrap UCL	21095
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.197	**Data appear Lognormal at 5% Significance Level**	
Theta Star	125860		
nu star	22.12		
A-D Test Statistic	6.376	**Nonparametric Statistics**	
5% A-D Critical Value	0.912	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.912	Mean	8996
5% K-S Critical Value	0.132	SD	55790
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4522
		95% KM (t) UCL	16478
Assuming Gamma Distribution		95% KM (z) UCL	16433
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	16435
Minimum	22	95% KM (bootstrap t) UCL	26521
Maximum	550000	95% KM (BCA) UCL	17399
Mean	31354	95% KM (Percentile Bootstrap) UCL	17832
Median	8067	95% KM (Chebyshev) UCL	28706
SD	69081	97.5% KM (Chebyshev) UCL	37234
k star	0.372	99% KM (Chebyshev) UCL	53986
Theta star	84311		
Nu star	115.3	**Potential UCLs to Use**	
AppChi2	91.49	97.5% KM (Chebyshev) UCL	37234
95% Gamma Approximate UCL	39506		
95% Adjusted Gamma UCL	39591		

Note: DL/2 is not a recommended method.

Result (acenaphthene)

General Statistics

Number of Valid Data	293	Number of Detected Data	31
Number of Distinct Detected Data	28	Number of Non-Detect Data	262
		Percent Non-Detects	89.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	26000	Maximum Detected	10.17
Mean of Detected	3007	Mean of Detected	5.469
SD of Detected	7150	SD of Detected	2.306
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	289
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.63%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.472	Lilliefors Test Statistic	0.939
5% Lilliefors Critical Value	0.929	5% Lilliefors Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	388.2	Mean	3.152
SD	2489	SD	1.645
95% DL/2 (t) UCL	628.1	95% H-Stat (DL/2) UCL	108.6
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	22104	Mean in Log Scale	0.988
SD	5673	SD in Log Scale	2.649
95% MLE (t) UCL	22651	Mean in Original Scale	325.2
95% MLE (Tiku) UCL	26733	SD in Original Scale	2471
		95% Percentile Bootstrap UCL	587
		95% BCA Bootstrap UCL	661.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.27	**Data appear Lognormal at 5% Significance Level**	
Theta Star	11126		
nu star	16.76		
A-D Test Statistic	3.065	**Nonparametric Statistics**	
5% A-D Critical Value	0.865	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.865	Mean	325.7
5% K-S Critical Value	0.172	SD	2467
Data not Gamma Distributed at 5% Significance Level		SE of Mean	146.5
		95% KM (t) UCL	567.4
Assuming Gamma Distribution		95% KM (z) UCL	566.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	563.9
Minimum	1E-09	95% KM (bootstrap t) UCL	742
Maximum	26000	95% KM (BCA) UCL	576.6
Mean	2077	95% KM (Percentile Bootstrap) UCL	585.4
Median	2354	95% KM (Chebyshev) UCL	964.3
SD	2579	97.5% KM (Chebyshev) UCL	1241
k star	0.16	99% KM (Chebyshev) UCL	1783
Theta star	12980		
Nu star	93.78	**Potential UCLs to Use**	
AppChi2	72.44	97.5% KM (Chebyshev) UCL	1241
95% Gamma Approximate UCL	2689		
95% Adjusted Gamma UCL	2692		

Note: DL/2 is not a recommended method.

Result (acenaphthylene)

General Statistics

Number of Valid Data	293	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	286
		Percent Non-Detects	97.61%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	33	Minimum Detected	3.497
Maximum Detected	3400	Maximum Detected	8.132
Mean of Detected	610.6	Mean of Detected	5.086
SD of Detected	1235	SD of Detected	1.648
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.532	Lilliefors Test Statistic	0.866
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	155.4	Mean	3.044
SD	855.2	SD	1.472
95% DL/2 (t) UCL	237.8	95% H-Stat (DL/2) UCL	77.04
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.395
		SD in Log Scale	4.011
		Mean in Original Scale	14.87
		SD in Original Scale	200.1
		95% Percentile Bootstrap UCL	37.5
		95% BCA Bootstrap UCL	60.78
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.37	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1649		
nu star	5.183		
A-D Test Statistic	0.817	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	47.13
5% K-S Critical Value	0.328	SD	198.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	12.6
		95% KM (t) UCL	67.93
Assuming Gamma Distribution		95% KM (z) UCL	67.86
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	63.19
Minimum	1E-09	95% KM (bootstrap t) UCL	186.5
Maximum	4385514	95% KM (BCA) UCL	242.4
Mean	1122317	95% KM (Percentile Bootstrap) UCL	94.24
Median	722398	95% KM (Chebyshev) UCL	102.1
SD	1188695	97.5% KM (Chebyshev) UCL	125.8
k star	0.424	99% KM (Chebyshev) UCL	172.5
Theta star	2646197		
Nu star	248.5	**Potential UCLs to Use**	
AppChi2	213	95% KM (Chebyshev) UCL	102.1
95% Gamma Approximate UCL	1309340		
95% Adjusted Gamma UCL	1310329		

Note: DL/2 is not a recommended method.

Result (acetone)

General Statistics

Number of Valid Data	295	Number of Detected Data	80
Number of Distinct Detected Data	57	Number of Non-Detect Data	215
		Percent Non-Detects	72.88%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	210	Maximum Detected	5.347
Mean of Detected	87.63	Mean of Detected	4.362
SD of Detected	40.49	SD of Detected	0.487
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	240625	Maximum Non-Detect	12.39
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.125	Lilliefors Test Statistic	0.0651
5% Lilliefors Critical Value	0.0991	5% Lilliefors Critical Value	0.0991
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1190	Mean	4.522
SD	7672	SD	1.749
95% DL/2 (t) UCL	1927	95% H-Stat (DL/2) UCL	829.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.729
		SD in Log Scale	0.588
		Mean in Original Scale	49.8
		SD in Original Scale	33.36
		95% Percentile Bootstrap UCL	52.98
		95% BCA Bootstrap UCL	53.15
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.511	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	19.42		
nu star	721.8		
A-D Test Statistic	0.366	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	52.42
5% K-S Critical Value	0.1	SD	35.86
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.68
		95% KM (t) UCL	56.84
Assuming Gamma Distribution		95% KM (z) UCL	56.82
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	56.41
Minimum	22	95% KM (bootstrap t) UCL	56.8
Maximum	210	95% KM (BCA) UCL	58.28
Mean	84.02	95% KM (Percentile Bootstrap) UCL	57.83
Median	79.05	95% KM (Chebyshev) UCL	64.1
SD	22.93	97.5% KM (Chebyshev) UCL	69.15
k star	13.98	99% KM (Chebyshev) UCL	79.08
Theta star	6.012		
Nu star	8246	**Potential UCLs to Use**	
AppChi2	8036	95% KM (t) UCL	56.84
95% Gamma Approximate UCL	86.22		
95% Adjusted Gamma UCL	86.23		

Note: DL/2 is not a recommended method.

Result (anthracene)

General Statistics

Number of Valid Data	293	Number of Detected Data	40
Number of Distinct Detected Data	35	Number of Non-Detect Data	253
		Percent Non-Detects	86.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	4000	Maximum Detected	8.294
Mean of Detected	407	Mean of Detected	4.398
SD of Detected	805	SD of Detected	1.964
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.557	Lilliefors Test Statistic	0.949
5% Lilliefors Critical Value	0.94	5% Lilliefors Critical Value	0.94
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	190.7	Mean	3.177
SD	887	SD	1.608
95% DL/2 (t) UCL	276.2	95% H-Stat (DL/2) UCL	105.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.076
		SD in Log Scale	1.717
		Mean in Original Scale	65.45
		SD in Original Scale	324.4
		95% Percentile Bootstrap UCL	98.42
		95% BCA Bootstrap UCL	108
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.393	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1034		
nu star	31.48		
A-D Test Statistic	1.398	**Nonparametric Statistics**	
5% A-D Critical Value	0.834	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.834	Mean	64.08
5% K-S Critical Value	0.149	SD	327.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	19.57
		95% KM (t) UCL	96.37
Assuming Gamma Distribution		95% KM (z) UCL	96.27
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	96.03
Minimum	1E-09	95% KM (bootstrap t) UCL	121
Maximum	4000	95% KM (BCA) UCL	102.2
Mean	324.8	95% KM (Percentile Bootstrap) UCL	98.22
Median	335.4	95% KM (Chebyshev) UCL	149.4
SD	317.6	97.5% KM (Chebyshev) UCL	186.3
k star	1.079	99% KM (Chebyshev) UCL	258.8
Theta star	301		
Nu star	632.2	**Potential UCLs to Use**	
AppChi2	574.9	95% KM (Chebyshev) UCL	149.4
95% Gamma Approximate UCL	357.1		
95% Adjusted Gamma UCL	357.3		

Note: DL/2 is not a recommended method.

Result (antimony)

General Statistics

Number of Valid Data	185	Number of Detected Data	58
Number of Distinct Detected Data	57	Number of Non-Detect Data	127
		Percent Non-Detects	68.65%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.813	Minimum Detected	-0.208
Maximum Detected	9.675	Maximum Detected	2.27
Mean of Detected	4.495	Mean of Detected	1.343
SD of Detected	2.202	SD of Detected	0.631
Minimum Non-Detect	0.762	Minimum Non-Detect	-0.272
Maximum Non-Detect	3.75	Maximum Non-Detect	1.322
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	148
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	37
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.0696	Lilliefors Test Statistic	0.154
5% Lilliefors Critical Value	0.116	5% Lilliefors Critical Value	0.116
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.785	Mean	-0.0937
SD	2.236	SD	1.099
95% DL/2 (t) UCL	2.057	95% H-Stat (DL/2) UCL	1.326
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.812	Mean in Log Scale	0.196
SD	3.544	SD in Log Scale	0.907
95% MLE (t) UCL	1.243	Mean in Original Scale	1.94
95% MLE (Tiku) UCL	1.842	SD in Original Scale	2.136
		95% Percentile Bootstrap UCL	2.204
		95% BCA Bootstrap UCL	2.228

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.125	**Data appear Normal at 5% Significance Level**	
Theta Star	1.439		
nu star	362.4		
A-D Test Statistic	1.004	**Nonparametric Statistics**	
5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	1.98
5% K-S Critical Value	0.118	SD	2.099
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.156
		95% KM (t) UCL	2.238
Assuming Gamma Distribution		95% KM (z) UCL	2.237
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.203
Minimum	0.813	95% KM (bootstrap t) UCL	2.232
Maximum	9.675	95% KM (BCA) UCL	2.347
Mean	4.498	95% KM (Percentile Bootstrap) UCL	2.279
Median	4.509	95% KM (Chebyshev) UCL	2.66
SD	1.229	97.5% KM (Chebyshev) UCL	2.955
k star	9.937	99% KM (Chebyshev) UCL	3.533
Theta star	0.453		
Nu star	3677	**Potential UCLs to Use**	
AppChi2	3537	95% KM (t) UCL	2.238
95% Gamma Approximate UCL	4.676	95% KM (Percentile Bootstrap) UCL	2.279
95% Adjusted Gamma UCL	4.677		

Note: DL/2 is not a recommended method.

Result (arsenic)

General Statistics

Number of Valid Data	185	Number of Detected Data	157
Number of Distinct Detected Data	150	Number of Non-Detect Data	28
		Percent Non-Detects	15.14%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.45	Minimum Detected	-0.799
Maximum Detected	13.5	Maximum Detected	2.603
Mean of Detected	5.037	Mean of Detected	1.439
SD of Detected	2.861	SD of Detected	0.64
Minimum Non-Detect	0.762	Minimum Non-Detect	-0.272
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	36
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	149
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	19.46%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.0988	Lilliefors Test Statistic	0.0815
5% Lilliefors Critical Value	0.0707	5% Lilliefors Critical Value	0.0707
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.357	Mean	1.127
SD	3.09	SD	0.95
95% DL/2 (t) UCL	4.733	95% H-Stat (DL/2) UCL	5.057
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	4.092	Mean in Log Scale	1.242
SD	3.505	SD in Log Scale	0.758
95% MLE (t) UCL	4.518	Mean in Original Scale	4.453
95% MLE (Tiku) UCL	4.528	SD in Original Scale	2.979
		95% Percentile Bootstrap UCL	4.83
		95% BCA Bootstrap UCL	4.841
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.917	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1.727		
nu star	915.9		
A-D Test Statistic	0.278	**Nonparametric Statistics**	
5% A-D Critical Value	0.76	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.76	Mean	4.375
5% K-S Critical Value	0.0753	SD	3.061
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.226
		95% KM (t) UCL	4.749
Assuming Gamma Distribution		95% KM (z) UCL	4.747
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4.749
Minimum	1E-09	95% KM (bootstrap t) UCL	4.768
Maximum	13.5	95% KM (BCA) UCL	4.784
Mean	4.444	95% KM (Percentile Bootstrap) UCL	4.743
Median	3.93	95% KM (Chebyshev) UCL	5.36
SD	3.007	97.5% KM (Chebyshev) UCL	5.787
k star	0.822	99% KM (Chebyshev) UCL	6.624
Theta star	5.408		
Nu star	304.1	**Potential UCLs to Use**	
AppChi2	264.7	95% KM (BCA) UCL	4.784
95% Gamma Approximate UCL	5.106		
95% Adjusted Gamma UCL	5.111		

Note: DL/2 is not a recommended method.

Result (barium)

General Statistics

Number of Valid Observations	185	Number of Distinct Observations	132

Raw Statistics		**Log-transformed Statistics**	
Minimum	31.9	Minimum of Log Data	3.463
Maximum	566	Maximum of Log Data	6.339
Mean	183.5	Mean of log Data	5.136
Median	173	SD of log Data	0.396
SD	78.28		
Coefficient of Variation	0.427		
Skewness	2.31		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.174	Lilliefors Test Statistic	0.108
Lilliefors Critical Value	0.0651	Lilliefors Critical Value	0.0651
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	193	95% H-UCL	193.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	208
95% Adjusted-CLT UCL	194	97.5% Chebyshev (MVUE) UCL	218.4
95% Modified-t UCL	193.2	99% Chebyshev (MVUE) UCL	239
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.619	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	27.73		
nu star	2449		
Approximate Chi Square Value (.05)	2335	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0487	95% CLT UCL	193
Adjusted Chi Square Value	2334	95% Jackknife UCL	193
		95% Standard Bootstrap UCL	193.1
Anderson-Darling Test Statistic	4.835	95% Bootstrap-t UCL	194.2
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	194.7
Kolmogorov-Smirnov Test Statistic	0.119	95% Percentile Bootstrap UCL	193
Kolmogorov-Smirnov 5% Critical Value	0.0676	95% BCA Bootstrap UCL	194.4
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	208.6
		97.5% Chebyshev(Mean, Sd) UCL	219.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	240.8
95% Approximate Gamma UCL	192.5		
95% Adjusted Gamma UCL	192.6		
Potential UCL to Use		Use 95% Student's-t UCL	193
		or 95% Modified-t UCL	193.2

Result (benzene)

General Statistics

Number of Valid Data	295	Number of Detected Data	59
Number of Distinct Detected Data	49	Number of Non-Detect Data	236
		Percent Non-Detects	80.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.61	Minimum Detected	-0.494
Maximum Detected	15750	Maximum Detected	9.665
Mean of Detected	494.7	Mean of Detected	2.318
SD of Detected	2222	SD of Detected	2.494
Minimum Non-Detect	0.42	Minimum Non-Detect	-0.868
Maximum Non-Detect	24063	Maximum Non-Detect	10.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.426	Lilliefors Test Statistic	0.203
5% Lilliefors Critical Value	0.115	5% Lilliefors Critical Value	0.115
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	167.1	Mean	0.943
SD	1236	SD	2.136
95% DL/2 (t) UCL	285.9	95% H-Stat (DL/2) UCL	33.41
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.882
		SD in Log Scale	3.707
		Mean in Original Scale	99.23
		SD in Original Scale	1007
		95% Percentile Bootstrap UCL	212
		95% BCA Bootstrap UCL	283.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.192	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2571		
nu star	22.7		
A-D Test Statistic	8.821	**Nonparametric Statistics**	
5% A-D Critical Value	0.916	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.916	Mean	100.4
5% K-S Critical Value	0.129	SD	1007
Data not Gamma Distributed at 5% Significance Level		SE of Mean	59.22
		95% KM (t) UCL	198.1
Assuming Gamma Distribution		95% KM (z) UCL	197.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	197.4
Minimum	1E-09	95% KM (bootstrap t) UCL	628.7
Maximum	15750	95% KM (BCA) UCL	214.1
Mean	439.5	95% KM (Percentile Bootstrap) UCL	208.4
Median	469.3	95% KM (Chebyshev) UCL	358.5
SD	1001	97.5% KM (Chebyshev) UCL	470.2
k star	0.232	99% KM (Chebyshev) UCL	689.6
Theta star	1896		
Nu star	136.8	**Potential UCLs to Use**	
AppChi2	110.8	97.5% KM (Chebyshev) UCL	470.2
95% Gamma Approximate UCL	542.7		
95% Adjusted Gamma UCL	543.3		

Note: DL/2 is not a recommended method.

Result (benzo(a)anthracene)

General Statistics

Number of Valid Data	293	Number of Detected Data	67
Number of Distinct Detected Data	58	Number of Non-Detect Data	226
		Percent Non-Detects	77.13%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	7200	Maximum Detected	8.882
Mean of Detected	544.7	Mean of Detected	4.753
SD of Detected	1293	SD of Detected	1.829
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.338	Lilliefors Test Statistic	0.0714
5% Lilliefors Critical Value	0.108	5% Lilliefors Critical Value	0.108
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	250.4	Mean	3.322
SD	1045	SD	1.738
95% DL/2 (t) UCL	351.1	95% H-Stat (DL/2) UCL	157.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.249
		SD in Log Scale	2.081
		Mean in Original Scale	132.4
		SD in Original Scale	654.6
		95% Percentile Bootstrap UCL	199.2
		95% BCA Bootstrap UCL	226.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.413	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1320		
nu star	55.31		
A-D Test Statistic	2.824	**Nonparametric Statistics**	
5% A-D Critical Value	0.835	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.835	Mean	133.6
5% K-S Critical Value	0.116	SD	657.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	38.96
		95% KM (t) UCL	197.9
Assuming Gamma Distribution		95% KM (z) UCL	197.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	197.6
Minimum	3.125	95% KM (bootstrap t) UCL	236.9
Maximum	7200	95% KM (BCA) UCL	207
Mean	1068	95% KM (Percentile Bootstrap) UCL	201.3
Median	629.4	95% KM (Chebyshev) UCL	303.5
SD	1123	97.5% KM (Chebyshev) UCL	377
k star	0.803	99% KM (Chebyshev) UCL	521.3
Theta star	1331		
Nu star	470.4	**Potential UCLs to Use**	
AppChi2	421.1	95% KM (Chebyshev) UCL	303.5
95% Gamma Approximate UCL	1193		
95% Adjusted Gamma UCL	1194		

Note: DL/2 is not a recommended method.

Result (benzo(a)pyrene)

General Statistics

Number of Valid Data	293	Number of Detected Data	75
Number of Distinct Detected Data	64	Number of Non-Detect Data	218
		Percent Non-Detects	74.40%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	5200	Maximum Detected	8.556
Mean of Detected	360.9	Mean of Detected	4.88
SD of Detected	724.8	SD of Detected	1.43
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.311	Lilliefors Test Statistic	0.0637
5% Lilliefors Critical Value	0.102	5% Lilliefors Critical Value	0.102
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	225.1	Mean	3.435
SD	912.5	SD	1.73
95% DL/2 (t) UCL	313	95% H-Stat (DL/2) UCL	163.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.417
		SD in Log Scale	2.016
		Mean in Original Scale	99.8
		SD in Original Scale	395.9
		95% Percentile Bootstrap UCL	138.5
		95% BCA Bootstrap UCL	154.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.595	**Data appear Lognormal at 5% Significance Level**	
Theta Star	606.2		
nu star	89.31		
A-D Test Statistic	2.343	**Nonparametric Statistics**	
5% A-D Critical Value	0.807	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.807	Mean	103.9
5% K-S Critical Value	0.108	SD	398.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	23.74
		95% KM (t) UCL	143
Assuming Gamma Distribution		95% KM (z) UCL	142.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	142.9
Minimum	1E-09	95% KM (bootstrap t) UCL	167.4
Maximum	5200	95% KM (BCA) UCL	146.6
Mean	644.5	95% KM (Percentile Bootstrap) UCL	146.3
Median	417.7	95% KM (Chebyshev) UCL	207.3
SD	699.3	97.5% KM (Chebyshev) UCL	252.1
k star	0.178	99% KM (Chebyshev) UCL	340
Theta star	3629		
Nu star	104.1	**Potential UCLs to Use**	
AppChi2	81.53	95% KM (BCA) UCL	146.6
95% Gamma Approximate UCL	822.7		
95% Adjusted Gamma UCL	823.7		

Note: DL/2 is not a recommended method.

Result (benzo(b)fluoranthene)

General Statistics

Number of Valid Data	293	Number of Detected Data	56
Number of Distinct Detected Data	50	Number of Non-Detect Data	237
		Percent Non-Detects	80.89%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	6.25	Minimum Detected	1.833
Maximum Detected	2900	Maximum Detected	7.972
Mean of Detected	288.1	Mean of Detected	4.618
SD of Detected	547	SD of Detected	1.452
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.303	Lilliefors Test Statistic	0.0613
5% Lilliefors Critical Value	0.118	5% Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	192	Mean	3.298
SD	868	SD	1.631
95% DL/2 (t) UCL	275.7	95% H-Stat (DL/2) UCL	124.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.204
		SD in Log Scale	1.785
		Mean in Original Scale	63.23
		SD in Original Scale	261.6
		95% Percentile Bootstrap UCL	89.34
		95% BCA Bootstrap UCL	97.18
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.572	**Data appear Lognormal at 5% Significance Level**	
Theta Star	503.5		
nu star	64.09		
A-D Test Statistic	2.01	**Nonparametric Statistics**	
5% A-D Critical Value	0.807	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.807	Mean	65.74
5% K-S Critical Value	0.125	SD	263.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	15.76
		95% KM (t) UCL	91.75
Assuming Gamma Distribution		95% KM (z) UCL	91.67
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	91.58
Minimum	6.25	95% KM (bootstrap t) UCL	106.6
Maximum	2900	95% KM (BCA) UCL	97.24
Mean	655.3	95% KM (Percentile Bootstrap) UCL	92.14
Median	491.8	95% KM (Chebyshev) UCL	134.5
SD	572.1	97.5% KM (Chebyshev) UCL	164.2
k star	0.978	99% KM (Chebyshev) UCL	222.6
Theta star	670.1		
Nu star	573	**Potential UCLs to Use**	
AppChi2	518.5	95% KM (BCA) UCL	97.24
95% Gamma Approximate UCL	724.2		
95% Adjusted Gamma UCL	724.5		

Note: DL/2 is not a recommended method.

Result (benzo(ghi)perylene)

General Statistics

Number of Valid Data	293	Number of Detected Data	89
Number of Distinct Detected Data	74	Number of Non-Detect Data	204
		Percent Non-Detects	69.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	1400	Maximum Detected	7.244
Mean of Detected	175.8	Mean of Detected	4.243
SD of Detected	285.9	SD of Detected	1.416
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.275	Lilliefors Test Statistic	0.0536
5% Lilliefors Critical Value	0.0939	5% Lilliefors Critical Value	0.0939
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	187.3	Mean	3.404
SD	846.6	SD	1.622
95% DL/2 (t) UCL	268.9	95% H-Stat (DL/2) UCL	135.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.601
		SD in Log Scale	1.636
		Mean in Original Scale	61.15
		SD in Original Scale	174.6
		95% Percentile Bootstrap UCL	78.81
		95% BCA Bootstrap UCL	81.68
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.643	**Data appear Lognormal at 5% Significance Level**	
Theta Star	273.2		
nu star	114.5		
A-D Test Statistic	2.266	**Nonparametric Statistics**	
5% A-D Critical Value	0.803	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.803	Mean	63.28
5% K-S Critical Value	0.0991	SD	178.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	10.74
		95% KM (t) UCL	81
Assuming Gamma Distribution		95% KM (z) UCL	80.94
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	80.94
Minimum	1E-09	95% KM (bootstrap t) UCL	86.99
Maximum	1400	95% KM (BCA) UCL	84.11
Mean	229.1	95% KM (Percentile Bootstrap) UCL	81.42
Median	136.6	95% KM (Chebyshev) UCL	110.1
SD	251.1	97.5% KM (Chebyshev) UCL	130.3
k star	0.184	99% KM (Chebyshev) UCL	170.1
Theta star	1244		
Nu star	108	**Potential UCLs to Use**	
AppChi2	84.98	95% KM (BCA) UCL	84.11
95% Gamma Approximate UCL	291.1		
95% Adjusted Gamma UCL	291.4		

Note: DL/2 is not a recommended method.

Result (benzo(k)fluoranthene)

General Statistics

Number of Valid Data	293	Number of Detected Data	40
Number of Distinct Detected Data	34	Number of Non-Detect Data	253
		Percent Non-Detects	86.35%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.375	Minimum Detected	1.476
Maximum Detected	2000	Maximum Detected	7.601
Mean of Detected	233.1	Mean of Detected	4.377
SD of Detected	426	SD of Detected	1.487
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.55	Lilliefors Test Statistic	0.971
5% Lilliefors Critical Value	0.94	5% Lilliefors Critical Value	0.94
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	172.6	Mean	3.199
SD	849.1	SD	1.565
95% DL/2 (t) UCL	254.4	95% H-Stat (DL/2) UCL	101.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.439
		SD in Log Scale	1.885
		Mean in Original Scale	37.22
		SD in Original Scale	174.3
		95% Percentile Bootstrap UCL	55.35
		95% BCA Bootstrap UCL	63.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.551	**Data appear Lognormal at 5% Significance Level**	
Theta Star	422.7		
nu star	44.11		
A-D Test Statistic	1.633	**Nonparametric Statistics**	
5% A-D Critical Value	0.806	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.806	Mean	39.71
5% K-S Critical Value	0.147	SD	177
Data not Gamma Distributed at 5% Significance Level		SE of Mean	10.72
		95% KM (t) UCL	57.4
Assuming Gamma Distribution		95% KM (z) UCL	57.35
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	57.28
Minimum	4.375	95% KM (bootstrap t) UCL	71.95
Maximum	2000	95% KM (BCA) UCL	60.62
Mean	539.8	95% KM (Percentile Bootstrap) UCL	59.09
Median	460	95% KM (Chebyshev) UCL	86.45
SD	387.4	97.5% KM (Chebyshev) UCL	106.7
k star	1.481	99% KM (Chebyshev) UCL	146.4
Theta star	364.5		
Nu star	867.9	**Potential UCLs to Use**	
AppChi2	800.6	95% KM (BCA) UCL	60.62
95% Gamma Approximate UCL	585.3		
95% Adjusted Gamma UCL	585.5		

Note: DL/2 is not a recommended method.

Result (beryllium)

General Statistics

Number of Valid Data	185	Number of Detected Data	178
Number of Distinct Detected Data	160	Number of Non-Detect Data	7
		Percent Non-Detects	3.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.274	Minimum Detected	-1.295
Maximum Detected	1.75	Maximum Detected	0.56
Mean of Detected	0.77	Mean of Detected	-0.363
SD of Detected	0.358	SD of Detected	0.449
Minimum Non-Detect	0.26	Minimum Non-Detect	-1.347
Maximum Non-Detect	0.625	Maximum Non-Detect	-0.47
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	86
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	99
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	46.49%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.122	Lilliefors Test Statistic	0.0622
5% Lilliefors Critical Value	0.0664	5% Lilliefors Critical Value	0.0664
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.747	Mean	-0.42
SD	0.37	SD	0.531
95% DL/2 (t) UCL	0.792	95% H-Stat (DL/2) UCL	0.79
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.657	Mean in Log Scale	-0.4
SD	0.479	SD in Log Scale	0.481
95% MLE (t) UCL	0.715	Mean in Original Scale	0.751
95% MLE (Tiku) UCL	0.726	SD in Original Scale	0.364
		95% Percentile Bootstrap UCL	0.796
		95% BCA Bootstrap UCL	0.798

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.028	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.153		
nu star	1790		
A-D Test Statistic	1.659	**Nonparametric Statistics**	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	0.752
5% K-S Critical Value	0.0695	SD	0.362
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0267
		95% KM (t) UCL	0.796
Assuming Gamma Distribution		95% KM (z) UCL	0.796
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.796
Minimum	1E-09	95% KM (bootstrap t) UCL	0.797
Maximum	1.75	95% KM (BCA) UCL	0.797
Mean	0.744	95% KM (Percentile Bootstrap) UCL	0.798
Median	0.668	95% KM (Chebyshev) UCL	0.868
SD	0.377	97.5% KM (Chebyshev) UCL	0.919
k star	0.804	99% KM (Chebyshev) UCL	1.017
Theta star	0.925		
Nu star	297.4	**Potential UCLs to Use**	
AppChi2	258.5	95% KM (BCA) UCL	0.797
95% Gamma Approximate UCL	0.856		
95% Adjusted Gamma UCL	0.857		

Note: DL/2 is not a recommended method.

Result (cadmium)

General Statistics

Number of Valid Data	185	Number of Detected Data	69
Number of Distinct Detected Data	66	Number of Non-Detect Data	116
		Percent Non-Detects	62.70%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0838	Minimum Detected	-2.48
Maximum Detected	1.97	Maximum Detected	0.678
Mean of Detected	0.58	Mean of Detected	-0.735
SD of Detected	0.407	SD of Detected	0.618
Minimum Non-Detect	0.508	Minimum Non-Detect	-0.677
Maximum Non-Detect	0.625	Maximum Non-Detect	-0.47
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	171
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.43%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.271	Lilliefors Test Statistic	0.152
5% Lilliefors Critical Value	0.107	5% Lilliefors Critical Value	0.107
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.388	Mean	-1.087
SD	0.288	SD	0.465
95% DL/2 (t) UCL	0.423	95% H-Stat (DL/2) UCL	0.382
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.905
		SD in Log Scale	0.432
		Mean in Original Scale	0.451
		SD in Original Scale	0.274
		95% Percentile Bootstrap UCL	0.487
		95% BCA Bootstrap UCL	0.493
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.678	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.216		
nu star	369.5		
A-D Test Statistic	3.31	**Nonparametric Statistics**	
5% A-D Critical Value	0.759	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.759	Mean	0.457
5% K-S Critical Value	0.108	SD	0.278
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0237
		95% KM (t) UCL	0.496
Assuming Gamma Distribution		95% KM (z) UCL	0.496
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.496
Minimum	0.0838	95% KM (bootstrap t) UCL	0.499
Maximum	1.97	95% KM (BCA) UCL	0.495
Mean	0.589	95% KM (Percentile Bootstrap) UCL	0.496
Median	0.588	95% KM (Chebyshev) UCL	0.56
SD	0.256	97.5% KM (Chebyshev) UCL	0.605
k star	6.524	99% KM (Chebyshev) UCL	0.692
Theta star	0.0903		
Nu star	2414	**Potential UCLs to Use**	
AppChi2	2301	95% KM (t) UCL	0.496
95% Gamma Approximate UCL	0.618	95% KM (% Bootstrap) UCL	0.496
95% Adjusted Gamma UCL	0.619		

Note: DL/2 is not a recommended method.

Result (carbon disulfide)

General Statistics

Number of Valid Data	295	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	290
		Percent Non-Detects	98.31%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	9.1	Minimum Detected	2.208
Maximum Detected	34	Maximum Detected	3.526
Mean of Detected	17.14	Mean of Detected	2.716
SD of Detected	10.24	SD of Detected	0.543
Minimum Non-Detect	4	Minimum Non-Detect	1.386
Maximum Non-Detect	24063	Maximum Non-Detect	10.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.845	Lilliefors Test Statistic	0.919
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	134.9	Mean	1.862
SD	849.5	SD	1.653
95% DL/2 (t) UCL	216.5	95% H-Stat (DL/2) UCL	33.28
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.77
		SD in Log Scale	1.446
		Mean in Original Scale	0.653
		SD in Original Scale	2.564
		95% Percentile Bootstrap UCL	0.905
		95% BCA Bootstrap UCL	1.036
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.792	**Data appear Normal at 5% Significance Level**	
Theta Star	9.567		
nu star	17.92		
A-D Test Statistic	0.349	**Nonparametric Statistics**	
5% A-D Critical Value	0.681	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.681	Mean	9.255
5% K-S Critical Value	0.358	SD	1.683
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.117
		95% KM (t) UCL	9.448
Assuming Gamma Distribution		95% KM (z) UCL	9.447
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9.593
Minimum	1.182	95% KM (bootstrap t) UCL	9.568
Maximum	41.44	95% KM (BCA) UCL	19.06
Mean	15.98	95% KM (Percentile Bootstrap) UCL	19
Median	14.86	95% KM (Chebyshev) UCL	9.764
SD	8.41	97.5% KM (Chebyshev) UCL	9.984
k star	3.054	99% KM (Chebyshev) UCL	10.42
Theta star	5.233		
Nu star	1802	**Potential UCLs to Use**	
AppChi2	1704	95% KM (t) UCL	9.448
95% Gamma Approximate UCL	16.9	95% KM (Percentile Bootstrap) UCL	19
95% Adjusted Gamma UCL	16.9		

Note: DL/2 is not a recommended method.

Result (chromium)			
General Statistics			
Number of Valid Observations	185	Number of Distinct Observations	161
Raw Statistics		**Log-transformed Statistics**	
Minimum	6.52	Minimum of Log Data	1.875
Maximum	415	Maximum of Log Data	6.028
Mean	43.26	Mean of log Data	3.509
Median	32.3	SD of log Data	0.647
SD	49.35		
Coefficient of Variation	1.141		
Skewness	5.404		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.282	Lilliefors Test Statistic	0.108
Lilliefors Critical Value	0.0651	Lilliefors Critical Value	0.0651
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	49.26	95% H-UCL	45.05
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	50.44
95% Adjusted-CLT UCL	50.77	97.5% Chebyshev (MVUE) UCL	54.48
95% Modified-t UCL	49.5	99% Chebyshev (MVUE) UCL	62.41
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.055	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	21.05		
nu star	760.2		
Approximate Chi Square Value (.05)	697.3	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0487	95% CLT UCL	49.22
Adjusted Chi Square Value	696.8	95% Jackknife UCL	49.26
		95% Standard Bootstrap UCL	49.31
Anderson-Darling Test Statistic	8.083	95% Bootstrap-t UCL	53.02
Anderson-Darling 5% Critical Value	0.766	95% Hall's Bootstrap UCL	52.04
Kolmogorov-Smirnov Test Statistic	0.171	95% Percentile Bootstrap UCL	49.46
Kolmogorov-Smirnov 5% Critical Value	0.0684	95% BCA Bootstrap UCL	51.02
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	59.07
		97.5% Chebyshev(Mean, Sd) UCL	65.92
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	79.36
95% Approximate Gamma UCL	47.16		
95% Adjusted Gamma UCL	47.2		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	59.07

Result (chromium, hexavalent)

General Statistics

Number of Valid Observations	9	Number of Distinct Observations	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	15	Minimum of Log Data	2.708
Maximum	1200	Maximum of Log Data	7.09
Mean	472.9	Mean of log Data	5.608
Median	340	SD of log Data	1.37
SD	411.4		
Coefficient of Variation	0.87		
Skewness	0.799		

Warning: There are only 9 Values in this data

Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.91	Shapiro Wilk Test Statistic	0.9
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	727.9	95% H-UCL	5114
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1813
95% Adjusted-CLT UCL	737.5	97.5% Chebyshev (MVUE) UCL	2342
95% Modified-t UCL	734	99% Chebyshev (MVUE) UCL	3380
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.769	**Data appear Normal at 5% Significance Level**	
Theta Star	615.2		
nu star	13.84		
Approximate Chi Square Value (.05)	6.46	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	698.5
Adjusted Chi Square Value	5.434	95% Jackknife UCL	727.9
		95% Standard Bootstrap UCL	693.3
Anderson-Darling Test Statistic	0.215	95% Bootstrap-t UCL	853.4
Anderson-Darling 5% Critical Value	0.743	95% Hall's Bootstrap UCL	830.3
Kolmogorov-Smirnov Test Statistic	0.166	95% Percentile Bootstrap UCL	689
Kolmogorov-Smirnov 5% Critical Value	0.287	95% BCA Bootstrap UCL	719.7
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1071
		97.5% Chebyshev(Mean, Sd) UCL	1329
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1837
95% Approximate Gamma UCL	1013		
95% Adjusted Gamma UCL	1204		
Potential UCL to Use		Use 95% Student's-t UCL	727.9

Result (chrysene)

General Statistics

Number of Valid Data	293	Number of Detected Data	128
Number of Distinct Detected Data	101	Number of Non-Detect Data	165
		Percent Non-Detects	56.31%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	20000	Maximum Detected	9.903
Mean of Detected	643	Mean of Detected	4.832
SD of Detected	2077	SD of Detected	1.763
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.379	Lilliefors Test Statistic	0.0633
5% Lilliefors Critical Value	0.0783	5% Lilliefors Critical Value	0.0783
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	400.1	Mean	3.735
SD	1614	SD	1.931
95% DL/2 (t) UCL	555.6	95% H-Stat (DL/2) UCL	362.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.105
		SD in Log Scale	2.161
		Mean in Original Scale	287.3
		SD in Original Scale	1405
		95% Percentile Bootstrap UCL	443.8
		95% BCA Bootstrap UCL	524.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.398	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1616		
nu star	101.9		
A-D Test Statistic	6.159	**Nonparametric Statistics**	
5% A-D Critical Value	0.843	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.843	Mean	292.6
5% K-S Critical Value	0.0881	SD	1407
Data not Gamma Distributed at 5% Significance Level		SE of Mean	82.79
		95% KM (t) UCL	429.2
Assuming Gamma Distribution		95% KM (z) UCL	428.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	428.9
Minimum	3.75	95% KM (bootstrap t) UCL	593.1
Maximum	20000	95% KM (BCA) UCL	445.1
Mean	634.3	95% KM (Percentile Bootstrap) UCL	433.7
Median	585.5	95% KM (Chebyshev) UCL	653.4
SD	1371	97.5% KM (Chebyshev) UCL	809.6
k star	0.817	99% KM (Chebyshev) UCL	1116
Theta star	776.5		
Nu star	478.7	**Potential UCLs to Use**	
AppChi2	429	95% KM (Chebyshev) UCL	653.4
95% Gamma Approximate UCL	707.8		
95% Adjusted Gamma UCL	708.2		

Note: DL/2 is not a recommended method.

Result (cobalt)

General Statistics

Number of Valid Observations	185	Number of Distinct Observations	129

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.76	Minimum of Log Data	1.324
Maximum	28.7	Maximum of Log Data	3.357
Mean	12.98	Mean of log Data	2.501
Median	12.7	SD of log Data	0.375
SD	4.312		
Coefficient of Variation	0.332		
Skewness	0.335		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0672	Lilliefors Test Statistic	0.117
Lilliefors Critical Value	0.0651	Lilliefors Critical Value	0.0651
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	13.5	95% H-UCL	13.72
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	14.69
95% Adjusted-CLT UCL	13.51	97.5% Chebyshev (MVUE) UCL	15.39
95% Modified-t UCL	13.5	99% Chebyshev (MVUE) UCL	16.77
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	8.013	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.62		
nu star	2965		
Approximate Chi Square Value (.05)	2839	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0487	95% CLT UCL	13.5
Adjusted Chi Square Value	2838	95% Jackknife UCL	13.5
		95% Standard Bootstrap UCL	13.5
Anderson-Darling Test Statistic	1.777	95% Bootstrap-t UCL	13.5
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	13.52
Kolmogorov-Smirnov Test Statistic	0.0922	95% Percentile Bootstrap UCL	13.53
Kolmogorov-Smirnov 5% Critical Value	0.0675	95% BCA Bootstrap UCL	13.49
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14.36
		97.5% Chebyshev(Mean, Sd) UCL	14.96
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	16.13
95% Approximate Gamma UCL	13.55		
95% Adjusted Gamma UCL	13.56		
Potential UCL to Use		Use 95% Student's-t UCL	13.5
		or 95% Modified-t UCL	13.5

Result (copper)

General Statistics

Number of Valid Data	185	Number of Detected Data	183
Number of Distinct Detected Data	165	Number of Non-Detect Data	2
		Percent Non-Detects	1.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	6.22	Minimum Detected	1.828
Maximum Detected	1640	Maximum Detected	7.402
Mean of Detected	54.86	Mean of Detected	3.513
SD of Detected	133.3	SD of Detected	0.752
Minimum Non-Detect	1.25	Minimum Non-Detect	0.223
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.367	Lilliefors Test Statistic	0.196
5% Lilliefors Critical Value	0.0655	5% Lilliefors Critical Value	0.0655
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	54.27	Mean	3.47
SD	132.7	SD	0.854
95% DL/2 (t) UCL	70.4	95% H-Stat (DL/2) UCL	51.61
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	53.31	Mean in Log Scale	3.492
SD	133.2	SD in Log Scale	0.773
95% MLE (t) UCL	69.5	Mean in Original Scale	54.32
95% MLE (Tiku) UCL	67.67	SD in Original Scale	132.7
		95% Percentile Bootstrap UCL	72.33
		95% BCA Bootstrap UCL	81.79
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.139	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	48.15		
nu star	417		
A-D Test Statistic	20.66	**Nonparametric Statistics**	
5% A-D Critical Value	0.78	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.78	Mean	54.33
5% K-S Critical Value	0.0698	SD	132.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	9.754
		95% KM (t) UCL	70.46
Assuming Gamma Distribution		95% KM (z) UCL	70.37
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	70.44
Minimum	1E-09	95% KM (bootstrap t) UCL	93.19
Maximum	1640	95% KM (BCA) UCL	73.62
Mean	54.26	95% KM (Percentile Bootstrap) UCL	71.96
Median	29.88	95% KM (Chebyshev) UCL	96.85
SD	132.7	97.5% KM (Chebyshev) UCL	115.2
k star	0.789	99% KM (Chebyshev) UCL	151.4
Theta star	68.73		
Nu star	292.1	**Potential UCLs to Use**	
AppChi2	253.5	95% KM (BCA) UCL	73.62
95% Gamma Approximate UCL	62.52		
95% Adjusted Gamma UCL	62.59		

Note: DL/2 is not a recommended method.

Result (dibenzo(a,h)anthracene)

General Statistics

Number of Valid Data	293	Number of Detected Data	18
Number of Distinct Detected Data	16	Number of Non-Detect Data	275
		Percent Non-Detects	93.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	51	Minimum Detected	3.932
Maximum Detected	530	Maximum Detected	6.273
Mean of Detected	204.8	Mean of Detected	5.003
SD of Detected	159.1	SD of Detected	0.853
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.869	Lilliefors Test Statistic	0.897
5% Lilliefors Critical Value	0.897	5% Lilliefors Critical Value	0.897
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	154.4	Mean	3.093
SD	836.3	SD	1.509
95% DL/2 (t) UCL	235.1	95% H-Stat (DL/2) UCL	82.25
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.027
		SD in Log Scale	1.861
		Mean in Original Scale	18.17
		SD in Original Scale	61.91
		95% Percentile Bootstrap UCL	24.23
		95% BCA Bootstrap UCL	25.88
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.465	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	139.8		
nu star	52.74		
A-D Test Statistic	0.602	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	61.31
5% K-S Critical Value	0.207	SD	55.03
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	3.428
		95% KM (t) UCL	66.96
Assuming Gamma Distribution		95% KM (z) UCL	66.94
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	66.6
Minimum	1E-09	95% KM (bootstrap t) UCL	69.53
Maximum	1723	95% KM (BCA) UCL	68.73
Mean	946.5	95% KM (Percentile Bootstrap) UCL	67.79
Median	1024	95% KM (Chebyshev) UCL	76.25
SD	478.2	97.5% KM (Chebyshev) UCL	82.71
k star	1.378	99% KM (Chebyshev) UCL	95.41
Theta star	686.8		
Nu star	807.6	**Potential UCLs to Use**	
AppChi2	742.6	95% KM (t) UCL	66.96
95% Gamma Approximate UCL	1029		
95% Adjusted Gamma UCL	1030		

Note: DL/2 is not a recommended method.

Result (ethylbenzene)

General Statistics

Number of Valid Data	295	Number of Detected Data	49
Number of Distinct Detected Data	43	Number of Non-Detect Data	246
		Percent Non-Detects	83.39%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	79125	Maximum Detected	11.28
Mean of Detected	4942	Mean of Detected	4.488
SD of Detected	16226	SD of Detected	3.027
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	290
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.31%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.349	Lilliefors Test Statistic	0.939
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	841.3	Mean	1.044
SD	6810	SD	2.43
95% DL/2 (t) UCL	1496	95% H-Stat (DL/2) UCL	63.11
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.977
		SD in Log Scale	5.756
		Mean in Original Scale	820.9
		SD in Original Scale	6810
		95% Percentile Bootstrap UCL	1517
		95% BCA Bootstrap UCL	1844
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.188	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	26341		
nu star	18.38		
A-D Test Statistic	4.582	**Nonparametric Statistics**	
5% A-D Critical Value	0.917	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.917	Mean	822.3
5% K-S Critical Value	0.141	SD	6799
Data not Gamma Distributed at 5% Significance Level		SE of Mean	399.9
		95% KM (t) UCL	1482
Assuming Gamma Distribution		95% KM (z) UCL	1480
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1476
Minimum	1.1	95% KM (bootstrap t) UCL	2751
Maximum	79125	95% KM (BCA) UCL	1633
Mean	5024	95% KM (Percentile Bootstrap) UCL	1515
Median	4908	95% KM (Chebyshev) UCL	2566
SD	6562	97.5% KM (Chebyshev) UCL	3320
k star	0.87	99% KM (Chebyshev) UCL	4802
Theta star	5772		
Nu star	513.6	**Potential UCLs to Use**	
AppChi2	462	97.5% KM (Chebyshev) UCL	3320
95% Gamma Approximate UCL	5585		
95% Adjusted Gamma UCL	5588		

Note: DL/2 is not a recommended method.

Result (fluoranthene)

General Statistics

Number of Valid Data	293	Number of Detected Data	63
Number of Distinct Detected Data	50	Number of Non-Detect Data	230
		Percent Non-Detects	78.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.375	Minimum Detected	1.476
Maximum Detected	4200	Maximum Detected	8.343
Mean of Detected	464.4	Mean of Detected	4.74
SD of Detected	994.1	SD of Detected	1.691
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.348	Lilliefors Test Statistic	0.0776
5% Lilliefors Critical Value	0.112	5% Lilliefors Critical Value	0.112
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	230.3	Mean	3.321
SD	957.1	SD	1.704
95% DL/2 (t) UCL	322.5	95% H-Stat (DL/2) UCL	146
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.931
		SD in Log Scale	2.16
		Mean in Original Scale	105.9
		SD in Original Scale	495.2
		95% Percentile Bootstrap UCL	153.6
		95% BCA Bootstrap UCL	167.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.448	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1036		
nu star	56.47		
A-D Test Statistic	3.101	**Nonparametric Statistics**	
5% A-D Critical Value	0.826	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.826	Mean	108.8
5% K-S Critical Value	0.119	SD	497.5
Data not Gamma Distributed at 5% Significance Level		SE of Mean	29.51
		95% KM (t) UCL	157.5
Assuming Gamma Distribution		95% KM (z) UCL	157.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	157.2
Minimum	1E-09	95% KM (bootstrap t) UCL	185.5
Maximum	5354	95% KM (BCA) UCL	158.1
Mean	1211	95% KM (Percentile Bootstrap) UCL	159.3
Median	675.2	95% KM (Chebyshev) UCL	237.4
SD	1287	97.5% KM (Chebyshev) UCL	293.1
k star	0.329	99% KM (Chebyshev) UCL	402.4
Theta star	3684		
Nu star	192.6	**Potential UCLs to Use**	
AppChi2	161.5	95% KM (Chebyshev) UCL	237.4
95% Gamma Approximate UCL	1444		
95% Adjusted Gamma UCL	1446		

Note: DL/2 is not a recommended method.

Result (fluorene)

General Statistics

Number of Valid Data	293	Number of Detected Data	51
Number of Distinct Detected Data	49	Number of Non-Detect Data	242
		Percent Non-Detects	82.59%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	6.25	Minimum Detected	1.833
Maximum Detected	42000	Maximum Detected	10.65
Mean of Detected	3025	Mean of Detected	6.064
SD of Detected	7859	SD of Detected	2.077
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	289
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.63%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.353	Lilliefors Test Statistic	0.0602
5% Lilliefors Critical Value	0.124	5% Lilliefors Critical Value	0.124
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	582.9	Mean	3.321
SD	3458	SD	1.88
95% DL/2 (t) UCL	916.2	95% H-Stat (DL/2) UCL	179.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.157
		SD in Log Scale	3.273
		Mean in Original Scale	532.5
		SD in Original Scale	3448
		95% Percentile Bootstrap UCL	903.6
		95% BCA Bootstrap UCL	1060
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.338	**Data appear Lognormal at 5% Significance Level**	
Theta Star	8944		
nu star	34.5		
A-D Test Statistic	2.542	**Nonparametric Statistics**	
5% A-D Critical Value	0.852	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.852	Mean	534.2
5% K-S Critical Value	0.134	SD	3443
Data not Gamma Distributed at 5% Significance Level		SE of Mean	203.1
		95% KM (t) UCL	869.4
Assuming Gamma Distribution		95% KM (z) UCL	868.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	866.7
Minimum	6.25	95% KM (bootstrap t) UCL	1296
Maximum	70799	95% KM (BCA) UCL	922.9
Mean	15419	95% KM (Percentile Bootstrap) UCL	880.7
Median	6335	95% KM (Chebyshev) UCL	1420
SD	18468	97.5% KM (Chebyshev) UCL	1803
k star	0.531	99% KM (Chebyshev) UCL	2556
Theta star	29032		
Nu star	311.2	**Potential UCLs to Use**	
AppChi2	271.4	97.5% KM (Chebyshev) UCL	1803
95% Gamma Approximate UCL	17685		
95% Adjusted Gamma UCL	17697		

Note: DL/2 is not a recommended method.

Result (indeno(1,2,3-cd)pyrene)

General Statistics

Number of Valid Data	293	Number of Detected Data	32
Number of Distinct Detected Data	29	Number of Non-Detect Data	261
		Percent Non-Detects	89.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	11.25	Minimum Detected	2.42
Maximum Detected	1400	Maximum Detected	7.244
Mean of Detected	222.5	Mean of Detected	4.526
SD of Detected	363.8	SD of Detected	1.301
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	23000	Maximum Non-Detect	10.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	293
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.574	Lilliefors Test Statistic	0.95
5% Lilliefors Critical Value	0.93	5% Lilliefors Critical Value	0.93
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	165.8	Mean	3.165
SD	843.3	SD	1.543
95% DL/2 (t) UCL	247.1	95% H-Stat (DL/2) UCL	94.51
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.016
		SD in Log Scale	1.996
		Mean in Original Scale	28.6
		SD in Original Scale	136.8
		95% Percentile Bootstrap UCL	43.06
		95% BCA Bootstrap UCL	48.22
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.645	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	344.8		
nu star	41.29		
A-D Test Statistic	1.485	**Nonparametric Statistics**	
5% A-D Critical Value	0.793	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.793	Mean	36.49
5% K-S Critical Value	0.162	SD	138.1
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	8.382
		95% KM (t) UCL	50.32
Assuming Gamma Distribution		95% KM (z) UCL	50.28
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	49.19
Minimum	11.25	95% KM (bootstrap t) UCL	58.07
Maximum	2711	95% KM (BCA) UCL	57.53
Mean	963.9	95% KM (Percentile Bootstrap) UCL	54.13
Median	845.2	95% KM (Chebyshev) UCL	73.03
SD	734.7	97.5% KM (Chebyshev) UCL	88.84
k star	1.145	99% KM (Chebyshev) UCL	119.9
Theta star	841.9		
Nu star	670.9	**Potential UCLs to Use**	
AppChi2	611.8	95% KM (t) UCL	50.32
95% Gamma Approximate UCL	1057		
95% Adjusted Gamma UCL	1058		

Note: DL/2 is not a recommended method.

Result (isopropylbenzene)

General Statistics

Number of Valid Data	295	Number of Detected Data	39
Number of Distinct Detected Data	37	Number of Non-Detect Data	256
		Percent Non-Detects	86.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.53	Minimum Detected	-0.635
Maximum Detected	7938	Maximum Detected	8.979
Mean of Detected	632.6	Mean of Detected	3.487
SD of Detected	1617	SD of Detected	2.791
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	294
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.66%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.457	Lilliefors Test Statistic	0.915
5% Lilliefors Critical Value	0.939	5% Lilliefors Critical Value	0.939
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	105.3	Mean	0.79
SD	645.2	SD	2.088
95% DL/2 (t) UCL	167.2	95% H-Stat (DL/2) UCL	23.85
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.182
		SD in Log Scale	4.929
		Mean in Original Scale	83.79
		SD in Original Scale	619.6
		95% Percentile Bootstrap UCL	147.5
		95% BCA Bootstrap UCL	174.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.24	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2639		
nu star	18.69		
A-D Test Statistic	2.357	**Nonparametric Statistics**	
5% A-D Critical Value	0.884	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.884	Mean	84.66
5% K-S Critical Value	0.155	SD	619
Data not Gamma Distributed at 5% Significance Level		SE of Mean	36.54
		95% KM (t) UCL	145
Assuming Gamma Distribution		95% KM (z) UCL	144.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	143.9
Minimum	1E-09	95% KM (bootstrap t) UCL	216.1
Maximum	7938	95% KM (BCA) UCL	156.5
Mean	570.7	95% KM (Percentile Bootstrap) UCL	149.8
Median	637.8	95% KM (Chebyshev) UCL	243.9
SD	626	97.5% KM (Chebyshev) UCL	312.9
k star	0.257	99% KM (Chebyshev) UCL	448.2
Theta star	2220		
Nu star	151.7	**Potential UCLs to Use**	
AppChi2	124.2	97.5% KM (Chebyshev) UCL	312.9
95% Gamma Approximate UCL	696.9		
95% Adjusted Gamma UCL	697.6		

Note: DL/2 is not a recommended method.

Result (lead)

General Statistics

Number of Valid Observations	185	Number of Distinct Observations	169

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.01	Minimum of Log Data	1.102
Maximum	4240	Maximum of Log Data	8.352
Mean	144.5	Mean of log Data	3.571
Median	27.6	SD of log Data	1.413
SD	457.7		
Coefficient of Variation	3.167		
Skewness	6.878		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.379	Lilliefors Test Statistic	0.12
Lilliefors Critical Value	0.0651	Lilliefors Critical Value	0.0651
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	200.1	95% H-UCL	125.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	155.2
95% Adjusted-CLT UCL	218	97.5% Chebyshev (MVUE) UCL	181.1
95% Modified-t UCL	203	99% Chebyshev (MVUE) UCL	231.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.455	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	317.4		
nu star	168.5		
Approximate Chi Square Value (.05)	139.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0487	95% CLT UCL	199.9
Adjusted Chi Square Value	139.3	95% Jackknife UCL	200.1
		95% Standard Bootstrap UCL	201
Anderson-Darling Test Statistic	17.61	95% Bootstrap-t UCL	252.7
Anderson-Darling 5% Critical Value	0.83	95% Hall's Bootstrap UCL	445.5
Kolmogorov-Smirnov Test Statistic	0.239	95% Percentile Bootstrap UCL	204.3
Kolmogorov-Smirnov 5% Critical Value	0.0718	95% BCA Bootstrap UCL	222.4
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	291.2
		97.5% Chebyshev(Mean, Sd) UCL	354.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	479.3
95% Approximate Gamma UCL	174.6		
95% Adjusted Gamma UCL	174.8		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	354.7

Result (mercury)

General Statistics

Number of Valid Data	185	Number of Detected Data	108
Number of Distinct Detected Data	68	Number of Non-Detect Data	77
		Percent Non-Detects	41.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.025	Minimum Detected	-3.689
Maximum Detected	2.51	Maximum Detected	0.92
Mean of Detected	0.209	Mean of Detected	-2.017
SD of Detected	0.307	SD of Detected	0.877
Minimum Non-Detect	0.0849	Minimum Non-Detect	-2.466
Maximum Non-Detect	0.175	Maximum Non-Detect	-1.743
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	149
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	36
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.54%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.275	Lilliefors Test Statistic	0.0802
5% Lilliefors Critical Value	0.0853	5% Lilliefors Critical Value	0.0853
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.144	Mean	-2.418
SD	0.247	SD	0.835
95% DL/2 (t) UCL	0.174	95% H-Stat (DL/2) UCL	0.124
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.411
		SD in Log Scale	0.841
		Mean in Original Scale	0.145
		SD in Original Scale	0.247
		95% Percentile Bootstrap UCL	0.176
		95% BCA Bootstrap UCL	0.183
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.219	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.171		
nu star	263.3		
A-D Test Statistic	3.3	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	0.145
5% K-S Critical Value	0.0895	SD	0.246
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0183
		95% KM (t) UCL	0.175
Assuming Gamma Distribution		95% KM (z) UCL	0.175
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.175
Minimum	1E-09	95% KM (bootstrap t) UCL	0.188
Maximum	2.51	95% KM (BCA) UCL	0.174
Mean	0.202	95% KM (Percentile Bootstrap) UCL	0.177
Median	0.163	95% KM (Chebyshev) UCL	0.224
SD	0.246	97.5% KM (Chebyshev) UCL	0.259
k star	1.063	99% KM (Chebyshev) UCL	0.326
Theta star	0.19		
Nu star	393.5	**Potential UCLs to Use**	
AppChi2	348.5	95% KM (t) UCL	0.175
95% Gamma Approximate UCL	0.229	95% KM (% Bootstrap) UCL	0.177
95% Adjusted Gamma UCL	0.229		

Note: DL/2 is not a recommended method.

Result (methyl-t-butyl ether (mtbe))

General Statistics

Number of Valid Data	295	Number of Detected Data	22
Number of Distinct Detected Data	20	Number of Non-Detect Data	273
		Percent Non-Detects	92.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.9	Minimum Detected	0.642
Maximum Detected	320	Maximum Detected	5.768
Mean of Detected	30.46	Mean of Detected	2.285
SD of Detected	67.84	SD of Detected	1.415
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	24063	Maximum Non-Detect	10.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.44	Lilliefors Test Statistic	0.919
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	92.7	Mean	1.129
SD	744.6	SD	1.866
95% DL/2 (t) UCL	164.2	95% H-Stat (DL/2) UCL	23.35
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.421
		SD in Log Scale	2.762
		Mean in Original Scale	2.428
		SD in Original Scale	19.81
		95% Percentile Bootstrap UCL	4.508
		95% BCA Bootstrap UCL	5.974
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.508	**Data appear Lognormal at 5% Significance Level**	
Theta Star	59.98		
nu star	22.34		
A-D Test Statistic	1.413	**Nonparametric Statistics**	
5% A-D Critical Value	0.8	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.8	Mean	4.273
5% K-S Critical Value	0.195	SD	20.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.267
		95% KM (t) UCL	6.364
Assuming Gamma Distribution		95% KM (z) UCL	6.357
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6.32
Minimum	1E-09	95% KM (bootstrap t) UCL	10.98
Maximum	320	95% KM (BCA) UCL	7.014
Mean	42.79	95% KM (Percentile Bootstrap) UCL	6.473
Median	35.15	95% KM (Chebyshev) UCL	9.796
SD	44.01	97.5% KM (Chebyshev) UCL	12.19
k star	0.178	99% KM (Chebyshev) UCL	16.88
Theta star	240.7		
Nu star	104.9	**Potential UCLs to Use**	
AppChi2	82.25	95% KM (BCA) UCL	7.014
95% Gamma Approximate UCL	54.56		
95% Adjusted Gamma UCL	54.63		

Note: DL/2 is not a recommended method.

Result (molybdenum)

General Statistics

Number of Valid Data	185	Number of Detected Data	88
Number of Distinct Detected Data	84	Number of Non-Detect Data	97
		Percent Non-Detects	52.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.116	Minimum Detected	-2.152
Maximum Detected	112	Maximum Detected	4.718
Mean of Detected	4.495	Mean of Detected	0.132
SD of Detected	15.15	SD of Detected	1.336
Minimum Non-Detect	0.254	Minimum Non-Detect	-1.37
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	154
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	31
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.24%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.386	Lilliefors Test Statistic	0.146
5% Lilliefors Critical Value	0.0944	5% Lilliefors Critical Value	0.0944
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.292	Mean	-0.722
SD	10.63	SD	1.331
95% DL/2 (t) UCL	3.585	95% H-Stat (DL/2) UCL	1.206
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.156
		SD in Log Scale	1.684
		Mean in Original Scale	2.227
		SD in Original Scale	10.64
		95% Percentile Bootstrap UCL	3.606
		95% BCA Bootstrap UCL	4.42
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.46	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	9.78		
nu star	80.89		
A-D Test Statistic	9.403	**Nonparametric Statistics**	
5% A-D Critical Value	0.826	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.826	Mean	2.251
5% K-S Critical Value	0.101	SD	10.61
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.785
		95% KM (t) UCL	3.548
Assuming Gamma Distribution		95% KM (z) UCL	3.542
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.544
Minimum	1E-09	95% KM (bootstrap t) UCL	6.908
Maximum	112	95% KM (BCA) UCL	3.706
Mean	5.299	95% KM (Percentile Bootstrap) UCL	3.642
Median	0.817	95% KM (Chebyshev) UCL	5.671
SD	13.4	97.5% KM (Chebyshev) UCL	7.151
k star	0.137	99% KM (Chebyshev) UCL	10.06
Theta star	38.7		
Nu star	50.66	**Potential UCLs to Use**	
AppChi2	35.31	95% KM (BCA) UCL	3.706
95% Gamma Approximate UCL	7.601		
95% Adjusted Gamma UCL	7.623		

Note: DL/2 is not a recommended method.

Result (naphthalene)

General Statistics

Number of Valid Data	295	Number of Detected Data	50
Number of Distinct Detected Data	49	Number of Non-Detect Data	245
		Percent Non-Detects	83.05%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	7.4	Minimum Detected	2.001
Maximum Detected	100000	Maximum Detected	11.51
Mean of Detected	9281	Mean of Detected	6.386
SD of Detected	21587	SD of Detected	2.857
Minimum Non-Detect	4.2	Minimum Non-Detect	1.435
Maximum Non-Detect	1269	Maximum Non-Detect	7.146
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	272
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	23
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.20%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.482	Lilliefors Test Statistic	0.915
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1592	Mean	2.475
SD	9475	SD	2.356
95% DL/2 (t) UCL	2502	95% H-Stat (DL/2) UCL	206.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.712
		SD in Log Scale	5.583
		Mean in Original Scale	1574
		SD in Original Scale	9478
		95% Percentile Bootstrap UCL	2578
		95% BCA Bootstrap UCL	2790
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.255	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	36393		
nu star	25.5		
A-D Test Statistic	2.032	**Nonparametric Statistics**	
5% A-D Critical Value	0.882	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.882	Mean	1580
5% K-S Critical Value	0.137	SD	9461
Data not Gamma Distributed at 5% Significance Level		SE of Mean	556.4
		95% KM (t) UCL	2498
Assuming Gamma Distribution		95% KM (z) UCL	2495
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2488
Minimum	1E-09	95% KM (bootstrap t) UCL	3379
Maximum	100000	95% KM (BCA) UCL	2642
Mean	6970	95% KM (Percentile Bootstrap) UCL	2549
Median	7121	95% KM (Chebyshev) UCL	4005
SD	9834	97.5% KM (Chebyshev) UCL	5055
k star	0.131	99% KM (Chebyshev) UCL	7116
Theta star	53193		
Nu star	77.3	**Potential UCLs to Use**	
AppChi2	58.05	97.5% KM (Chebyshev) UCL	5055
95% Gamma Approximate UCL	9281		
95% Adjusted Gamma UCL	9294		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)

General Statistics

Number of Valid Data	295	Number of Detected Data	34
Number of Distinct Detected Data	32	Number of Non-Detect Data	261
		Percent Non-Detects	88.47%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.68	Minimum Detected	-0.386
Maximum Detected	34000	Maximum Detected	10.43
Mean of Detected	2868	Mean of Detected	4.521
SD of Detected	7518	SD of Detected	3.302
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	292
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.98%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.432	Lilliefors Test Statistic	0.915
5% Lilliefors Critical Value	0.933	5% Lilliefors Critical Value	0.933
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	364.4	Mean	0.896
SD	2687	SD	2.355
95% DL/2 (t) UCL	622.6	95% H-Stat (DL/2) UCL	48.25
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-7.1
		SD in Log Scale	6.19
		Mean in Original Scale	330.7
		SD in Original Scale	2681
		95% Percentile Bootstrap UCL	631
		95% BCA Bootstrap UCL	716
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.213	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	13473		
nu star	14.48		
A-D Test Statistic	1.633	**Nonparametric Statistics**	
5% A-D Critical Value	0.894	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.894	Mean	332
5% K-S Critical Value	0.167	SD	2676
Data not Gamma Distributed at 5% Significance Level		SE of Mean	158.2
		95% KM (t) UCL	593
Assuming Gamma Distribution		95% KM (z) UCL	592.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	588.9
Minimum	0.68	95% KM (bootstrap t) UCL	1247
Maximum	34000	95% KM (BCA) UCL	619.4
Mean	3059	95% KM (Percentile Bootstrap) UCL	605.6
Median	2791	95% KM (Chebyshev) UCL	1021
SD	2591	97.5% KM (Chebyshev) UCL	1320
k star	1.346	99% KM (Chebyshev) UCL	1906
Theta star	2273		
Nu star	793.9	**Potential UCLs to Use**	
AppChi2	729.6	97.5% KM (Chebyshev) UCL	1320
95% Gamma Approximate UCL	3329		
95% Adjusted Gamma UCL	3330		

Note: DL/2 is not a recommended method.

Result (nickel)

General Statistics

Number of Valid Observations	185	Number of Distinct Observations	138

Raw Statistics		**Log-transformed Statistics**	
Minimum	5.47	Minimum of Log Data	1.699
Maximum	42.4	Maximum of Log Data	3.747
Mean	20.58	Mean of log Data	2.959
Median	20.4	SD of log Data	0.39
SD	6.792		
Coefficient of Variation	0.33		
Skewness	0.0802		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0676	Lilliefors Test Statistic	0.143
Lilliefors Critical Value	0.0651	Lilliefors Critical Value	0.0651
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	21.41	95% H-UCL	21.87
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	23.47
95% Adjusted-CLT UCL	21.4	97.5% Chebyshev (MVUE) UCL	24.63
95% Modified-t UCL	21.41	99% Chebyshev (MVUE) UCL	26.92
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.655	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2.688		
nu star	2832		
Approximate Chi Square Value (.05)	2710	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0487	95% CLT UCL	21.4
Adjusted Chi Square Value	2709	95% Jackknife UCL	21.41
		95% Standard Bootstrap UCL	21.4
Anderson-Darling Test Statistic	2.595	95% Bootstrap-t UCL	21.42
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	21.4
Kolmogorov-Smirnov Test Statistic	0.116	95% Percentile Bootstrap UCL	21.39
Kolmogorov-Smirnov 5% Critical Value	0.0675	95% BCA Bootstrap UCL	21.38
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	22.76
		97.5% Chebyshev(Mean, Sd) UCL	23.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	25.55
95% Approximate Gamma UCL	21.51		
95% Adjusted Gamma UCL	21.52		
Potential UCL to Use		Use 95% Student's-t UCL	21.41
		or 95% Modified-t UCL	21.41

Result (n-propylbenzene)

General Statistics

Number of Valid Data	295	Number of Detected Data	47
Number of Distinct Detected Data	45	Number of Non-Detect Data	248
		Percent Non-Detects	84.07%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.56	Minimum Detected	-0.58
Maximum Detected	52375	Maximum Detected	10.87
Mean of Detected	2973	Mean of Detected	4.147
SD of Detected	9520	SD of Detected	3.2
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	290
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.31%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.363	Lilliefors Test Statistic	0.927
5% Lilliefors Critical Value	0.946	5% Lilliefors Critical Value	0.946
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	491.2	Mean	0.918
SD	3923	SD	2.336
95% DL/2 (t) UCL	868.1	95% H-Stat (DL/2) UCL	44.63
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	34580	Mean in Log Scale	-5.166
SD	17538	SD in Log Scale	5.693
95% MLE (t) UCL	36265	Mean in Original Scale	473.9
95% MLE (Tiku) UCL	47224	SD in Original Scale	3920
		95% Percentile Bootstrap UCL	879.6
		95% BCA Bootstrap UCL	1082
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.194	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	15311		
nu star	18.25		
A-D Test Statistic	3.27	**Nonparametric Statistics**	
5% A-D Critical Value	0.911	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.911	Mean	474.7
5% K-S Critical Value	0.143	SD	3914
Data not Gamma Distributed at 5% Significance Level		SE of Mean	230.3
		95% KM (t) UCL	854.8
Assuming Gamma Distribution		95% KM (z) UCL	853.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	851.3
Minimum	1E-09	95% KM (bootstrap t) UCL	1682
Maximum	52375	95% KM (BCA) UCL	932.2
Mean	2731	95% KM (Percentile Bootstrap) UCL	885.6
Median	3076	95% KM (Chebyshev) UCL	1479
SD	3890	97.5% KM (Chebyshev) UCL	1913
k star	0.267	99% KM (Chebyshev) UCL	2766
Theta star	10238		
Nu star	157.4	**Potential UCLs to Use**	
AppChi2	129.4	97.5% KM (Chebyshev) UCL	1913
95% Gamma Approximate UCL	3322		
95% Adjusted Gamma UCL	3325		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	295	Number of Detected Data	44
Number of Distinct Detected Data	41	Number of Non-Detect Data	251
		Percent Non-Detects	85.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	238750	Maximum Detected	12.38
Mean of Detected	11438	Mean of Detected	4.279
SD of Detected	41291	SD of Detected	3.439
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	289
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.97%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.326	Lilliefors Test Statistic	0.897
5% Lilliefors Critical Value	0.944	5% Lilliefors Critical Value	0.944
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1731	Mean	0.987
SD	16309	SD	2.442
95% DL/2 (t) UCL	3298	95% H-Stat (DL/2) UCL	67.88
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.274
		SD in Log Scale	6.257
		Mean in Original Scale	1706
		SD in Original Scale	16310
		95% Percentile Bootstrap UCL	3412
		95% BCA Bootstrap UCL	4332
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.156	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	73171		
nu star	13.76		
A-D Test Statistic	5.002	**Nonparametric Statistics**	
5% A-D Critical Value	0.935	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.935	Mean	1707
5% K-S Critical Value	0.149	SD	16282
Data not Gamma Distributed at 5% Significance Level		SE of Mean	959
		95% KM (t) UCL	3290
Assuming Gamma Distribution		95% KM (z) UCL	3285
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3274
Minimum	1E-09	95% KM (bootstrap t) UCL	5654
Maximum	238750	95% KM (BCA) UCL	3397
Mean	9857	95% KM (Percentile Bootstrap) UCL	3538
Median	11361	95% KM (Chebyshev) UCL	5887
SD	16514	97.5% KM (Chebyshev) UCL	7696
k star	0.153	99% KM (Chebyshev) UCL	11249
Theta star	64434		
Nu star	90.26	**Potential UCLs to Use**	
AppChi2	69.35	97.5% KM (Chebyshev) UCL	7696
95% Gamma Approximate UCL	12828		
95% Adjusted Gamma UCL	12845		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	295	Number of Detected Data	58
Number of Distinct Detected Data	55	Number of Non-Detect Data	237
		Percent Non-Detects	80.34%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	386250	Maximum Detected	12.86
Mean of Detected	18084	Mean of Detected	4.555
SD of Detected	69077	SD of Detected	3.595
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	1263	Maximum Non-Detect	7.141
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	279
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.58%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.457	Lilliefors Test Statistic	0.129
5% Lilliefors Critical Value	0.116	5% Lilliefors Critical Value	0.116
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3568	Mean	1.418
SD	31255	SD	2.498
95% DL/2 (t) UCL	6571	95% H-Stat (DL/2) UCL	108
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.683
		SD in Log Scale	6.397
		Mean in Original Scale	3556
		SD in Original Scale	31256
		95% Percentile Bootstrap UCL	6662
		95% BCA Bootstrap UCL	8302
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.151	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	119917		
nu star	17.49		
A-D Test Statistic	5.963	**Nonparametric Statistics**	
5% A-D Critical Value	0.948	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.948	Mean	3557
5% K-S Critical Value	0.131	SD	31203
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1833
		95% KM (t) UCL	6581
Assuming Gamma Distribution		95% KM (z) UCL	6571
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6560
Minimum	1E-09	95% KM (bootstrap t) UCL	10433
Maximum	386250	95% KM (BCA) UCL	6885
Mean	17400	95% KM (Chebyshev) UCL	6783
Median	18724	95% KM (Chebyshev) UCL	11545
SD	30627	97.5% KM (Chebyshev) UCL	15001
k star	0.44	99% KM (Chebyshev) UCL	21791
Theta star	39544		
Nu star	259.6	**Potential UCLs to Use**	
AppChi2	223.3	97.5% KM (Chebyshev) UCL	15001
95% Gamma Approximate UCL	20230		
95% Adjusted Gamma UCL	20244		

Note: DL/2 is not a recommended method.

Result (phenanthrene)

General Statistics

Number of Valid Data	295	Number of Detected Data	117
Number of Distinct Detected Data	96	Number of Non-Detect Data	178
		Percent Non-Detects	60.34%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	110000	Maximum Detected	11.61
Mean of Detected	3341	Mean of Detected	5.396
SD of Detected	13440	SD of Detected	2.386
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	289
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.97%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.402	Lilliefors Test Statistic	0.0648
5% Lilliefors Critical Value	0.0819	5% Lilliefors Critical Value	0.0819
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1364	Mean	3.729
SD	8600	SD	2.208
95% DL/2 (t) UCL	2190	95% H-Stat (DL/2) UCL	545.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.944
		SD in Log Scale	2.838
		Mean in Original Scale	1332
		SD in Original Scale	8599
		95% Percentile Bootstrap UCL	2241
		95% BCA Bootstrap UCL	2663
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.259	**Data appear Lognormal at 5% Significance Level**	
Theta Star	12914		
nu star	60.54		
A-D Test Statistic	7.618	**Nonparametric Statistics**	
5% A-D Critical Value	0.886	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.886	Mean	1332
5% K-S Critical Value	0.0931	SD	8584
Data not Gamma Distributed at 5% Significance Level		SE of Mean	502
		95% KM (t) UCL	2160
Assuming Gamma Distribution		95% KM (z) UCL	2158
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2158
Minimum	3.125	95% KM (bootstrap t) UCL	3353
Maximum	110000	95% KM (BCA) UCL	2296
Mean	3228	95% KM (Percentile Bootstrap) UCL	2251
Median	837.8	95% KM (Chebyshev) UCL	3520
SD	8894	97.5% KM (Chebyshev) UCL	4467
k star	0.441	99% KM (Chebyshev) UCL	6327
Theta star	7321		
Nu star	260.1	**Potential UCLs to Use**	
AppChi2	223.8	97.5% KM (Chebyshev) UCL	4467
95% Gamma Approximate UCL	3752		
95% Adjusted Gamma UCL	3754		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	295	Number of Detected Data	28
Number of Distinct Detected Data	28	Number of Non-Detect Data	267
		Percent Non-Detects	90.51%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.68	Minimum Detected	-0.386
Maximum Detected	2600	Maximum Detected	7.863
Mean of Detected	456.3	Mean of Detected	4.182
SD of Detected	718.5	SD of Detected	2.487
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	24063	Maximum Non-Detect	10.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.689	Lilliefors Test Statistic	0.928
5% Lilliefors Critical Value	0.924	5% Lilliefors Critical Value	0.924
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	110.3	Mean	0.786
SD	765.9	SD	2.145
95% DL/2 (t) UCL	183.8	95% H-Stat (DL/2) UCL	26.87
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.348
		SD in Log Scale	4.752
		Mean in Original Scale	43.5
		SD in Original Scale	255.6
		95% Percentile Bootstrap UCL	68.49
		95% BCA Bootstrap UCL	77.27
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.334	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1368		
nu star	18.68		
A-D Test Statistic	0.805	**Nonparametric Statistics**	
5% A-D Critical Value	0.844	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.844	Mean	44.66
5% K-S Critical Value	0.178	SD	256.2
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	15.27
		95% KM (t) UCL	69.85
Assuming Gamma Distribution		95% KM (z) UCL	69.77
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	68.28
Minimum	0.68	95% KM (bootstrap t) UCL	82.1
Maximum	2600	95% KM (BCA) UCL	72.88
Mean	458.8	95% KM (Percentile Bootstrap) UCL	71.14
Median	455.3	95% KM (Chebyshev) UCL	111.2
SD	217.9	97.5% KM (Chebyshev) UCL	140
k star	2.84	99% KM (Chebyshev) UCL	196.5
Theta star	161.5		
Nu star	1675	**Potential UCLs to Use**	
AppChi2	1581	95% KM (t) UCL	69.85
95% Gamma Approximate UCL	486		
95% Adjusted Gamma UCL	486.2		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	294	Number of Detected Data	124
Number of Distinct Detected Data	102	Number of Non-Detect Data	170
		Percent Non-Detects	57.82%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	31000	Maximum Detected	10.34
Mean of Detected	1305	Mean of Detected	5.067
SD of Detected	4489	SD of Detected	1.921
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	289
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.30%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.386	Lilliefors Test Statistic	0.0694
5% Lilliefors Critical Value	0.0796	5% Lilliefors Critical Value	0.0796
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	610.6	Mean	3.756
SD	2990	SD	2.005
95% DL/2 (t) UCL	898.3	95% H-Stat (DL/2) UCL	405.9
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	24834	Mean in Log Scale	3.041
SD	8124	SD in Log Scale	2.42
95% MLE (t) UCL	25615	Mean in Original Scale	556.7
95% MLE (Tiku) UCL	30713	SD in Original Scale	2978
		95% Percentile Bootstrap UCL	859.3
		95% BCA Bootstrap UCL	979
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.321	**Data appear Lognormal at 5% Significance Level**	
Theta Star	4067		
nu star	79.59		
A-D Test Statistic	10.07	**Nonparametric Statistics**	
5% A-D Critical Value	0.862	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.862	Mean	560.2
5% K-S Critical Value	0.0901	SD	2973
Data not Gamma Distributed at 5% Significance Level		SE of Mean	174.1
		95% KM (t) UCL	847.5
Assuming Gamma Distribution		95% KM (z) UCL	846.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	846.8
Minimum	1E-09	95% KM (bootstrap t) UCL	1093
Maximum	31000	95% KM (BCA) UCL	884.2
Mean	1277	95% KM (Percentile Bootstrap) UCL	881.2
Median	1107	95% KM (Chebyshev) UCL	1319
SD	2916	97.5% KM (Chebyshev) UCL	1648
k star	0.612	99% KM (Chebyshev) UCL	2293
Theta star	2088		
Nu star	359.6	**Potential UCLs to Use**	
AppChi2	316.6	95% KM (Chebyshev) UCL	1319
95% Gamma Approximate UCL	1450		
95% Adjusted Gamma UCL	1451		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	295	Number of Detected Data	33
Number of Distinct Detected Data	33	Number of Non-Detect Data	262
		Percent Non-Detects	88.81%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.66	Minimum Detected	-0.416
Maximum Detected	2800	Maximum Detected	7.937
Mean of Detected	405.6	Mean of Detected	3.589
SD of Detected	727.9	SD of Detected	2.697
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	24063	Maximum Non-Detect	10.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.629	Lilliefors Test Statistic	0.899
5% Lilliefors Critical Value	0.931	5% Lilliefors Critical Value	0.931
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	109.1	Mean	0.788
SD	770.2	SD	2.116
95% DL/2 (t) UCL	183.1	95% H-Stat (DL/2) UCL	25.56
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.366
		SD in Log Scale	4.818
		Mean in Original Scale	45.58
		SD in Original Scale	272.1
		95% Percentile Bootstrap UCL	74.01
		95% BCA Bootstrap UCL	82.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.281	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1441		
nu star	18.58		
A-D Test Statistic	1.522	**Nonparametric Statistics**	
5% A-D Critical Value	0.861	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.861	Mean	46.65
5% K-S Critical Value	0.167	SD	272.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	16.18
		95% KM (t) UCL	73.35
Assuming Gamma Distribution		95% KM (z) UCL	73.27
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	72.94
Minimum	1E-09	95% KM (bootstrap t) UCL	88.08
Maximum	2800	95% KM (BCA) UCL	75.85
Mean	366.9	95% KM (Percentile Bootstrap) UCL	76.47
Median	406.4	95% KM (Chebyshev) UCL	117.2
SD	263.8	97.5% KM (Chebyshev) UCL	147.7
k star	0.599	99% KM (Chebyshev) UCL	207.7
Theta star	613		
Nu star	353.1	**Potential UCLs to Use**	
AppChi2	310.6	97.5% KM (Chebyshev) UCL	147.7
95% Gamma Approximate UCL	417.1		
95% Adjusted Gamma UCL	417.4		

Note: DL/2 is not a recommended method.

Result (selenium)

General Statistics

Number of Valid Data	185	Number of Detected Data	19
Number of Distinct Detected Data	18	Number of Non-Detect Data	166
		Percent Non-Detects	89.73%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.863	Minimum Detected	-0.147
Maximum Detected	6.82	Maximum Detected	1.92
Mean of Detected	1.727	Mean of Detected	0.396
SD of Detected	1.332	SD of Detected	0.493
Minimum Non-Detect	0.762	Minimum Non-Detect	-0.272
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	172
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	13
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.97%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.577	Lilliefors Test Statistic	0.857
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.611	Mean	-0.632
SD	0.571	SD	0.428
95% DL/2 (t) UCL	0.68	95% H-Stat (DL/2) UCL	0.583
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.689
		SD in Log Scale	0.99
		Mean in Original Scale	0.344
		SD in Original Scale	0.643
		95% Percentile Bootstrap UCL	0.427
		95% BCA Bootstrap UCL	0.451
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.981	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.579		
nu star	113.3		
A-D Test Statistic	1.221	**Nonparametric Statistics**	
5% A-D Critical Value	0.747	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.747	Mean	0.953
5% K-S Critical Value	0.2	SD	0.491
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0371
		95% KM (t) UCL	1.014
Assuming Gamma Distribution		95% KM (z) UCL	1.014
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.002
Minimum	0.379	95% KM (bootstrap t) UCL	1.082
Maximum	6.82	95% KM (BCA) UCL	1.083
Mean	1.718	95% KM (Percentile Bootstrap) UCL	1.053
Median	1.753	95% KM (Chebyshev) UCL	1.115
SD	0.533	97.5% KM (Chebyshev) UCL	1.185
k star	12.54	99% KM (Chebyshev) UCL	1.322
Theta star	0.137		
Nu star	4639	**Potential UCLs to Use**	
AppChi2	4482	95% KM (t) UCL	1.014
95% Gamma Approximate UCL	1.778	95% KM (% Bootstrap) UCL	1.053
95% Adjusted Gamma UCL	1.779		

Note: DL/2 is not a recommended method.

Result (tert-butyl alcohol (tba))

General Statistics

Number of Valid Data	295	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	273
		Percent Non-Detects	92.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	12	Minimum Detected	2.485
Maximum Detected	950	Maximum Detected	6.856
Mean of Detected	143.7	Mean of Detected	4.167
SD of Detected	252.8	SD of Detected	1.131
Minimum Non-Detect	8	Minimum Non-Detect	2.079
Maximum Non-Detect	240625	Maximum Non-Detect	12.39
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	295
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.516	Lilliefors Test Statistic	0.894
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	914.8	Mean	3.388
SD	7445	SD	1.841
95% DL/2 (t) UCL	1630	95% H-Stat (DL/2) UCL	215.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.00711
		SD in Log Scale	2.068
		Mean in Original Scale	13.27
		SD in Original Scale	77.33
		95% Percentile Bootstrap UCL	21.62
		95% BCA Bootstrap UCL	24.49
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.676	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	212.7		
nu star	29.74		
A-D Test Statistic	2.079	**Nonparametric Statistics**	
5% A-D Critical Value	0.783	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.783	Mean	23.83
5% K-S Critical Value	0.193	SD	80.03
Data not Gamma Distributed at 5% Significance Level		SE of Mean	5.053
		95% KM (t) UCL	32.17
Assuming Gamma Distribution		95% KM (z) UCL	32.14
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	31.39
Minimum	1E-09	95% KM (bootstrap t) UCL	43.08
Maximum	950	95% KM (BCA) UCL	42.87
Mean	197	95% KM (Percentile Bootstrap) UCL	40.07
Median	169.3	95% KM (Chebyshev) UCL	45.86
SD	190.4	97.5% KM (Chebyshev) UCL	55.39
k star	0.147	99% KM (Chebyshev) UCL	74.11
Theta star	1340		
Nu star	86.71	**Potential UCLs to Use**	
AppChi2	66.25	95% KM (BCA) UCL	42.87
95% Gamma Approximate UCL	257.8		
95% Adjusted Gamma UCL	258.2		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics

Number of Valid Data	295	Number of Detected Data	59
Number of Distinct Detected Data	47	Number of Non-Detect Data	236
		Percent Non-Detects	80.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.94	Minimum Detected	-0.0619
Maximum Detected	97000	Maximum Detected	11.48
Mean of Detected	3809	Mean of Detected	2.717
SD of Detected	16248	SD of Detected	3.14
Minimum Non-Detect	0.42	Minimum Non-Detect	-0.868
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	291
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.64%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.457	Lilliefors Test Statistic	0.229
5% Lilliefors Critical Value	0.115	5% Lilliefors Critical Value	0.115
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	789.6	Mean	0.943
SD	7376	SD	2.286
95% DL/2 (t) UCL	1498	95% H-Stat (DL/2) UCL	47.46
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	67919	Mean in Log Scale	-3.838
SD	34417	SD in Log Scale	4.707
95% MLE (t) UCL	71225	Mean in Original Scale	762.3
95% MLE (Tiku) UCL	95859	SD in Original Scale	7376
		95% Percentile Bootstrap UCL	1534
		95% BCA Bootstrap UCL	1878
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.145	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	26358		
nu star	17.05		
A-D Test Statistic	10.32	**Nonparametric Statistics**	
5% A-D Critical Value	0.954	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.954	Mean	763.2
5% K-S Critical Value	0.131	SD	7364
Data not Gamma Distributed at 5% Significance Level		SE of Mean	432.4
		95% KM (t) UCL	1477
Assuming Gamma Distribution		95% KM (z) UCL	1474
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1472
Minimum	0.94	95% KM (bootstrap t) UCL	3542
Maximum	107998	95% KM (BCA) UCL	1615
Mean	8850	95% KM (Percentile Bootstrap) UCL	1547
Median	3474	95% KM (Chebyshev) UCL	2648
SD	17706	97.5% KM (Chebyshev) UCL	3464
k star	0.399	99% KM (Chebyshev) UCL	5066
Theta star	22201		
Nu star	235.2	**Potential UCLs to Use**	
AppChi2	200.7	97.5% KM (Chebyshev) UCL	3464
95% Gamma Approximate UCL	10372		
95% Adjusted Gamma UCL	10380		

Note: DL/2 is not a recommended method.

Result (vanadium)

General Statistics

Number of Valid Observations	185	Number of Distinct Observations	167

Raw Statistics		**Log-transformed Statistics**	
Minimum	12.8	Minimum of Log Data	2.549
Maximum	103	Maximum of Log Data	4.635
Mean	47.02	Mean of log Data	3.783
Median	44.1	SD of log Data	0.373
SD	17.45		
Coefficient of Variation	0.371		
Skewness	0.829		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.117	Lilliefors Test Statistic	0.0458
Lilliefors Critical Value	0.0651	Lilliefors Critical Value	0.0651
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	49.14	95% H-UCL	49.43
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	52.9
95% Adjusted-CLT UCL	49.21	97.5% Chebyshev (MVUE) UCL	55.41
95% Modified-t UCL	49.15	99% Chebyshev (MVUE) UCL	60.34
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.46	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	6.303		
nu star	2760		
Approximate Chi Square Value (.05)	2639	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0487	95% CLT UCL	49.13
Adjusted Chi Square Value	2638	95% Jackknife UCL	49.14
		95% Standard Bootstrap UCL	49.13
Anderson-Darling Test Statistic	0.686	95% Bootstrap-t UCL	49.22
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	49.24
Kolmogorov-Smirnov Test Statistic	0.0691	95% Percentile Bootstrap UCL	49.15
Kolmogorov-Smirnov 5% Critical Value	0.0675	95% BCA Bootstrap UCL	49.21
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	52.61
		97.5% Chebyshev(Mean, Sd) UCL	55.03
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	59.79
95% Approximate Gamma UCL	49.18		
95% Adjusted Gamma UCL	49.19		
Potential UCL to Use		Use 95% Approximate Gamma UCL	49.18

Result (xylenes, total)

General Statistics

Number of Valid Data	295	Number of Detected Data	59
Number of Distinct Detected Data	55	Number of Non-Detect Data	236
		Percent Non-Detects	80.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	625000	Maximum Detected	13.35
Mean of Detected	26304	Mean of Detected	4.819
SD of Detected	103742	SD of Detected	3.591
Minimum Non-Detect	0.8	Minimum Non-Detect	-0.223
Maximum Non-Detect	1263	Maximum Non-Detect	7.141
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	277
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	18
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.90%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.449	Lilliefors Test Statistic	0.112
5% Lilliefors Critical Value	0.115	5% Lilliefors Critical Value	0.115
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5273	Mean	1.488
SD	47267	SD	2.577
95% DL/2 (t) UCL	9814	95% H-Stat (DL/2) UCL	140.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.791
		SD in Log Scale	6.619
		Mean in Original Scale	5261
		SD in Original Scale	47268
		95% Percentile Bootstrap UCL	10248
		95% BCA Bootstrap UCL	12925
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.148	**Data appear Lognormal at 5% Significance Level**	
Theta Star	177461		
nu star	17.49		
A-D Test Statistic	6.266	**Nonparametric Statistics**	
5% A-D Critical Value	0.951	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.951	Mean	5262
5% K-S Critical Value	0.13	SD	47188
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2771
		95% KM (t) UCL	9834
Assuming Gamma Distribution		95% KM (z) UCL	9820
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9803
Minimum	1E-09	95% KM (bootstrap t) UCL	16130
Maximum	625000	95% KM (BCA) UCL	10118
Mean	25646	95% KM (Percentile Bootstrap) UCL	10056
Median	27335	95% KM (Chebyshev) UCL	17340
SD	46292	97.5% KM (Chebyshev) UCL	22567
k star	0.522	99% KM (Chebyshev) UCL	32833
Theta star	49117		
Nu star	308.1	**Potential UCLs to Use**	
AppChi2	268.4	97.5% KM (Chebyshev) UCL	22567
95% Gamma Approximate UCL	29436		
95% Adjusted Gamma UCL	29456		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	185	Number of Distinct Observations	166

Raw Statistics		**Log-transformed Statistics**	
Minimum	20.8	Minimum of Log Data	3.035
Maximum	1240	Maximum of Log Data	7.123
Mean	133.9	Mean of log Data	4.565
Median	81.8	SD of log Data	0.701
SD	170.6		
Coefficient of Variation	1.274		
Skewness	4.124		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.295	Lilliefors Test Statistic	0.143
Lilliefors Critical Value	0.0651	Lilliefors Critical Value	0.0651
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	154.6	95% H-UCL	135.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	153.1
95% Adjusted-CLT UCL	158.5	97.5% Chebyshev (MVUE) UCL	166.3
95% Modified-t UCL	155.2	99% Chebyshev (MVUE) UCL	192.3
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.63	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	82.1		
nu star	603.2		
Approximate Chi Square Value (.05)	547.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0487	95% CLT UCL	154.5
Adjusted Chi Square Value	546.8	95% Jackknife UCL	154.6
		95% Standard Bootstrap UCL	154.2
Anderson-Darling Test Statistic	13.86	95% Bootstrap-t UCL	160.5
Anderson-Darling 5% Critical Value	0.77	95% Hall's Bootstrap UCL	158.5
Kolmogorov-Smirnov Test Statistic	0.213	95% Percentile Bootstrap UCL	155.8
Kolmogorov-Smirnov 5% Critical Value	0.0687	95% BCA Bootstrap UCL	160.6
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	188.5
		97.5% Chebyshev(Mean, Sd) UCL	212.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	258.6
95% Approximate Gamma UCL	147.5		
95% Adjusted Gamma UCL	147.7		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	188.5

	General UCL Statistics for Data Sets with Non-Detects		
User Selected Options			
From File	WorkSheet.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Result (benzene)			
	General Statistics		
Number of Valid Data	76	Number of Detected Data	13
Number of Distinct Detected Data	11	Number of Non-Detect Data	63
		Percent Non-Detects	82.89%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	460	Maximum Detected	6.131
Mean of Detected	96.62	Mean of Detected	2.32
SD of Detected	165.1	SD of Detected	2.398
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
	UCL Statistics		
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.643	Lilliefors Test Statistic	0.812
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	16.94	Mean	-0.178
SD	75.44	SD	1.491
95% DL/2 (t) UCL	31.35	95% H-Stat (DL/2) UCL	2.849
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.465
		SD in Log Scale	5.86
		Mean in Original Scale	16.55
		SD in Original Scale	75.52
		95% Percentile Bootstrap UCL	32.9
		95% BCA Bootstrap UCL	36.35
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.286	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	337.6		
nu star	7.442		
A-D Test Statistic	1.378	**Nonparametric Statistics**	
5% A-D Critical Value	0.829	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.829	Mean	17.36
5% K-S Critical Value	0.256	SD	74.85
Data not Gamma Distributed at 5% Significance Level		SE of Mean	8.936
		95% KM (t) UCL	32.24
Assuming Gamma Distribution		95% KM (z) UCL	32.05
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	31.52
Minimum	1E-09	95% KM (bootstrap t) UCL	44.71
Maximum	120994	95% KM (BCA) UCL	34.26
Mean	23120	95% KM (Percentile Bootstrap) UCL	32.29
Median	5111	95% KM (Chebyshev) UCL	56.31
SD	33115	97.5% KM (Chebyshev) UCL	73.16
k star	0.181	99% KM (Chebyshev) UCL	106.3
Theta star	127967		
Nu star	27.46	**Potential UCLs to Use**	
AppChi2	16.51	97.5% KM (Chebyshev) UCL	73.16
95% Gamma Approximate UCL	38458		
95% Adjusted Gamma UCL	38844		
Note: DL/2 is not a recommended method.			

Result (ethylbenzene)

General Statistics

Number of Valid Data	76	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	63
		Percent Non-Detects	82.89%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.9	Minimum Detected	0.642
Maximum Detected	1200	Maximum Detected	7.09
Mean of Detected	187.4	Mean of Detected	2.884
SD of Detected	366	SD of Detected	2.343
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.592	Lilliefors Test Statistic	0.833
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	32.47	Mean	-0.0813
SD	162.6	SD	1.648
95% DL/2 (t) UCL	63.53	95% H-Stat (DL/2) UCL	4.07
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.827
		SD in Log Scale	5.809
		Mean in Original Scale	32.09
		SD in Original Scale	162.7
		95% Percentile Bootstrap UCL	63.63
		95% BCA Bootstrap UCL	79.73
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.278	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	674.6		
nu star	7.222		
A-D Test Statistic	1.416	**Nonparametric Statistics**	
5% A-D Critical Value	0.832	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.832	Mean	33.63
5% K-S Critical Value	0.257	SD	161.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	19.26
		95% KM (t) UCL	65.7
Assuming Gamma Distribution		95% KM (z) UCL	65.31
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	64.49
Minimum	1E-09	95% KM (bootstrap t) UCL	100.6
Maximum	308801	95% KM (BCA) UCL	70.48
Mean	57678	95% KM (Percentile Bootstrap) UCL	65.86
Median	11839	95% KM (Chebyshev) UCL	117.6
SD	83906	97.5% KM (Chebyshev) UCL	153.9
k star	0.166	99% KM (Chebyshev) UCL	225.3
Theta star	348014		
Nu star	25.19	**Potential UCLs to Use**	
AppChi2	14.76	97.5% KM (Chebyshev) UCL	153.9
95% Gamma Approximate UCL	98453		
95% Adjusted Gamma UCL	99495		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	76	Number of Detected Data	13
Number of Distinct Detected Data	12	Number of Non-Detect Data	63
		Percent Non-Detects	82.89%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	1600	Maximum Detected	7.378
Mean of Detected	241.1	Mean of Detected	2.741
SD of Detected	477.9	SD of Detected	2.652
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.594	Lilliefors Test Statistic	0.812
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	41.66	Mean	-0.106
SD	211.8	SD	1.679
95% DL/2 (t) UCL	82.12	95% H-Stat (DL/2) UCL	4.299
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.979
		SD in Log Scale	6.484
		Mean in Original Scale	41.27
		SD in Original Scale	211.9
		95% Percentile Bootstrap UCL	85.82
		95% BCA Bootstrap UCL	108.2

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.249	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	966.9		
nu star	6.484		
A-D Test Statistic	1.47	**Nonparametric Statistics**	
5% A-D Critical Value	0.846	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.846	Mean	42.24
5% K-S Critical Value	0.258	SD	210.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	25.11
		95% KM (t) UCL	84.06
Assuming Gamma Distribution		95% KM (z) UCL	83.54
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	82.6
Minimum	1E-09	95% KM (bootstrap t) UCL	190.2
Maximum	789755	95% KM (BCA) UCL	94.27
Mean	135914	95% KM (Percentile Bootstrap) UCL	84.15
Median	20967	95% KM (Chebyshev) UCL	151.7
SD	208816	97.5% KM (Chebyshev) UCL	199
k star	0.155	99% KM (Chebyshev) UCL	292.1
Theta star	878763		
Nu star	23.51	**Potential UCLs to Use**	
AppChi2	13.48	97.5% KM (Chebyshev) UCL	199
95% Gamma Approximate UCL	237105		
95% Adjusted Gamma UCL	239723		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	76	Number of Detected Data	29
Number of Distinct Detected Data	23	Number of Non-Detect Data	47
		Percent Non-Detects	61.84%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	4800	Maximum Detected	8.476

Mean of Detected	308.5	Mean of Detected	2.013
SD of Detected	972.2	SD of Detected	2.433
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.373	Lilliefors Test Statistic	0.749
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	118	Mean	0.339
SD	612.8	SD	1.99
95% DL/2 (t) UCL	235.1	95% H-Stat (DL/2) UCL	12.07
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.477
		SD in Log Scale	4.454
		Mean in Original Scale	117.7
		SD in Original Scale	612.8
		95% Percentile Bootstrap UCL	254.3
		95% BCA Bootstrap UCL	315.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.201	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1537		
nu star	11.64		
A-D Test Statistic	5.354	**Nonparametric Statistics**	
5% A-D Critical Value	0.898	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.898	Mean	118.3
5% K-S Critical Value	0.18	SD	608.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	71.06
		95% KM (t) UCL	236.7
Assuming Gamma Distribution		95% KM (z) UCL	235.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	235.4
Minimum	1E-09	95% KM (bootstrap t) UCL	526.1
Maximum	31203	95% KM (BCA) UCL	253
Mean	3482	95% KM (Percentile Bootstrap) UCL	245.1
Median	10.95	95% KM (Chebyshev) UCL	428.1
SD	7060	97.5% KM (Chebyshev) UCL	562.1
k star	0.0981	99% KM (Chebyshev) UCL	825.3
Theta star	35488		
Nu star	14.91	**Potential UCLs to Use**	
AppChi2	7.2	97.5% KM (Chebyshev) UCL	562.1
95% Gamma Approximate UCL	7210		
95% Adjusted Gamma UCL	7316		
Note: DL/2 is not a recommended method.			
Result (toluene)			
General Statistics			
Number of Valid Data	76	Number of Detected Data	15
Number of Distinct Detected Data	12	Number of Non-Detect Data	61
		Percent Non-Detects	80.26%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	3100	Maximum Detected	8.039
Mean of Detected	320	Mean of Detected	2.159
SD of Detected	859.4	SD of Detected	2.643
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.439	Lilliefors Test Statistic	0.763
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	63.57	Mean	-0.13
SD	392.7	SD	1.616
95% DL/2 (t) UCL	138.6	95% H-Stat (DL/2) UCL	3.785
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.595
		SD in Log Scale	6.16
		Mean in Original Scale	63.18
		SD in Original Scale	392.8
		95% Percentile Bootstrap UCL	143.8
		95% BCA Bootstrap UCL	188.1
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.207	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1545		
nu star	6.214		
A-D Test Statistic	2.466	**Nonparametric Statistics**	
5% A-D Critical Value	0.875	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.875	Mean	64.05
5% K-S Critical Value	0.245	SD	390.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	46.31
		95% KM (t) UCL	141.2
Assuming Gamma Distribution		95% KM (z) UCL	140.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	139
Minimum	1E-09	95% KM (bootstrap t) UCL	2160
Maximum	2156668	95% KM (BCA) UCL	144.4
Mean	311364	95% KM (Percentile Bootstrap) UCL	145.9
Median	21473	95% KM (Chebyshev) UCL	265.9
SD	537184	97.5% KM (Chebyshev) UCL	353.3
k star	0.125	99% KM (Chebyshev) UCL	524.9
Theta star	2496078		
Nu star	18.96	**Potential UCLs to Use**	
AppChi2	10.09	97.5% KM (Chebyshev) UCL	353.3
95% Gamma Approximate UCL	585179		
95% Adjusted Gamma UCL	592544		
Note: DL/2 is not a recommended method.			
Result (xylenes, total)			
General Statistics			
Number of Valid Data	76	Number of Detected Data	29
Number of Distinct Detected Data	23	Number of Non-Detect Data	47
		Percent Non-Detects	61.84%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	6400	Maximum Detected	8.764
Mean of Detected	416.6	Mean of Detected	2.147
SD of Detected	1305	SD of Detected	2.54
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.376	Lilliefors Test Statistic	0.764
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	159.3	Mean	0.39
SD	823.1	SD	2.083
95% DL/2 (t) UCL	316.5	95% H-Stat (DL/2) UCL	15.82
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.573
		SD in Log Scale	4.678
		Mean in Original Scale	159
		SD in Original Scale	823.1
		95% Percentile Bootstrap UCL	323.7

		95% BCA Bootstrap UCL	413
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.194	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2147		
nu star	11.25		
A-D Test Statistic	5.164	**Nonparametric Statistics**	
5% A-D Critical Value	0.902	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.902	Mean	159.6
5% K-S Critical Value	0.18	SD	817.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	95.44
		95% KM (t) UCL	318.5
Assuming Gamma Distribution		95% KM (z) UCL	316.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	316.8
Minimum	1E-09	95% KM (bootstrap t) UCL	771.8
Maximum	46446	95% KM (BCA) UCL	362.3
Mean	5046	95% KM (Percentile Bootstrap) UCL	335.1
Median	14.35	95% KM (Chebyshev) UCL	575.6
SD	10401	97.5% KM (Chebyshev) UCL	755.6
k star	0.0964	99% KM (Chebyshev) UCL	1109
Theta star	52349		
Nu star	14.65	**Potential UCLs to Use**	
AppChi2	7.02	97.5% KM (Chebyshev) UCL	755.6
95% Gamma Approximate UCL	10532		
95% Adjusted Gamma UCL	10687		
Note: DL/2 is not a recommended method.			

Result (1,2,4-trimethylbenzene)			
General Statistics			
Number of Valid Data	65	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	52
		Percent Non-Detects	80.00%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	15	Minimum Detected	2.708
Maximum Detected	410000	Maximum Detected	12.92
Mean of Detected	60828	Mean of Detected	8.042
SD of Detected	125022	SD of Detected	3.386
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.69%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.563	Lilliefors Test Statistic	0.949
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12177	Mean	1.87
SD	59428	SD	3.588
95% DL/2 (t) UCL	24480	95% H-Stat (DL/2) UCL	10543
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.467
		SD in Log Scale	6.461
		Mean in Original Scale	12166
		SD in Original Scale	59430
		95% Percentile Bootstrap UCL	24974
		95% BCA Bootstrap UCL	32782
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.236	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	257563		
nu star	6.14		
A-D Test Statistic	0.354	**Nonparametric Statistics**	
5% A-D Critical Value	0.853	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.853	Mean	12178
5% K-S Critical Value	0.259	SD	58969
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	7613
		95% KM (t) UCL	24884
Assuming Gamma Distribution		95% KM (z) UCL	24700
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	24467
Minimum	1E-09	95% KM (bootstrap t) UCL	91714
Maximum	410000	95% KM (BCA) UCL	30508
Mean	58673	95% KM (Percentile Bootstrap) UCL	25946
Median	67373	95% KM (Chebyshev) UCL	45361
SD	59389	97.5% KM (Chebyshev) UCL	59720
k star	0.263	99% KM (Chebyshev) UCL	87925
Theta star	223046		
Nu star	34.2	**Potential UCLs to Use**	
AppChi2	21.82	95% KM (t) UCL	24884
95% Gamma Approximate UCL	91947		
95% Adjusted Gamma UCL	92902		
Note: DL/2 is not a recommended method.			

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	65	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	54
		Percent Non-Detects	83.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	5.1	Minimum Detected	1.629
Maximum Detected	120000	Maximum Detected	11.7
Mean of Detected	24091	Mean of Detected	6.8
SD of Detected	42823	SD of Detected	3.661
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	2200	Maximum Non-Detect	7.696
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	60
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.637	Lilliefors Test Statistic	0.929
5% Lilliefors Critical Value	0.85	5% Lilliefors Critical Value	0.85
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4113	Mean	1.615
SD	19213	SD	3.145
95% DL/2 (t) UCL	8090	95% H-Stat (DL/2) UCL	1612
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.593
		SD in Log Scale	6.989
		Mean in Original Scale	4077
		SD in Original Scale	19220
		95% Percentile Bootstrap UCL	8440
		95% BCA Bootstrap UCL	10533
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.221	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	109091		
nu star	4.858		
A-D Test Statistic	0.459	**Nonparametric Statistics**	
5% A-D Critical Value	0.852	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.852	Mean	4082
5% K-S Critical Value	0.281	SD	19070
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2481
		95% KM (t) UCL	8223
Assuming Gamma Distribution		95% KM (z) UCL	8163
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8055
Minimum	5.1	95% KM (bootstrap t) UCL	22585
Maximum	120000	95% KM (BCA) UCL	8512
Mean	24097	95% KM (Percentile Bootstrap) UCL	8558
Median	23941	95% KM (Chebyshev) UCL	14896
SD	16930	97.5% KM (Chebyshev) UCL	19575
k star	0.995	99% KM (Chebyshev) UCL	28766
Theta star	24210		
Nu star	129.4	**Potential UCLs to Use**	
AppChi2	104.1	95% KM (t) UCL	8223
95% Gamma Approximate UCL	29947		
95% Adjusted Gamma UCL	30095		

Note: DL/2 is not a recommended method.

Result (1-methylnaphthalene)

General Statistics

Number of Valid Data	65	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	53
		Percent Non-Detects	81.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	27	Minimum Detected	3.296
Maximum Detected	32000	Maximum Detected	10.37
Mean of Detected	8707	Mean of Detected	7.692
SD of Detected	9437	SD of Detected	2.533
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	440	Maximum Non-Detect	6.087
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	86.15%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.848	Lilliefors Test Statistic	0.823
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1666	Mean	4.556
SD	5168	SD	2.067
95% DL/2 (t) UCL	2736	95% H-Stat (DL/2) UCL	949.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.633
		SD in Log Scale	4.374
		Mean in Original Scale	1612
		SD in Original Scale	5185
		95% Percentile Bootstrap UCL	2773
		95% BCA Bootstrap UCL	3056
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.405	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	21518		
nu star	9.712		
A-D Test Statistic	0.635	**Nonparametric Statistics**	
5% A-D Critical Value	0.792	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.792	Mean	1631
5% K-S Critical Value	0.26	SD	5139
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	665.8
		95% KM (t) UCL	2742
Assuming Gamma Distribution		95% KM (z) UCL	2726
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2700
Minimum	1E-09	95% KM (bootstrap t) UCL	3428
Maximum	32000	95% KM (BCA) UCL	3113
Mean	7702	95% KM (Percentile Bootstrap) UCL	3000
Median	8152	95% KM (Chebyshev) UCL	4533
SD	4591	97.5% KM (Chebyshev) UCL	5789
k star	0.761	99% KM (Chebyshev) UCL	8255
Theta star	10127		
Nu star	98.87	**Potential UCLs to Use**	
AppChi2	76.93	95% KM (t) UCL	2742
95% Gamma Approximate UCL	9898		
95% Adjusted Gamma UCL	9955		

Note: DL/2 is not a recommended method.

Result (2-butanone)

General Statistics

Number of Valid Data	65	Number of Detected Data	12
Number of Distinct Detected Data	10	Number of Non-Detect Data	53
		Percent Non-Detects	81.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	23	Minimum Detected	3.135
Maximum Detected	160	Maximum Detected	5.075
Mean of Detected	45.42	Mean of Detected	3.638
SD of Detected	38.07	SD of Detected	0.539
Minimum Non-Detect	11	Minimum Non-Detect	2.398
Maximum Non-Detect	48000	Maximum Non-Detect	10.78
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.572	Lilliefors Test Statistic	0.781
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1285	Mean	3.736
SD	3946	SD	2.323
95% DL/2 (t) UCL	2102	95% H-Stat (DL/2) UCL	2195
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.233
		SD in Log Scale	0.834
		Mean in Original Scale	14.51
		SD in Original Scale	21.83
		95% Percentile Bootstrap UCL	19.11
		95% BCA Bootstrap UCL	21.62
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.286	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	19.87		
nu star	54.87		
A-D Test Statistic	1.417	**Nonparametric Statistics**	
5% A-D Critical Value	0.739	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.739	Mean	28.22
5% K-S Critical Value	0.247	SD	19.89
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.881
		95% KM (t) UCL	33.03
Assuming Gamma Distribution		95% KM (z) UCL	32.96
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	32.33
Minimum	23	95% KM (bootstrap t) UCL	43.79
Maximum	160	95% KM (BCA) UCL	36.6
Mean	45.69	95% KM (Percentile Bootstrap) UCL	34.49
Median	45.81	95% KM (Chebyshev) UCL	40.78
SD	15.79	97.5% KM (Chebyshev) UCL	46.21
k star	14.7	99% KM (Chebyshev) UCL	56.89
Theta star	3.108		
Nu star	1911	**Potential UCLs to Use**	
AppChi2	1811	95% KM (t) UCL	33.03
95% Gamma Approximate UCL	48.23	95% KM (% Bootstrap) UCL	34.49
95% Adjusted Gamma UCL	48.29		

Note: DL/2 is not a recommended method.

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	65	Number of Detected Data	12
Number of Distinct Detected Data	11	Number of Non-Detect Data	53
		Percent Non-Detects	81.54%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	34	Minimum Detected	3.526
Maximum Detected	36000	Maximum Detected	10.49
Mean of Detected	13168	Mean of Detected	7.998
SD of Detected	14050	SD of Detected	2.603
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	440	Maximum Non-Detect	6.087
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	86.15%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.835	Lilliefors Test Statistic	0.839
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2489	Mean	4.612
SD	7756	SD	2.17
95% DL/2 (t) UCL	4095	95% H-Stat (DL/2) UCL	1267
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.455
		SD in Log Scale	4.641
		Mean in Original Scale	2435
		SD in Original Scale	7773
		95% Percentile Bootstrap UCL	4124
		95% BCA Bootstrap UCL	4503
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.383	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	34410		
nu star	9.184		
A-D Test Statistic	0.547	**Nonparametric Statistics**	
5% A-D Critical Value	0.797	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.797	Mean	2459
5% K-S Critical Value	0.261	SD	7705
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	998.2
		95% KM (t) UCL	4125
Assuming Gamma Distribution		95% KM (z) UCL	4101
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4064
Minimum	1E-09	95% KM (bootstrap t) UCL	4816
Maximum	36000	95% KM (BCA) UCL	4833
Mean	11456	95% KM (Percentile Bootstrap) UCL	4264
Median	12199	95% KM (Chebyshev) UCL	6810
SD	7227	97.5% KM (Chebyshev) UCL	8693
k star	0.688	99% KM (Chebyshev) UCL	12391
Theta star	16654		
Nu star	89.43	**Potential UCLs to Use**	
AppChi2	68.62	95% KM (t) UCL	4125
95% Gamma Approximate UCL	14929		
95% Adjusted Gamma UCL	15019		

Note: DL/2 is not a recommended method.

Result (acenaphthene)

General Statistics

Number of Valid Data	65	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	59
		Percent Non-Detects	90.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	120	Minimum Detected	4.787
Maximum Detected	2500	Maximum Detected	7.824
Mean of Detected	1453	Mean of Detected	6.969
SD of Detected	839.2	SD of Detected	1.109
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	64
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.46%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.941	Lilliefors Test Statistic	0.737
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	221.7	Mean	4.18
SD	485	SD	1.475
95% DL/2 (t) UCL	322.1	95% H-Stat (DL/2) UCL	218.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.304
		SD in Log Scale	1.708
		Mean in Original Scale	167.7
		SD in Original Scale	477
		95% Percentile Bootstrap UCL	272.6
		95% BCA Bootstrap UCL	300.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.984	**Data appear Normal at 5% Significance Level**	
Theta Star	1477		
nu star	11.81		
A-D Test Statistic	0.626	**Nonparametric Statistics**	
5% A-D Critical Value	0.706	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.706	Mean	244.4
5% K-S Critical Value	0.337	SD	452.6
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	61.8
		95% KM (t) UCL	347.6
Assuming Gamma Distribution		95% KM (z) UCL	346.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	905.6
Minimum	120	95% KM (bootstrap t) UCL	325.8
Maximum	2551	95% KM (BCA) UCL	1442
Mean	1475	95% KM (Percentile Bootstrap) UCL	1400
Median	1451	95% KM (Chebyshev) UCL	513.8
SD	584.7	97.5% KM (Chebyshev) UCL	630.4
k star	4.677	99% KM (Chebyshev) UCL	859.3
Theta star	315.3		
Nu star	608	**Potential UCLs to Use**	
AppChi2	551.8	95% KM (t) UCL	347.6
95% Gamma Approximate UCL	1625	95% KM (Percentile Bootstrap) UCL	1400
95% Adjusted Gamma UCL	1628		

Note: DL/2 is not a recommended method.

Result (acetone)

General Statistics

Number of Valid Data	65	Number of Detected Data	24
Number of Distinct Detected Data	21	Number of Non-Detect Data	41
		Percent Non-Detects	63.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	48	Minimum Detected	3.871
Maximum Detected	250	Maximum Detected	5.521
Mean of Detected	108.9	Mean of Detected	4.586
SD of Detected	54.58	SD of Detected	0.453
Minimum Non-Detect	28	Minimum Non-Detect	3.332
Maximum Non-Detect	120000	Maximum Non-Detect	11.7
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.861	Lilliefors Test Statistic	0.955
5% Lilliefors Critical Value	0.916	5% Lilliefors Critical Value	0.916
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3337	Mean	5.201
SD	9823	SD	2.27
95% DL/2 (t) UCL	5371	95% H-Stat (DL/2) UCL	9713
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.029
		SD in Log Scale	0.565
		Mean in Original Scale	66.98
		SD in Original Scale	47.08
		95% Percentile Bootstrap UCL	76.95
		95% BCA Bootstrap UCL	78.67
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.371	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	24.91		
nu star	209.8		
A-D Test Statistic	0.659	**Nonparametric Statistics**	
5% A-D Critical Value	0.746	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.746	Mean	79.48
5% K-S Critical Value	0.178	SD	48.64
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	7.257
		95% KM (t) UCL	91.59
Assuming Gamma Distribution		95% KM (z) UCL	91.42
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	90.16
Minimum	48	95% KM (bootstrap t) UCL	94.86
Maximum	250	95% KM (BCA) UCL	95.69
Mean	118.3	95% KM (Percentile Bootstrap) UCL	93.55
Median	112.5	95% KM (Chebyshev) UCL	111.1
SD	42.07	97.5% KM (Chebyshev) UCL	124.8
k star	7.566	99% KM (Chebyshev) UCL	151.7
Theta star	15.64		
Nu star	983.6	**Potential UCLs to Use**	
AppChi2	911.8	95% KM (t) UCL	91.59
95% Gamma Approximate UCL	127.7		
95% Adjusted Gamma UCL	127.9		

Note: DL/2 is not a recommended method.

Result (anthracene)

General Statistics

Number of Valid Data	65	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	56
		Percent Non-Detects	86.15%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	140	Minimum Detected	4.942
Maximum Detected	4100	Maximum Detected	8.319
Mean of Detected	1354	Mean of Detected	6.54
SD of Detected	1534	SD of Detected	1.26
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	62
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.38%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.769	Lilliefors Test Statistic	0.895
5% Lilliefors Critical Value	0.829	5% Lilliefors Critical Value	0.829
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	253.7	Mean	4.187
SD	705.7	SD	1.48
95% DL/2 (t) UCL	399.8	95% H-Stat (DL/2) UCL	216.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.83
		SD in Log Scale	2.529
		Mean in Original Scale	195.5
		SD in Original Scale	716.7
		95% Percentile Bootstrap UCL	352.3
		95% BCA Bootstrap UCL	424.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.657	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	2061		
nu star	11.83		
A-D Test Statistic	0.667	**Nonparametric Statistics**	
5% A-D Critical Value	0.747	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.747	Mean	308.8
5% K-S Critical Value	0.288	SD	682.4
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	89.79
		95% KM (t) UCL	458.7
Assuming Gamma Distribution		95% KM (z) UCL	456.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	426.6
Minimum	140	95% KM (bootstrap t) UCL	548.6
Maximum	4100	95% KM (BCA) UCL	640.5
Mean	1374	95% KM (Percentile Bootstrap) UCL	533.8
Median	1324	95% KM (Chebyshev) UCL	700.2
SD	614.6	97.5% KM (Chebyshev) UCL	869.6
k star	4.33	99% KM (Chebyshev) UCL	1202
Theta star	317.2		
Nu star	562.9	**Potential UCLs to Use**	
AppChi2	508.9	95% KM (t) UCL	458.7
95% Gamma Approximate UCL	1520		
95% Adjusted Gamma UCL	1523		

Note: DL/2 is not a recommended method.

Result (antimony)			
General Statistics			
Number of Valid Data	55	Number of Detected Data	14
Number of Distinct Detected Data	13	Number of Non-Detect Data	41
		Percent Non-Detects	74.55%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.877	Minimum Detected	-0.131
Maximum Detected	2.88	Maximum Detected	1.058
Mean of Detected	1.573	Mean of Detected	0.391
SD of Detected	0.581	SD of Detected	0.365
Minimum Non-Detect	0.785	Minimum Non-Detect	-0.242
Maximum Non-Detect	1.01	Maximum Non-Detect	0.00995
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	44
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.93	Lilliefors Test Statistic	0.952
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.723	Mean	-0.524
SD	0.577	SD	0.57
95% DL/2 (t) UCL	0.854	95% H-Stat (DL/2) UCL	0.72
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.847	Mean in Log Scale	-0.571
SD	0.495	SD in Log Scale	0.61
95% MLE (t) UCL	1.959	Mean in Original Scale	0.707
95% MLE (Tiku) UCL	2.092	SD in Original Scale	0.587
		95% Percentile Bootstrap UCL	0.844
		95% BCA Bootstrap UCL	0.859
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	6.517	**Data appear Normal at 5% Significance Level**	
Theta Star	0.241		
nu star	182.5		
A-D Test Statistic	0.299	**Nonparametric Statistics**	
5% A-D Critical Value	0.736	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.736	Mean	1.054
5% K-S Critical Value	0.229	SD	0.414
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.058
		95% KM (t) UCL	1.151
Assuming Gamma Distribution		95% KM (z) UCL	1.15
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.133
Minimum	0.877	95% KM (bootstrap t) UCL	1.168
Maximum	2.88	95% KM (BCA) UCL	1.312
Mean	1.573	95% KM (Percentile Bootstrap) UCL	1.219
Median	1.573	95% KM (Chebyshev) UCL	1.307
SD	0.285	97.5% KM (Chebyshev) UCL	1.416
k star	30.12	99% KM (Chebyshev) UCL	1.631
Theta star	0.0522		
Nu star	3313	**Potential UCLs to Use**	
AppChi2	3180	95% KM (t) UCL	1.151
95% Gamma Approximate UCL	1.639	95% KM (Percentile Bootstrap) UCL	1.219
95% Adjusted Gamma UCL	1.64		
Note: DL/2 is not a recommended method.			

Result (arsenic)

General Statistics

Number of Valid Observations	65	Number of Distinct Observations	61

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.29	Minimum of Log Data	0.829
Maximum	18.6	Maximum of Log Data	2.923
Mean	7.822	Mean of log Data	1.987
Median	7.56	SD of log Data	0.391
SD	2.908		
Coefficient of Variation	0.372		
Skewness	0.953		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0836	Lilliefors Test Statistic	0.1
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	8.425	95% H-UCL	8.591
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9.575
95% Adjusted-CLT UCL	8.461	97.5% Chebyshev (MVUE) UCL	10.32
95% Modified-t UCL	8.432	99% Chebyshev (MVUE) UCL	11.77
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.959	**Data appear Normal at 5% Significance Level**	
Theta Star	1.124		
nu star	904.7		
Approximate Chi Square Value (.05)	835.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	8.416
Adjusted Chi Square Value	834.4	95% Jackknife UCL	8.425
		95% Standard Bootstrap UCL	8.418
Anderson-Darling Test Statistic	0.407	95% Bootstrap-t UCL	8.462
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	8.517
Kolmogorov-Smirnov Test Statistic	0.0836	95% Percentile Bootstrap UCL	8.406
Kolmogorov-Smirnov 5% Critical Value	0.111	95% BCA Bootstrap UCL	8.466
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9.395
		97.5% Chebyshev(Mean, Sd) UCL	10.08
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	11.41
95% Approximate Gamma UCL	8.466		
95% Adjusted Gamma UCL	8.482		
Potential UCL to Use		Use 95% Student's-t UCL	8.425

Result (barium)

General Statistics

Number of Valid Observations	65	Number of Distinct Observations	59

Raw Statistics		**Log-transformed Statistics**	
Minimum	56.3	Minimum of Log Data	4.031
Maximum	850	Maximum of Log Data	6.745
Mean	181	Mean of log Data	5.111
Median	173	SD of log Data	0.404
SD	98.26		
Coefficient of Variation	0.543		
Skewness	4.972		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.226	Lilliefors Test Statistic	0.149
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	201.3	95% H-UCL	197
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	220.2
95% Adjusted-CLT UCL	209	97.5% Chebyshev (MVUE) UCL	237.8
95% Modified-t UCL	202.6	99% Chebyshev (MVUE) UCL	272.3
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.63	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	32.15		
nu star	731.9		
Approximate Chi Square Value (.05)	670.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	201
Adjusted Chi Square Value	668.8	95% Jackknife UCL	201.3
		95% Standard Bootstrap UCL	200.7
Anderson-Darling Test Statistic	1.975	95% Bootstrap-t UCL	213.2
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	294.2
Kolmogorov-Smirnov Test Statistic	0.148	95% Percentile Bootstrap UCL	203.2
Kolmogorov-Smirnov 5% Critical Value	0.111	95% BCA Bootstrap UCL	212.4
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	234.1
		97.5% Chebyshev(Mean, Sd) UCL	257.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	302.2
95% Approximate Gamma UCL	197.7		
95% Adjusted Gamma UCL	198		
Potential UCL to Use		Use 95% Student's-t UCL	201.3
		or 95% Modified-t UCL	202.6

Result (benzene)

General Statistics

Number of Valid Data	65	Number of Detected Data	15
Number of Distinct Detected Data	14	Number of Non-Detect Data	50
		Percent Non-Detects	76.92%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.96	Minimum Detected	-0.0408
Maximum Detected	100000	Maximum Detected	11.51
Mean of Detected	7713	Mean of Detected	4.255
SD of Detected	25711	SD of Detected	3.6
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	2400	Maximum Non-Detect	7.783
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	63
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.92%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.34	Lilliefors Test Statistic	0.919
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1812	Mean	1.002
SD	12460	SD	2.963
95% DL/2 (t) UCL	4391	95% H-Stat (DL/2) UCL	518.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.815
		SD in Log Scale	5.873
		Mean in Original Scale	1780
		SD in Original Scale	12463
		95% Percentile Bootstrap UCL	4802
		95% BCA Bootstrap UCL	7771
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.174	**Data appear Lognormal at 5% Significance Level**	
Theta Star	44345		
nu star	5.218		
A-D Test Statistic	1.416	**Nonparametric Statistics**	
5% A-D Critical Value	0.89	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.89	Mean	1782
5% K-S Critical Value	0.247	SD	12367
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1588
		95% KM (t) UCL	4432
Assuming Gamma Distribution		95% KM (z) UCL	4394
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4362
Minimum	1E-09	95% KM (bootstrap t) UCL	105201
Maximum	100000	95% KM (BCA) UCL	4850
Mean	7027	95% KM (Percentile Bootstrap) UCL	4836
Median	6173	95% KM (Chebyshev) UCL	8703
SD	12640	97.5% KM (Chebyshev) UCL	11698
k star	0.144	99% KM (Chebyshev) UCL	17580
Theta star	48965		
Nu star	18.66	**Potential UCLs to Use**	
AppChi2	9.867	97.5% KM (Chebyshev) UCL	11698
95% Gamma Approximate UCL	13287		
95% Adjusted Gamma UCL	13486		

Note: DL/2 is not a recommended method.

Result (benzo(a)anthracene)

General Statistics

Number of Valid Data	65	Number of Detected Data	17
Number of Distinct Detected Data	17	Number of Non-Detect Data	48
		Percent Non-Detects	73.85%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	24	Minimum Detected	3.178
Maximum Detected	11000	Maximum Detected	9.306
Mean of Detected	982.8	Mean of Detected	5.718
SD of Detected	2594	SD of Detected	1.393
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	64
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.46%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.345	Lilliefors Test Statistic	0.902
5% Lilliefors Critical Value	0.892	5% Lilliefors Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	322.3	Mean	4.326
SD	1360	SD	1.5
95% DL/2 (t) UCL	603.8	95% H-Stat (DL/2) UCL	308.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.907
		SD in Log Scale	2.101
		Mean in Original Scale	266.3
		SD in Original Scale	1367
		95% Percentile Bootstrap UCL	606.1
		95% BCA Bootstrap UCL	821.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.481	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2044		
nu star	16.34		
A-D Test Statistic	1.875	**Nonparametric Statistics**	
5% A-D Critical Value	0.795	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.795	Mean	281.5
5% K-S Critical Value	0.22	SD	1354
Data not Gamma Distributed at 5% Significance Level		SE of Mean	173.2
		95% KM (t) UCL	570.6
Assuming Gamma Distribution		95% KM (z) UCL	566.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	560.3
Minimum	1E-09	95% KM (bootstrap t) UCL	1982
Maximum	11000	95% KM (BCA) UCL	662.7
Mean	1497	95% KM (Percentile Bootstrap) UCL	626.5
Median	660	95% KM (Chebyshev) UCL	1036
SD	2015	97.5% KM (Chebyshev) UCL	1363
k star	0.135	99% KM (Chebyshev) UCL	2005
Theta star	11056		
Nu star	17.61	**Potential UCLs to Use**	
AppChi2	9.108	95% KM (BCA) UCL	662.7
95% Gamma Approximate UCL	2895		
95% Adjusted Gamma UCL	2940		

Note: DL/2 is not a recommended method.

Result (benzo(a)pyrene)

General Statistics

Number of Valid Data	65	Number of Detected Data	16
Number of Distinct Detected Data	15	Number of Non-Detect Data	49
		Percent Non-Detects	75.38%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	27	Minimum Detected	3.296
Maximum Detected	4700	Maximum Detected	8.455
Mean of Detected	587.1	Mean of Detected	5.546
SD of Detected	1120	SD of Detected	1.291
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	64
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.46%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.453	Lilliefors Test Statistic	0.941
5% Lilliefors Critical Value	0.887	5% Lilliefors Critical Value	0.887
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	211.5	Mean	4.267
SD	592	SD	1.418
95% DL/2 (t) UCL	334	95% H-Stat (DL/2) UCL	255.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.773
		SD in Log Scale	1.999
		Mean in Original Scale	153.4
		SD in Original Scale	597
		95% Percentile Bootstrap UCL	293.9
		95% BCA Bootstrap UCL	377.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.631	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	930.7		
nu star	20.19		
A-D Test Statistic	0.896	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	170.5
5% K-S Critical Value	0.224	SD	589.4
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	75.66
		95% KM (t) UCL	296.8
Assuming Gamma Distribution		95% KM (z) UCL	295
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	292.5
Minimum	1E-09	95% KM (bootstrap t) UCL	560.3
Maximum	4700	95% KM (BCA) UCL	381.4
Mean	768	95% KM (Percentile Bootstrap) UCL	315.4
Median	578	95% KM (Chebyshev) UCL	500.3
SD	757.6	97.5% KM (Chebyshev) UCL	643
k star	0.487	99% KM (Chebyshev) UCL	923.3
Theta star	1576		
Nu star	63.36	**Potential UCLs to Use**	
AppChi2	46.04	95% KM (t) UCL	296.8
95% Gamma Approximate UCL	1057		
95% Adjusted Gamma UCL	1064		

Note: DL/2 is not a recommended method.

Result (benzo(b)fluoranthene)

General Statistics

Number of Valid Data	65	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	57
		Percent Non-Detects	87.69%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	25	Minimum Detected	3.219
Maximum Detected	660	Maximum Detected	6.492
Mean of Detected	339.4	Mean of Detected	5.514
SD of Detected	208	SD of Detected	1.052
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.986	Lilliefors Test Statistic	0.824
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	135.1	Mean	4.133
SD	194.9	SD	1.31
95% DL/2 (t) UCL	175.5	95% H-Stat (DL/2) UCL	207.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.113
		SD in Log Scale	1.763
		Mean in Original Scale	50.4
		SD in Original Scale	129.5
		95% Percentile Bootstrap UCL	79.01
		95% BCA Bootstrap UCL	83.01
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.175	**Data appear Normal at 5% Significance Level**	
Theta Star	288.9		
nu star	18.8		
A-D Test Statistic	0.391	**Nonparametric Statistics**	
5% A-D Critical Value	0.726	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.726	Mean	67.26
5% K-S Critical Value	0.298	SD	126.8
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	17.39
		95% KM (t) UCL	96.29
Assuming Gamma Distribution		95% KM (z) UCL	95.87
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	131.1
Minimum	25	95% KM (bootstrap t) UCL	97.12
Maximum	660	95% KM (BCA) UCL	318.5
Mean	344.5	95% KM (Percentile Bootstrap) UCL	299.1
Median	345.6	95% KM (Chebyshev) UCL	143.1
SD	72.12	97.5% KM (Chebyshev) UCL	175.9
k star	11.95	99% KM (Chebyshev) UCL	240.3
Theta star	28.83		
Nu star	1553	**Potential UCLs to Use**	
AppChi2	1463	95% KM (t) UCL	96.29
95% Gamma Approximate UCL	365.8	95% KM (Percentile Bootstrap) UCL	299.1
95% Adjusted Gamma UCL	366.3		

Note: DL/2 is not a recommended method.

Result (benzo(ghi)perylene)

General Statistics

Number of Valid Data	65	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	56
		Percent Non-Detects	86.15%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	160	Minimum Detected	5.075
Maximum Detected	410	Maximum Detected	6.016
Mean of Detected	277.8	Mean of Detected	5.581
SD of Detected	87.72	SD of Detected	0.325
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.944	Lilliefors Test Statistic	0.957
5% Lilliefors Critical Value	0.829	5% Lilliefors Critical Value	0.829
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	129.2	Mean	4.128
SD	178.8	SD	1.304
95% DL/2 (t) UCL	166.2	95% H-Stat (DL/2) UCL	222
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.425
		SD in Log Scale	0.627
		Mean in Original Scale	103.7
		SD in Original Scale	82.3
		95% Percentile Bootstrap UCL	120.3
		95% BCA Bootstrap UCL	124.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	7.469	**Data appear Normal at 5% Significance Level**	
Theta Star	37.19		
nu star	134.4		
A-D Test Statistic	0.208	**Nonparametric Statistics**	
5% A-D Critical Value	0.722	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.722	Mean	178.1
5% K-S Critical Value	0.279	SD	52.56
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	7.205
		95% KM (t) UCL	190.2
Assuming Gamma Distribution		95% KM (z) UCL	190
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	192
Minimum	160	95% KM (bootstrap t) UCL	191.4
Maximum	410	95% KM (BCA) UCL	260.8
Mean	279.7	95% KM (Percentile Bootstrap) UCL	236.3
Median	282.5	95% KM (Chebyshev) UCL	209.5
SD	44.16	97.5% KM (Chebyshev) UCL	223.1
k star	36.63	99% KM (Chebyshev) UCL	249.8
Theta star	7.635		
Nu star	4762	**Potential UCLs to Use**	
AppChi2	4603	95% KM (t) UCL	190.2
95% Gamma Approximate UCL	289.4	95% KM (Percentile Bootstrap) UCL	236.3
95% Adjusted Gamma UCL	289.6		

Note: DL/2 is not a recommended method.

Result (benzo(k)fluoranthene)

Appendix D
ProUCL Generated Output for Detected Constituents in Soil (0-2 Ft Interval)
Area 2
Baseline Human Health Risk Assessment
Isola Law Group, LLC
Former CENCO Refinery

General Statistics			
Number of Valid Data	65	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	55
		Percent Non-Detects	84.62%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	62	Minimum Detected	4.127
Maximum Detected	1000	Maximum Detected	6.908
Mean of Detected	436.2	Mean of Detected	5.819
SD of Detected	295.9	SD of Detected	0.832
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.931	Lilliefors Test Statistic	0.944
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	156.6	Mean	4.191
SD	232.6	SD	1.381
95% DL/2 (t) UCL	204.7	95% H-Stat (DL/2) UCL	230.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.112
		SD in Log Scale	1.53
		Mean in Original Scale	85.32
		SD in Original Scale	188.2
		95% Percentile Bootstrap UCL	125.6
		95% BCA Bootstrap UCL	134.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.524	**Data appear Normal at 5% Significance Level**	
Theta Star	286.2		
nu star	30.48		
A-D Test Statistic	0.235	**Nonparametric Statistics**	
5% A-D Critical Value	0.735	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.735	Mean	123.8
5% K-S Critical Value	0.27	SD	177.9
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	23.91
		95% KM (t) UCL	163.7
Assuming Gamma Distribution		95% KM (z) UCL	163.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	179.9
Minimum	62	95% KM (bootstrap t) UCL	169.2
Maximum	1000	95% KM (BCA) UCL	305.2
Mean	415.9	95% KM (Percentile Bootstrap) UCL	296.8
Median	400.8	95% KM (Chebyshev) UCL	228
SD	132.9	97.5% KM (Chebyshev) UCL	273.1
k star	8.799	99% KM (Chebyshev) UCL	361.7
Theta star	47.26		
Nu star	1144	**Potential UCLs to Use**	
AppChi2	1066	95% KM (t) UCL	163.7
95% Gamma Approximate UCL	446.1	95% KM (Percentile Bootstrap) UCL	296.8
95% Adjusted Gamma UCL	446.8		
Note: DL/2 is not a recommended method.			

Result (beryllium)

General Statistics

Number of Valid Data	65	Number of Detected Data	60
Number of Distinct Detected Data	60	Number of Non-Detect Data	5
		Percent Non-Detects	7.69%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.275	Minimum Detected	-1.291
Maximum Detected	1.42	Maximum Detected	0.351
Mean of Detected	0.727	Mean of Detected	-0.379
SD of Detected	0.237	SD of Detected	0.37
Minimum Non-Detect	0.262	Minimum Non-Detect	-1.339
Maximum Non-Detect	0.335	Maximum Non-Detect	-1.094
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	56
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	13.85%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.12	Lilliefors Test Statistic	0.15
5% Lilliefors Critical Value	0.114	5% Lilliefors Critical Value	0.114
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.683	Mean	-0.497
SD	0.275	SD	0.546
95% DL/2 (t) UCL	0.74	95% H-Stat (DL/2) UCL	0.735
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.682	Mean in Log Scale	-0.438
SD	0.277	SD in Log Scale	0.411
95% MLE (t) UCL	0.739	Mean in Original Scale	0.696
95% MLE (Tiku) UCL	0.741	SD in Original Scale	0.252
		95% Percentile Bootstrap UCL	0.747
		95% BCA Bootstrap UCL	0.748
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	7.989	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.0911		
nu star	958.7		
A-D Test Statistic	1.526	**Nonparametric Statistics**	
5% A-D Critical Value	0.752	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.752	Mean	0.693
5% K-S Critical Value	0.115	SD	0.255
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0319
		95% KM (t) UCL	0.746
Assuming Gamma Distribution		95% KM (z) UCL	0.745
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.746
Minimum	0.163	95% KM (bootstrap t) UCL	0.748
Maximum	1.42	95% KM (BCA) UCL	0.751
Mean	0.69	95% KM (Percentile Bootstrap) UCL	0.743
Median	0.742	95% KM (Chebyshev) UCL	0.832
SD	0.262	97.5% KM (Chebyshev) UCL	0.892
k star	5.38	99% KM (Chebyshev) UCL	1.01
Theta star	0.128		
Nu star	699.4	**Potential UCLs to Use**	
AppChi2	639.1	95% KM (Chebyshev) UCL	0.832
95% Gamma Approximate UCL	0.755		
95% Adjusted Gamma UCL	0.757		

Note: DL/2 is not a recommended method.

Result (cadmium)

General Statistics

Number of Valid Data	65	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	60
		Percent Non-Detects	92.31%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.863	Minimum Detected	-0.147
Maximum Detected	11.9	Maximum Detected	2.477
Mean of Detected	3.593	Mean of Detected	0.745
SD of Detected	4.704	SD of Detected	1.062
Minimum Non-Detect	0.523	Minimum Non-Detect	-0.648
Maximum Non-Detect	0.67	Maximum Non-Detect	-0.4
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	60
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.677	Lilliefors Test Statistic	0.858
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.543	Mean	-1.088
SD	1.473	SD	0.597
95% DL/2 (t) UCL	0.848	95% H-Stat (DL/2) UCL	0.418
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.838
		SD in Log Scale	2.305
		Mean in Original Scale	0.28
		SD in Original Scale	1.52
		95% Percentile Bootstrap UCL	0.639
		95% BCA Bootstrap UCL	0.865
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.562	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	6.389		
nu star	5.623		
A-D Test Statistic	0.615	**Nonparametric Statistics**	
5% A-D Critical Value	0.691	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.691	Mean	1.073
5% K-S Critical Value	0.364	SD	1.375
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.191
		95% KM (t) UCL	1.391
Assuming Gamma Distribution		95% KM (z) UCL	1.387
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.323
Minimum	0.863	95% KM (bootstrap t) UCL	4.09
Maximum	11.9	95% KM (BCA) UCL	3.201
Mean	3.613	95% KM (Percentile Bootstrap) UCL	2.78
Median	3.565	95% KM (Chebyshev) UCL	1.904
SD	1.254	97.5% KM (Chebyshev) UCL	2.264
k star	10.1	99% KM (Chebyshev) UCL	2.97
Theta star	0.358		
Nu star	1313	**Potential UCLs to Use**	
AppChi2	1230	95% KM (t) UCL	1.391
95% Gamma Approximate UCL	3.857		
95% Adjusted Gamma UCL	3.863		

Note: DL/2 is not a recommended method.

Result (chromium)			
General Statistics			
Number of Valid Observations	65	Number of Distinct Observations	62
Raw Statistics		**Log-transformed Statistics**	
Minimum	4.81	Minimum of Log Data	1.571
Maximum	340	Maximum of Log Data	5.829
Mean	40.35	Mean of log Data	3.433
Median	33.6	SD of log Data	0.686
SD	45.11		
Coefficient of Variation	1.118		
Skewness	5.197		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.314	Lilliefors Test Statistic	0.164
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	49.69	95% H-UCL	46.46
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	54.86
95% Adjusted-CLT UCL	53.41	97.5% Chebyshev (MVUE) UCL	61.72
95% Modified-t UCL	50.29	99% Chebyshev (MVUE) UCL	75.19
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.954	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	20.65		
nu star	254.1		
Approximate Chi Square Value (.05)	218.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	49.56
Adjusted Chi Square Value	217.4	95% Jackknife UCL	49.69
		95% Standard Bootstrap UCL	49.63
Anderson-Darling Test Statistic	3.467	95% Bootstrap-t UCL	59.95
Anderson-Darling 5% Critical Value	0.763	95% Hall's Bootstrap UCL	92.3
Kolmogorov-Smirnov Test Statistic	0.212	95% Percentile Bootstrap UCL	49.89
Kolmogorov-Smirnov 5% Critical Value	0.112	95% BCA Bootstrap UCL	56.04
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	64.74
		97.5% Chebyshev(Mean, Sd) UCL	75.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	96.03
95% Approximate Gamma UCL	46.99		
95% Adjusted Gamma UCL	47.15		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	64.74

Result (chrysene)

General Statistics

Number of Valid Data	65	Number of Detected Data	24
Number of Distinct Detected Data	23	Number of Non-Detect Data	41
		Percent Non-Detects	63.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	33	Minimum Detected	3.497
Maximum Detected	14000	Maximum Detected	9.547
Mean of Detected	1217	Mean of Detected	5.975
SD of Detected	2912	SD of Detected	1.418
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	61
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.85%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.399	Lilliefors Test Statistic	0.937
5% Lilliefors Critical Value	0.916	5% Lilliefors Critical Value	0.916
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	497.3	Mean	4.547
SD	1833	SD	1.677
95% DL/2 (t) UCL	876.8	95% H-Stat (DL/2) UCL	511.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.675
		SD in Log Scale	2.143
		Mean in Original Scale	459.9
		SD in Original Scale	1841
		95% Percentile Bootstrap UCL	862.5
		95% BCA Bootstrap UCL	1196
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.512	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2376		
nu star	24.59		
A-D Test Statistic	1.849	**Nonparametric Statistics**	
5% A-D Critical Value	0.801	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.801	Mean	475.7
5% K-S Critical Value	0.187	SD	1823
Data not Gamma Distributed at 5% Significance Level		SE of Mean	231
		95% KM (t) UCL	861.3
Assuming Gamma Distribution		95% KM (z) UCL	855.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	854.5
Minimum	33	95% KM (bootstrap t) UCL	2461
Maximum	14000	95% KM (BCA) UCL	915.3
Mean	1184	95% KM (Percentile Bootstrap) UCL	910.9
Median	920.7	95% KM (Chebyshev) UCL	1483
SD	1766	97.5% KM (Chebyshev) UCL	1918
k star	1.225	99% KM (Chebyshev) UCL	2774
Theta star	966.8		
Nu star	159.2	**Potential UCLs to Use**	
AppChi2	131.1	95% KM (BCA) UCL	915.3
95% Gamma Approximate UCL	1439		
95% Adjusted Gamma UCL	1445		

Note: DL/2 is not a recommended method.

Result (cobalt)

General Statistics

Number of Valid Observations	65	Number of Distinct Observations	54

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.97	Minimum of Log Data	1.379
Maximum	37.7	Maximum of Log Data	3.63
Mean	14.6	Mean of log Data	2.602
Median	14.5	SD of log Data	0.411
SD	5.905		
Coefficient of Variation	0.405		
Skewness	1.509		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.167	Lilliefors Test Statistic	0.141
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	15.82	95% H-UCL	16.11
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18.04
95% Adjusted-CLT UCL	15.95	97.5% Chebyshev (MVUE) UCL	19.5
95% Modified-t UCL	15.84	99% Chebyshev (MVUE) UCL	22.37
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.258	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2.332		
nu star	813.5		
Approximate Chi Square Value (.05)	748.3	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	15.8
Adjusted Chi Square Value	746.9	95% Jackknife UCL	15.82
		95% Standard Bootstrap UCL	15.81
Anderson-Darling Test Statistic	1.927	95% Bootstrap-t UCL	16.08
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	16.25
Kolmogorov-Smirnov Test Statistic	0.13	95% Percentile Bootstrap UCL	15.81
Kolmogorov-Smirnov 5% Critical Value	0.111	95% BCA Bootstrap UCL	15.94
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17.79
		97.5% Chebyshev(Mean, Sd) UCL	19.17
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	21.88
95% Approximate Gamma UCL	15.87		
95% Adjusted Gamma UCL	15.9		
Potential UCL to Use		Use 95% Student's-t UCL	15.82
		or 95% Modified-t UCL	15.84

Result (copper)

General Statistics

Number of Valid Observations	65	Number of Distinct Observations	60

Raw Statistics		**Log-transformed Statistics**	
Minimum	8.26	Minimum of Log Data	2.111
Maximum	3420	Maximum of Log Data	8.137
Mean	108.9	Mean of log Data	3.699
Median	36.9	SD of log Data	0.897
SD	432.5		
Coefficient of Variation	3.972		
Skewness	7.335		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.43	Lilliefors Test Statistic	0.257
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	198.4	95% H-UCL	77.05
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	93.47
95% Adjusted-CLT UCL	249.3	97.5% Chebyshev (MVUE) UCL	108
95% Modified-t UCL	206.6	99% Chebyshev (MVUE) UCL	136.5
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.602	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	181		
nu star	78.22		
Approximate Chi Square Value (.05)	58.85	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	197.1
Adjusted Chi Square Value	58.47	95% Jackknife UCL	198.4
		95% Standard Bootstrap UCL	195.8
Anderson-Darling Test Statistic	12.22	95% Bootstrap-t UCL	1064
Anderson-Darling 5% Critical Value	0.805	95% Hall's Bootstrap UCL	603.2
Kolmogorov-Smirnov Test Statistic	0.359	95% Percentile Bootstrap UCL	197.9
Kolmogorov-Smirnov 5% Critical Value	0.116	95% BCA Bootstrap UCL	291.7
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	342.7
		97.5% Chebyshev(Mean, Sd) UCL	443.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	642.7
95% Approximate Gamma UCL	144.7		
95% Adjusted Gamma UCL	145.7		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	342.7

Result (ethylbenzene)

General Statistics

Number of Valid Data	65	Number of Detected Data	15
Number of Distinct Detected Data	14	Number of Non-Detect Data	50
		Percent Non-Detects	76.92%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	55000	Maximum Detected	10.92
Mean of Detected	13502	Mean of Detected	6.745
SD of Detected	19478	SD of Detected	3.813
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	51	Maximum Non-Detect	3.932
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	53
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	81.54%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.728	Lilliefors Test Statistic	0.88
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3117	Mean	1.186
SD	10763	SD	3.614
95% DL/2 (t) UCL	5345	95% H-Stat (DL/2) UCL	5438
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.23
		SD in Log Scale	6.526
		Mean in Original Scale	3116
		SD in Original Scale	10764
		95% Percentile Bootstrap UCL	5477
		95% BCA Bootstrap UCL	5783
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.249	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	54196		
nu star	7.474		
A-D Test Statistic	0.379	**Nonparametric Statistics**	
5% A-D Critical Value	0.854	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.854	Mean	3117
5% K-S Critical Value	0.242	SD	10680
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1371
		95% KM (t) UCL	5405
Assuming Gamma Distribution		95% KM (z) UCL	5372
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5345
Minimum	1.2	95% KM (bootstrap t) UCL	6774
Maximum	55000	95% KM (BCA) UCL	5723
Mean	14469	95% KM (Percentile Bootstrap) UCL	5538
Median	11912	95% KM (Chebyshev) UCL	9094
SD	10838	97.5% KM (Chebyshev) UCL	11680
k star	0.814	99% KM (Chebyshev) UCL	16760
Theta star	17785		
Nu star	105.8	**Potential UCLs to Use**	
AppChi2	83.03	95% KM (t) UCL	5405
95% Gamma Approximate UCL	18430		
95% Adjusted Gamma UCL	18532		

Note: DL/2 is not a recommended method.

Result (fluoranthene)

General Statistics

Number of Valid Data	65	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	45
		Percent Non-Detects	69.23%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	45	Minimum Detected	3.807
Maximum Detected	3000	Maximum Detected	8.006
Mean of Detected	693.5	Mean of Detected	6.049
SD of Detected	715	SD of Detected	1.107
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	61
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.85%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.785	Lilliefors Test Statistic	0.969
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	264.1	Mean	4.435
SD	490.1	SD	1.562
95% DL/2 (t) UCL	365.6	95% H-Stat (DL/2) UCL	356
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.864
		SD in Log Scale	1.778
		Mean in Original Scale	232
		SD in Original Scale	498.3
		95% Percentile Bootstrap UCL	334.6
		95% BCA Bootstrap UCL	375.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.013	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	684.7		
nu star	40.52		
A-D Test Statistic	0.177	**Nonparametric Statistics**	
5% A-D Critical Value	0.765	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765	Mean	248.4
5% K-S Critical Value	0.199	SD	488.5
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	62.3
		95% KM (t) UCL	352.3
Assuming Gamma Distribution		95% KM (z) UCL	350.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	345.2
Minimum	45	95% KM (bootstrap t) UCL	399.5
Maximum	3000	95% KM (BCA) UCL	397
Mean	726.1	95% KM (Percentile Bootstrap) UCL	373.3
Median	660	95% KM (Chebyshev) UCL	519.9
SD	499.5	97.5% KM (Chebyshev) UCL	637.4
k star	1.862	99% KM (Chebyshev) UCL	868.3
Theta star	389.9		
Nu star	242.1	**Potential UCLs to Use**	
AppChi2	207.1	95% KM (t) UCL	352.3
95% Gamma Approximate UCL	848.9		
95% Adjusted Gamma UCL	851.9		

Note: DL/2 is not a recommended method.

Result (fluorene)

General Statistics

Number of Valid Data	65	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	56
		Percent Non-Detects	86.15%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	140	Minimum Detected	4.942
Maximum Detected	4300	Maximum Detected	8.366
Mean of Detected	2109	Mean of Detected	7.278
SD of Detected	1339	SD of Detected	1.147
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	58
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.23%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.935	Lilliefors Test Statistic	0.803
5% Lilliefors Critical Value	0.829	5% Lilliefors Critical Value	0.829
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	358.4	Mean	4.291
SD	854.4	SD	1.647
95% DL/2 (t) UCL	535.3	95% H-Stat (DL/2) UCL	289
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.342
		SD in Log Scale	2.125
		Mean in Original Scale	322.6
		SD in Original Scale	864.2
		95% Percentile Bootstrap UCL	509
		95% BCA Bootstrap UCL	567.5

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.057	**Data appear Normal at 5% Significance Level**	
Theta Star	1995		
nu star	19.03		
A-D Test Statistic	0.699	**Nonparametric Statistics**	
5% A-D Critical Value	0.735	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.735	Mean	412.7
5% K-S Critical Value	0.284	SD	826.4
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	108.7
		95% KM (t) UCL	594.2
Assuming Gamma Distribution		95% KM (z) UCL	591.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	581.7
Minimum	140	95% KM (bootstrap t) UCL	612.9
Maximum	4300	95% KM (BCA) UCL	2132
Mean	2126	95% KM (Percentile Bootstrap) UCL	1446
Median	2155	95% KM (Chebyshev) UCL	886.6
SD	700.5	97.5% KM (Chebyshev) UCL	1092
k star	5.88	99% KM (Chebyshev) UCL	1495
Theta star	361.5		
Nu star	764.4	**Potential UCLs to Use**	
AppChi2	701.2	95% KM (t) UCL	594.2
95% Gamma Approximate UCL	2317	95% KM (Percentile Bootstrap) UCL	1446
95% Adjusted Gamma UCL	2322		

Note: DL/2 is not a recommended method.

Result (Indeno(1,2,3-cd)pyrene)

General Statistics

Number of Valid Data	65	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	58
		Percent Non-Detects	89.23%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	48	Minimum Detected	3.871
Maximum Detected	430	Maximum Detected	6.064
Mean of Detected	266.9	Mean of Detected	5.405
SD of Detected	133.1	SD of Detected	0.759
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.967	Lilliefors Test Statistic	0.828
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	123.5	Mean	4.097
SD	177.5	SD	1.272
95% DL/2 (t) UCL	160.3	95% H-Stat (DL/2) UCL	192.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.646
		SD in Log Scale	1.372
		Mean in Original Scale	42.76
		SD in Original Scale	89.55
		95% Percentile Bootstrap UCL	60.8
		95% BCA Bootstrap UCL	68.32
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.757	**Data appear Normal at 5% Significance Level**	
Theta Star	151.9		
nu star	24.6		
A-D Test Statistic	0.431	**Nonparametric Statistics**	
5% A-D Critical Value	0.712	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.712	Mean	74.62
5% K-S Critical Value	0.314	SD	81.78
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	11.54
		95% KM (t) UCL	93.88
Assuming Gamma Distribution		95% KM (z) UCL	93.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	136
Minimum	48	95% KM (bootstrap t) UCL	92.34
Maximum	430	95% KM (BCA) UCL	293.6
Mean	269.8	95% KM (Percentile Bootstrap) UCL	258.2
Median	272.3	95% KM (Chebyshev) UCL	124.9
SD	42.8	97.5% KM (Chebyshev) UCL	146.7
k star	23.16	99% KM (Chebyshev) UCL	189.5
Theta star	11.65		
Nu star	3011	**Potential UCLs to Use**	
AppChi2	2885	95% KM (t) UCL	93.88
95% Gamma Approximate UCL	281.7	95% KM (Percentile Bootstrap) UCL	258.2
95% Adjusted Gamma UCL	282		

Note: DL/2 is not a recommended method.

Result (Isopropylbenzene)

General Statistics			
Number of Valid Data	65	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	55
		Percent Non-Detects	84.62%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	8400	Maximum Detected	9.036
Mean of Detected	3531	Mean of Detected	6.912
SD of Detected	2955	SD of Detected	2.833
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.69%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.933	Lilliefors Test Statistic	0.719
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	547.2	Mean	0.851
SD	1695	SD	3.04
95% DL/2 (t) UCL	898.1	95% H-Stat (DL/2) UCL	456.9
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	4849	Mean in Log Scale	-1.463
SD	2437	SD in Log Scale	4.47
95% MLE (t) UCL	5354	Mean in Original Scale	543.8
95% MLE (Tiku) UCL	6269	SD in Original Scale	1696
		95% Percentile Bootstrap UCL	891.4
		95% BCA Bootstrap UCL	993.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.42	**Data appear Normal at 5% Significance Level**	
Theta Star	8411		
nu star	8.398		
A-D Test Statistic	0.881	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	545.4
5% K-S Critical Value	0.281	SD	1682
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	219.9
		95% KM (t) UCL	912.5
Assuming Gamma Distribution		95% KM (z) UCL	907.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	889.2
Minimum	2.5	95% KM (bootstrap t) UCL	1078
Maximum	8400	95% KM (BCA) UCL	2255
Mean	3637	95% KM (Percentile Bootstrap) UCL	1900
Median	3434	95% KM (Chebyshev) UCL	1504
SD	1376	97.5% KM (Chebyshev) UCL	1919
k star	2.367	99% KM (Chebyshev) UCL	2734
Theta star	1537		
Nu star	307.7	**Potential UCLs to Use**	
AppChi2	268	95% KM (t) UCL	912.5
95% Gamma Approximate UCL	4175	95% KM (Percentile Bootstrap) UCL	1900
95% Adjusted Gamma UCL	4188		
Note: DL/2 is not a recommended method.			

Result (lead)

General Statistics

Number of Valid Observations	65	Number of Distinct Observations	63

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.57	Minimum of Log Data	1.52
Maximum	4690	Maximum of Log Data	8.453
Mean	136.5	Mean of log Data	3.604
Median	29.8	SD of log Data	1.222
SD	582.5		
Coefficient of Variation	4.266		
Skewness	7.707		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.41	Lilliefors Test Statistic	0.126
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	257.1	95% H-UCL	139.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	139.2
95% Adjusted-CLT UCL	329.2	97.5% Chebyshev (MVUE) UCL	166.6
95% Modified-t UCL	268.6	99% Chebyshev (MVUE) UCL	220.4
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.474	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	288.2		
nu star	61.58		
Approximate Chi Square Value (.05)	44.54	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	255.4
Adjusted Chi Square Value	44.21	95% Jackknife UCL	257.1
		95% Standard Bootstrap UCL	251.3
Anderson-Darling Test Statistic	7.378	95% Bootstrap-t UCL	838.6
Anderson-Darling 5% Critical Value	0.82	95% Hall's Bootstrap UCL	662.4
Kolmogorov-Smirnov Test Statistic	0.274	95% Percentile Bootstrap UCL	274.5
Kolmogorov-Smirnov 5% Critical Value	0.117	95% BCA Bootstrap UCL	361.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	451.4
		97.5% Chebyshev(Mean, Sd) UCL	587.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	855.4
95% Approximate Gamma UCL	188.8		
95% Adjusted Gamma UCL	190.2		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	587.7

Result (mercury)

General Statistics

Number of Valid Data	65	Number of Detected Data	28
Number of Distinct Detected Data	26	Number of Non-Detect Data	37
		Percent Non-Detects	56.92%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.104	Minimum Detected	-2.263
Maximum Detected	1.94	Maximum Detected	0.663
Mean of Detected	0.275	Mean of Detected	-1.653
SD of Detected	0.372	SD of Detected	0.71
Minimum Non-Detect	0.0873	Minimum Non-Detect	-2.438
Maximum Non-Detect	0.112	Maximum Non-Detect	-2.189
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	44
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	21
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	67.69%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.481	Lilliefors Test Statistic	0.772
5% Lilliefors Critical Value	0.924	5% Lilliefors Critical Value	0.924
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.146	Mean	-2.439
SD	0.267	SD	0.83
95% DL/2 (t) UCL	0.201	95% H-Stat (DL/2) UCL	0.124
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.707
		SD in Log Scale	1.037
		Mean in Original Scale	0.136
		SD in Original Scale	0.271
		95% Percentile Bootstrap UCL	0.199
		95% BCA Bootstrap UCL	0.221
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.385	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.199		
nu star	77.57		
A-D Test Statistic	3.382	**Nonparametric Statistics**	
5% A-D Critical Value	0.762	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.762	Mean	0.178
5% K-S Critical Value	0.168	SD	0.254
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0321
		95% KM (t) UCL	0.231
Assuming Gamma Distribution		95% KM (z) UCL	0.231
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.231
Minimum	0.104	95% KM (bootstrap t) UCL	0.335
Maximum	1.94	95% KM (BCA) UCL	0.24
Mean	0.275	95% KM (Percentile Bootstrap) UCL	0.231
Median	0.275	95% KM (Chebyshev) UCL	0.318
SD	0.242	97.5% KM (Chebyshev) UCL	0.378
k star	3.213	99% KM (Chebyshev) UCL	0.498
Theta star	0.0857		
Nu star	417.7	**Potential UCLs to Use**	
AppChi2	371.4	95% KM (t) UCL	0.231
95% Gamma Approximate UCL	0.31	95% KM (% Bootstrap) UCL	0.231
95% Adjusted Gamma UCL	0.311		

Note: DL/2 is not a recommended method.

Result (molybdenum)

General Statistics

Number of Valid Data	65	Number of Detected Data	26
Number of Distinct Detected Data	26	Number of Non-Detect Data	39
		Percent Non-Detects	60.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.297	Minimum Detected	-1.214
Maximum Detected	101	Maximum Detected	4.615
Mean of Detected	9.638	Mean of Detected	1.111
SD of Detected	21.61	SD of Detected	1.406
Minimum Non-Detect	0.262	Minimum Non-Detect	-1.339
Maximum Non-Detect	0.335	Maximum Non-Detect	-1.094
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	40
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	25
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	61.54%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.445	Lilliefors Test Statistic	0.955
5% Lilliefors Critical Value	0.92	5% Lilliefors Critical Value	0.92
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.942	Mean	-0.714
SD	14.3	SD	1.74
95% DL/2 (t) UCL	6.902	95% H-Stat (DL/2) UCL	2.74
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.321
		SD in Log Scale	2.252
		Mean in Original Scale	3.895
		SD in Original Scale	14.31
		95% Percentile Bootstrap UCL	7.02
		95% BCA Bootstrap UCL	8.916
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.506	**Data appear Lognormal at 5% Significance Level**	
Theta Star	19.05		
nu star	26.31		
A-D Test Statistic	1.846	**Nonparametric Statistics**	
5% A-D Critical Value	0.804	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.804	Mean	4.033
5% K-S Critical Value	0.181	SD	14.16
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.791
		95% KM (t) UCL	7.023
Assuming Gamma Distribution		95% KM (z) UCL	6.98
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6.945
Minimum	0.297	95% KM (bootstrap t) UCL	16.16
Maximum	101	95% KM (BCA) UCL	7.669
Mean	9.705	95% KM (Percentile Bootstrap) UCL	7.363
Median	9.151	95% KM (Chebyshev) UCL	11.84
SD	13.81	97.5% KM (Chebyshev) UCL	15.22
k star	1.082	99% KM (Chebyshev) UCL	21.86
Theta star	8.972		
Nu star	140.6	**Potential UCLs to Use**	
AppChi2	114.2	95% KM (BCA) UCL	7.669
95% Gamma Approximate UCL	11.95		
95% Adjusted Gamma UCL	12		

Note: DL/2 is not a recommended method.

Result (naphthalene)

General Statistics

Number of Valid Data	65	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	60
		Percent Non-Detects	92.31%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	63	Minimum Detected	4.143
Maximum Detected	53000	Maximum Detected	10.88
Mean of Detected	15299	Mean of Detected	7.652
SD of Detected	22310	SD of Detected	2.997
Minimum Non-Detect	5.7	Minimum Non-Detect	1.74
Maximum Non-Detect	24000	Maximum Non-Detect	10.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	64
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.46%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.783	Lilliefors Test Statistic	0.893
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1657	Mean	2.97
SD	7091	SD	2.583
95% DL/2 (t) UCL	3125	95% H-Stat (DL/2) UCL	1268
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.246
		SD in Log Scale	5.033
		Mean in Original Scale	1177
		SD in Original Scale	6927
		95% Percentile Bootstrap UCL	2805
		95% BCA Bootstrap UCL	4165
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.27	**Data appear Normal at 5% Significance Level**	
Theta Star	56751		
nu star	2.696		
A-D Test Statistic	0.292	**Nonparametric Statistics**	
5% A-D Critical Value	0.733	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.733	Mean	1245
5% K-S Critical Value	0.378	SD	6870
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	953.8
		95% KM (t) UCL	2837
Assuming Gamma Distribution		95% KM (z) UCL	2814
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2624
Minimum	1E-09	95% KM (bootstrap t) UCL	6611
Maximum	53000	95% KM (BCA) UCL	19077
Mean	13329	95% KM (Percentile Bootstrap) UCL	7703
Median	15832	95% KM (Chebyshev) UCL	5402
SD	9853	97.5% KM (Chebyshev) UCL	7201
k star	0.174	99% KM (Chebyshev) UCL	10735
Theta star	76765		
Nu star	22.57	**Potential UCLs to Use**	
AppChi2	12.77	95% KM (t) UCL	2837
95% Gamma Approximate UCL	23564	95% KM (Percentile Bootstrap) UCL	7703
95% Adjusted Gamma UCL	23877		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)			
General Statistics			
Number of Valid Data	65	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	55
		Percent Non-Detects	84.62%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.7	Minimum Detected	0.531
Maximum Detected	38000	Maximum Detected	10.55
Mean of Detected	6930	Mean of Detected	6.672
SD of Detected	11943	SD of Detected	3.171
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	600	Maximum Non-Detect	6.397
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	59
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.77%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.644	Lilliefors Test Statistic	0.926
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1074	Mean	0.848
SD	5137	SD	3.052
95% DL/2 (t) UCL	2138	95% H-Stat (DL/2) UCL	495.7
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	18205	Mean in Log Scale	-4.372
SD	12746	SD in Log Scale	5.882
95% MLE (t) UCL	20844	Mean in Original Scale	1066
95% MLE (Tiku) UCL	26583	SD in Original Scale	5139
		95% Percentile Bootstrap UCL	2252
		95% BCA Bootstrap UCL	3024
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.287	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	24135		
nu star	5.743		
A-D Test Statistic	0.176	**Nonparametric Statistics**	
5% A-D Critical Value	0.811	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.811	Mean	1068
5% K-S Critical Value	0.287	SD	5099
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	666.6
		95% KM (t) UCL	2180
Assuming Gamma Distribution		95% KM (z) UCL	2164
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2119
Minimum	1E-09	95% KM (bootstrap t) UCL	6123
Maximum	38000	95% KM (BCA) UCL	2521
Mean	6412	95% KM (Percentile Bootstrap) UCL	2387
Median	7104	95% KM (Chebyshev) UCL	3973
SD	5798	97.5% KM (Chebyshev) UCL	5231
k star	0.174	99% KM (Chebyshev) UCL	7701
Theta star	36882		
Nu star	22.6	**Potential UCLs to Use**	
AppChi2	12.79	95% KM (t) UCL	2180
95% Gamma Approximate UCL	11331		
95% Adjusted Gamma UCL	11481		
Note: DL/2 is not a recommended method.			

Result (nickel)

General Statistics

Number of Valid Observations	65	Number of Distinct Observations	62

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.96	Minimum of Log Data	1.601
Maximum	3620	Maximum of Log Data	8.194
Mean	79.35	Mean of log Data	3.149
Median	23.8	SD of log Data	0.803
SD	446.2		
Coefficient of Variation	5.623		
Skewness	8.054		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.494	Lilliefors Test Statistic	0.243
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	171.7	95% H-UCL	39.69
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	47.65
95% Adjusted-CLT UCL	229.4	97.5% Chebyshev (MVUE) UCL	54.42
95% Modified-t UCL	180.9	99% Chebyshev (MVUE) UCL	67.73
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.503	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	157.9		
nu star	65.34		
Approximate Chi Square Value (.05)	47.74	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	170.4
Adjusted Chi Square Value	47.4	95% Jackknife UCL	171.7
		95% Standard Bootstrap UCL	170.8
Anderson-Darling Test Statistic	16.51	95% Bootstrap-t UCL	3049
Anderson-Darling 5% Critical Value	0.815	95% Hall's Bootstrap UCL	997.5
Kolmogorov-Smirnov Test Statistic	0.426	95% Percentile Bootstrap UCL	190.4
Kolmogorov-Smirnov 5% Critical Value	0.117	95% BCA Bootstrap UCL	247
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	320.6
		97.5% Chebyshev(Mean, Sd) UCL	425
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	630
95% Approximate Gamma UCL	108.6		
95% Adjusted Gamma UCL	109.4		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	320.6

Result (n-propylbenzene)

General Statistics

Number of Valid Data	65	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	54
		Percent Non-Detects	83.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	8	Minimum Detected	2.079
Maximum Detected	47000	Maximum Detected	10.76
Mean of Detected	11101	Mean of Detected	7.556
SD of Detected	15857	SD of Detected	2.896
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.69%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.703	Lilliefors Test Statistic	0.852
5% Lilliefors Critical Value	0.85	5% Lilliefors Critical Value	0.85
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1882	Mean	1.114
SD	7541	SD	3.329
95% DL/2 (t) UCL	3443	95% H-Stat (DL/2) UCL	1696
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	22185	Mean in Log Scale	-1.614
SD	15849	SD in Log Scale	4.991
95% MLE (t) UCL	25466	Mean in Original Scale	1879
95% MLE (Tiku) UCL	31208	SD in Original Scale	7542
		95% Percentile Bootstrap UCL	3595
		95% BCA Bootstrap UCL	4373
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.335	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	33113		
nu star	7.375		
A-D Test Statistic	0.427	**Nonparametric Statistics**	
5% A-D Critical Value	0.805	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.805	Mean	1885
5% K-S Critical Value	0.273	SD	7482
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	973.4
		95% KM (t) UCL	3510
Assuming Gamma Distribution		95% KM (z) UCL	3486
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3418
Minimum	1E-09	95% KM (bootstrap t) UCL	7354
Maximum	47000	95% KM (BCA) UCL	4597
Mean	10279	95% KM (Percentile Bootstrap) UCL	4266
Median	11573	95% KM (Chebyshev) UCL	6128
SD	7793	97.5% KM (Chebyshev) UCL	7964
k star	0.361	99% KM (Chebyshev) UCL	11570
Theta star	28507		
Nu star	46.87	**Potential UCLs to Use**	
AppChi2	32.16	95% KM (t) UCL	3510
95% Gamma Approximate UCL	14980		
95% Adjusted Gamma UCL	15110		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	65	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	56
		Percent Non-Detects	86.15%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.3	Minimum Detected	1.459
Maximum Detected	34000	Maximum Detected	10.43
Mean of Detected	5949	Mean of Detected	6.016
SD of Detected	11419	SD of Detected	3.306
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	61
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.85%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.605	Lilliefors Test Statistic	0.91
5% Lilliefors Critical Value	0.829	5% Lilliefors Critical Value	0.829
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	842.7	Mean	0.828
SD	4535	SD	2.895
95% DL/2 (t) UCL	1781	95% H-Stat (DL/2) UCL	318.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.262
		SD in Log Scale	6.123
		Mean in Original Scale	823.8
		SD in Original Scale	4537
		95% Percentile Bootstrap UCL	1854
		95% BCA Bootstrap UCL	2583
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.25	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	23835		
nu star	4.493		
A-D Test Statistic	0.337	**Nonparametric Statistics**	
5% A-D Critical Value	0.821	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.821	Mean	828
5% K-S Critical Value	0.304	SD	4502
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	592.2
		95% KM (t) UCL	1816
Assuming Gamma Distribution		95% KM (z) UCL	1802
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1766
Minimum	4.3	95% KM (bootstrap t) UCL	10062
Maximum	34000	95% KM (BCA) UCL	1899
Mean	7137	95% KM (Percentile Bootstrap) UCL	1953
Median	4609	95% KM (Chebyshev) UCL	3409
SD	7511	97.5% KM (Chebyshev) UCL	4527
k star	0.849	99% KM (Chebyshev) UCL	6721
Theta star	8406		
Nu star	110.4	**Potential UCLs to Use**	
AppChi2	87.12	95% KM (t) UCL	1816
95% Gamma Approximate UCL	9041		
95% Adjusted Gamma UCL	9090		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)			
General Statistics			
Number of Valid Data	65	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	55
		Percent Non-Detects	84.62%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.9	Minimum Detected	1.589
Maximum Detected	150000	Maximum Detected	11.92
Mean of Detected	43321	Mean of Detected	7.616
SD of Detected	60574	SD of Detected	4.164
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	2200	Maximum Non-Detect	7.696
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	59
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.77%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.73	Lilliefors Test Statistic	0.855
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6701	Mean	1.694
SD	27634	SD	3.363
95% DL/2 (t) UCL	12422	95% H-Stat (DL/2) UCL	4436
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.83
		SD in Log Scale	7.782
		Mean in Original Scale	6665
		SD in Original Scale	27642
		95% Percentile Bootstrap UCL	12740
		95% BCA Bootstrap UCL	15546
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.231	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	187705		
nu star	4.616		
A-D Test Statistic	0.472	**Nonparametric Statistics**	
5% A-D Critical Value	0.84	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.84	Mean	6669
5% K-S Critical Value	0.292	SD	27428
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	3586
		95% KM (t) UCL	12654
Assuming Gamma Distribution		95% KM (z) UCL	12568
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12389
Minimum	4.9	95% KM (bootstrap t) UCL	23630
Maximum	150000	95% KM (BCA) UCL	13329
Mean	42738	95% KM (Percentile Bootstrap) UCL	12980
Median	37753	95% KM (Chebyshev) UCL	22300
SD	24893	97.5% KM (Chebyshev) UCL	29064
k star	1.108	99% KM (Chebyshev) UCL	42350
Theta star	38584		
Nu star	144	**Potential UCLs to Use**	
AppChi2	117.3	95% KM (t) UCL	12654
95% Gamma Approximate UCL	52480		
95% Adjusted Gamma UCL	52725		
Note: DL/2 is not a recommended method.			

Result (phenanthrene)

General Statistics

Number of Valid Data	65	Number of Detected Data	19
Number of Distinct Detected Data	18	Number of Non-Detect Data	46
		Percent Non-Detects	70.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	160	Minimum Detected	5.075
Maximum Detected	29000	Maximum Detected	10.28
Mean of Detected	3824	Mean of Detected	6.922
SD of Detected	7562	SD of Detected	1.554
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	59
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.77%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.544	Lilliefors Test Statistic	0.888
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1167	Mean	4.588
SD	4365	SD	1.974
95% DL/2 (t) UCL	2070	95% H-Stat (DL/2) UCL	958.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.349
		SD in Log Scale	2.775
		Mean in Original Scale	1129
		SD in Original Scale	4374
		95% Percentile Bootstrap UCL	2138
		95% BCA Bootstrap UCL	2642
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.441	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	8681		
nu star	16.74		
A-D Test Statistic	1.764	**Nonparametric Statistics**	
5% A-D Critical Value	0.807	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.807	Mean	1232
5% K-S Critical Value	0.21	SD	4314
Data not Gamma Distributed at 5% Significance Level		SE of Mean	549.8
		95% KM (t) UCL	2150
Assuming Gamma Distribution		95% KM (z) UCL	2137
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2120
Minimum	1E-09	95% KM (bootstrap t) UCL	4283
Maximum	29000	95% KM (BCA) UCL	2311
Mean	4312	95% KM (Percentile Bootstrap) UCL	2177
Median	2359	95% KM (Chebyshev) UCL	3629
SD	5815	97.5% KM (Chebyshev) UCL	4666
k star	0.123	99% KM (Chebyshev) UCL	6703
Theta star	35082		
Nu star	15.98	**Potential UCLs to Use**	
AppChi2	7.947	95% KM (Chebyshev) UCL	3629
95% Gamma Approximate UCL	8670		
95% Adjusted Gamma UCL	8813		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	65	Number of Detected Data	10
Number of Distinct Detected Data	9	Number of Non-Detect Data	55
		Percent Non-Detects	84.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	6	Minimum Detected	1.792
Maximum Detected	6700	Maximum Detected	8.81
Mean of Detected	1619	Mean of Detected	5.423
SD of Detected	2251	SD of Detected	2.776
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	2400	Maximum Non-Detect	7.783
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	63
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.92%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.764	Lilliefors Test Statistic	0.87
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	286	Mean	0.826
SD	1035	SD	2.822
95% DL/2 (t) UCL	500.2	95% H-Stat (DL/2) UCL	237.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.445
		SD in Log Scale	4.674
		Mean in Original Scale	249.2
		SD in Original Scale	1029
		95% Percentile Bootstrap UCL	460.3
		95% BCA Bootstrap UCL	584.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.307	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	5278		
nu star	6.136		
A-D Test Statistic	0.503	**Nonparametric Statistics**	
5% A-D Critical Value	0.806	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.806	Mean	255.6
5% K-S Critical Value	0.286	SD	1021
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	133.6
		95% KM (t) UCL	478.6
Assuming Gamma Distribution		95% KM (z) UCL	475.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	467.7
Minimum	6	95% KM (bootstrap t) UCL	798.4
Maximum	6700	95% KM (BCA) UCL	498.8
Mean	1732	95% KM (Percentile Bootstrap) UCL	492.4
Median	1515	95% KM (Chebyshev) UCL	837.9
SD	1040	97.5% KM (Chebyshev) UCL	1090
k star	1.504	99% KM (Chebyshev) UCL	1585
Theta star	1152		
Nu star	195.5	**Potential UCLs to Use**	
AppChi2	164.2	95% KM (t) UCL	478.6
95% Gamma Approximate UCL	2063		
95% Adjusted Gamma UCL	2071		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	65	Number of Detected Data	29
Number of Distinct Detected Data	27	Number of Non-Detect Data	36
		Percent Non-Detects	55.38%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	54	Minimum Detected	3.989
Maximum Detected	18000	Maximum Detected	9.798
Mean of Detected	1578	Mean of Detected	6.335
SD of Detected	3476	SD of Detected	1.342
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.69%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.441	Lilliefors Test Statistic	0.972
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	741.6	Mean	4.776
SD	2422	SD	1.885
95% DL/2 (t) UCL	1243	95% H-Stat (DL/2) UCL	887.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	4.427
		SD in Log Scale	2.071
		Mean in Original Scale	719
		SD in Original Scale	2427
		95% Percentile Bootstrap UCL	1260
		95% BCA Bootstrap UCL	1617
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.561	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2811		
nu star	32.56		
A-D Test Statistic	1.65	**Nonparametric Statistics**	
5% A-D Critical Value	0.8	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.8	Mean	738.4
5% K-S Critical Value	0.171	SD	2403
Data not Gamma Distributed at 5% Significance Level		SE of Mean	303.4
		95% KM (t) UCL	1245
Assuming Gamma Distribution		95% KM (z) UCL	1237
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1237
Minimum	54	95% KM (bootstrap t) UCL	2543
Maximum	18000	95% KM (BCA) UCL	1252
Mean	1445	95% KM (Percentile Bootstrap) UCL	1245
Median	1000	95% KM (Chebyshev) UCL	2061
SD	2346	97.5% KM (Chebyshev) UCL	2633
k star	1.064	99% KM (Chebyshev) UCL	3757
Theta star	1359		
Nu star	138.3	**Potential UCLs to Use**	
AppChi2	112.1	95% KM (BCA) UCL	1252
95% Gamma Approximate UCL	1782		
95% Adjusted Gamma UCL	1791		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	65	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	54
		Percent Non-Detects	83.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.8	Minimum Detected	1.569
Maximum Detected	7100	Maximum Detected	8.868
Mean of Detected	2297	Mean of Detected	6.452
SD of Detected	2187	SD of Detected	2.596
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.69%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.901	Lilliefors Test Statistic	0.779
5% Lilliefors Critical Value	0.85	5% Lilliefors Critical Value	0.85
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	392.3	Mean	0.832
SD	1224	SD	2.956
95% DL/2 (t) UCL	645.7	95% H-Stat (DL/2) UCL	310.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.249
		SD in Log Scale	4.301
		Mean in Original Scale	389.2
		SD in Original Scale	1225
		95% Percentile Bootstrap UCL	662.1
		95% BCA Bootstrap UCL	735.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.42	**Data appear Normal at 5% Significance Level**	
Theta Star	5467		
nu star	9.244		
A-D Test Statistic	0.783	**Nonparametric Statistics**	
5% A-D Critical Value	0.782	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.782	Mean	392.7
5% K-S Critical Value	0.269	SD	1214
Data not Gamma Distributed at 5% Significance Level		SE of Mean	158
		95% KM (t) UCL	656.4
Assuming Gamma Distribution		95% KM (z) UCL	652.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	643
Minimum	1E-09	95% KM (bootstrap t) UCL	806.1
Maximum	7100	95% KM (BCA) UCL	1548
Mean	2142	95% KM (Percentile Bootstrap) UCL	839.4
Median	2319	95% KM (Chebyshev) UCL	1081
SD	1148	97.5% KM (Chebyshev) UCL	1379
k star	0.537	99% KM (Chebyshev) UCL	1965
Theta star	3991		
Nu star	69.75	**Potential UCLs to Use**	
AppChi2	51.52	95% KM (t) UCL	656.4
95% Gamma Approximate UCL	2899	95% KM (Percentile Bootstrap) UCL	839.4
95% Adjusted Gamma UCL	2919		

Note: DL/2 is not a recommended method.

Result (selenium)

General Statistics

Number of Valid Data	65	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	45
		Percent Non-Detects	69.23%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.01	Minimum Detected	0.00995
Maximum Detected	13.4	Maximum Detected	2.595
Mean of Detected	2.578	Mean of Detected	0.727
SD of Detected	2.65	SD of Detected	0.578
Minimum Non-Detect	0.785	Minimum Non-Detect	-0.242
Maximum Non-Detect	1.01	Maximum Non-Detect	0.00995
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	45
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	20
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.23%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.484	Lilliefors Test Statistic	0.848
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.093	Mean	-0.356
SD	1.755	SD	0.794
95% DL/2 (t) UCL	1.457	95% H-Stat (DL/2) UCL	0.937
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.512
		SD in Log Scale	0.906
		Mean in Original Scale	1.037
		SD in Original Scale	1.777
		95% Percentile Bootstrap UCL	1.426
		95% BCA Bootstrap UCL	1.612
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.099	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.228		
nu star	83.94		
A-D Test Statistic	1.528	**Nonparametric Statistics**	
5% A-D Critical Value	0.75	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.75	Mean	1.492
5% K-S Critical Value	0.196	SD	1.605
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.204
		95% KM (t) UCL	1.833
Assuming Gamma Distribution		95% KM (z) UCL	1.828
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.804
Minimum	1.01	95% KM (bootstrap t) UCL	2.317
Maximum	13.4	95% KM (BCA) UCL	1.906
Mean	2.577	95% KM (Percentile Bootstrap) UCL	1.912
Median	2.579	95% KM (Chebyshev) UCL	2.383
SD	1.445	97.5% KM (Chebyshev) UCL	2.768
k star	7.202	99% KM (Chebyshev) UCL	3.525
Theta star	0.358		
Nu star	936.3	**Potential UCLs to Use**	
AppChi2	866.3	95% KM (t) UCL	1.833
95% Gamma Approximate UCL	2.785	95% KM (% Bootstrap) UCL	1.912
95% Adjusted Gamma UCL	2.79		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics

Number of Valid Data	65	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	59
		Percent Non-Detects	90.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	7.8	Maximum Detected	2.054
Mean of Detected	4.95	Mean of Detected	1.529
SD of Detected	1.936	SD of Detected	0.425
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	2400	Maximum Non-Detect	7.783
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	65
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.955	Lilliefors Test Statistic	0.935
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	64.03	Mean	0.704
SD	195.9	SD	2.366
95% DL/2 (t) UCL	104.6	95% H-Stat (DL/2) UCL	91.98
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.49
		SD in Log Scale	0.835
		Mean in Original Scale	0.974
		SD in Original Scale	1.415
		95% Percentile Bootstrap UCL	1.266
		95% BCA Bootstrap UCL	1.338

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.723	**Data appear Normal at 5% Significance Level**	
Theta Star	1.33		
nu star	44.68		
A-D Test Statistic	0.299	**Nonparametric Statistics**	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	2.783
5% K-S Critical Value	0.333	SD	0.986
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.15
		95% KM (t) UCL	3.033
Assuming Gamma Distribution		95% KM (z) UCL	3.029
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.178
Minimum	2.365	95% KM (bootstrap t) UCL	3.032
Maximum	7.8	95% KM (BCA) UCL	5.321
Mean	4.971	95% KM (Percentile Bootstrap) UCL	5.217
Median	5.341	95% KM (Chebyshev) UCL	3.436
SD	1.091	97.5% KM (Chebyshev) UCL	3.718
k star	16.99	99% KM (Chebyshev) UCL	4.274
Theta star	0.293		
Nu star	2209	**Potential UCLs to Use**	
AppChi2	2101	95% KM (t) UCL	3.033
95% Gamma Approximate UCL	5.227	95% KM (Percentile Bootstrap) UCL	5.217
95% Adjusted Gamma UCL	5.233		

Note: DL/2 is not a recommended method.

Result (vanadium)			
General Statistics			
Number of Valid Observations	65	Number of Distinct Observations	58
Raw Statistics		**Log-transformed Statistics**	
Minimum	17.7	Minimum of Log Data	2.874
Maximum	128	Maximum of Log Data	4.852
Mean	45.31	Mean of log Data	3.75
Median	47.7	SD of log Data	0.368
SD	16.56		
Coefficient of Variation	0.365		
Skewness	1.697		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.154	Lilliefors Test Statistic	0.174
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	48.73	95% H-UCL	49.37
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	54.74
95% Adjusted-CLT UCL	49.15	97.5% Chebyshev (MVUE) UCL	58.76
95% Modified-t UCL	48.81	99% Chebyshev (MVUE) UCL	66.67
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.663	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	5.912		
nu star	996.2		
Approximate Chi Square Value (.05)	923.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	48.68
Adjusted Chi Square Value	922.4	95% Jackknife UCL	48.73
		95% Standard Bootstrap UCL	48.71
Anderson-Darling Test Statistic	1.907	95% Bootstrap-t UCL	49.15
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	50.07
Kolmogorov-Smirnov Test Statistic	0.155	95% Percentile Bootstrap UCL	48.91
Kolmogorov-Smirnov 5% Critical Value	0.111	95% BCA Bootstrap UCL	49.28
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	54.26
		97.5% Chebyshev(Mean, Sd) UCL	58.13
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	65.74
95% Approximate Gamma UCL	48.85		
95% Adjusted Gamma UCL	48.93		
Potential UCL to Use		Use 95% Student's-t UCL	48.73
		or 95% Modified-t UCL	48.81

Result (xylenes, total)

General Statistics

Number of Valid Data	65	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	55
		Percent Non-Detects	84.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	14.4	Minimum Detected	2.667
Maximum Detected	184000	Maximum Detected	12.12
Mean of Detected	48671	Mean of Detected	7.892
SD of Detected	70191	SD of Detected	3.886
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	2200	Maximum Non-Detect	7.696
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	59
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.77%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.731	Lilliefors Test Statistic	0.85
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7524	Mean	1.737
SD	31710	SD	3.394
95% DL/2 (t) UCL	14089	95% H-Stat (DL/2) UCL	5192
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.738
		SD in Log Scale	7.339
		Mean in Original Scale	7488
		SD in Original Scale	31718
		95% Percentile Bootstrap UCL	14324
		95% BCA Bootstrap UCL	17670
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.239	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	204042		
nu star	4.771		
A-D Test Statistic	0.471	**Nonparametric Statistics**	
5% A-D Critical Value	0.836	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.836	Mean	7501
5% K-S Critical Value	0.291	SD	31470
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4115
		95% KM (t) UCL	14368
Assuming Gamma Distribution		95% KM (z) UCL	14268
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	14062
Minimum	14.4	95% KM (bootstrap t) UCL	25951
Maximum	184000	95% KM (BCA) UCL	15739
Mean	47947	95% KM (Percentile Bootstrap) UCL	14412
Median	41674	95% KM (Chebyshev) UCL	25435
SD	29352	97.5% KM (Chebyshev) UCL	33196
k star	1.145	99% KM (Chebyshev) UCL	48439
Theta star	41864		
Nu star	148.9	**Potential UCLs to Use**	
AppChi2	121.7	95% KM (t) UCL	14368
95% Gamma Approximate UCL	58665		
95% Adjusted Gamma UCL	58934		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	65	Number of Distinct Observations	65

Raw Statistics		**Log-transformed Statistics**	
Minimum	25.9	Minimum of Log Data	3.254
Maximum	1810	Maximum of Log Data	7.501
Mean	163.8	Mean of log Data	4.64
Median	86	SD of log Data	0.764
SD	274.1		
Coefficient of Variation	1.673		
Skewness	4.46		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.361	Lilliefors Test Statistic	0.242
Lilliefors Critical Value	0.11	Lilliefors Critical Value	0.11
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	220.6	95% H-UCL	168.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	201.5
95% Adjusted-CLT UCL	239.8	97.5% Chebyshev (MVUE) UCL	229
95% Modified-t UCL	223.7	99% Chebyshev (MVUE) UCL	283
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.183	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	138.5		
nu star	153.8		
Approximate Chi Square Value (.05)	126.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0463	95% CLT UCL	219.7
Adjusted Chi Square Value	125.6	95% Jackknife UCL	220.6
		95% Standard Bootstrap UCL	218.9
Anderson-Darling Test Statistic	8.998	95% Bootstrap-t UCL	277.3
Anderson-Darling 5% Critical Value	0.775	95% Hall's Bootstrap UCL	294.8
Kolmogorov-Smirnov Test Statistic	0.315	95% Percentile Bootstrap UCL	222.6
Kolmogorov-Smirnov 5% Critical Value	0.113	95% BCA Bootstrap UCL	244.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	312
		97.5% Chebyshev(Mean, Sd) UCL	376.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	502.1
95% Approximate Gamma UCL	199.8		
95% Adjusted Gamma UCL	200.7		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	312

Result (1,2,4-trimethylbenzene)			
General Statistics			
Number of Valid Data	190	Number of Detected Data	26
Number of Distinct Detected Data	26	Number of Non-Detect Data	164
		Percent Non-Detects	86.32%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.375	Minimum Detected	0.318
Maximum Detected	410000	Maximum Detected	12.92
Mean of Detected	30585	Mean of Detected	5.656
SD of Detected	91946	SD of Detected	3.933
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	184
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.84%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.385	Lilliefors Test Statistic	0.939
5% Lilliefors Critical Value	0.92	5% Lilliefors Critical Value	0.92
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4215	Mean	1.656
SD	35059	SD	2.467
95% DL/2 (t) UCL	8419	95% H-Stat (DL/2) UCL	138.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.131
		SD in Log Scale	5.973
		Mean in Original Scale	4186
		SD in Original Scale	35062
		95% Percentile Bootstrap UCL	8811
		95% BCA Bootstrap UCL	11825
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.169	**Data appear Lognormal at 5% Significance Level**	
Theta Star	180509		
nu star	8.811		
A-D Test Statistic	1.523	**Nonparametric Statistics**	
5% A-D Critical Value	0.911	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.911	Mean	4187
5% K-S Critical Value	0.191	SD	34969
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2587
		95% KM (t) UCL	8464
Assuming Gamma Distribution		95% KM (z) UCL	8443
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8392
Minimum	1.375	95% KM (bootstrap t) UCL	34367
Maximum	410000	95% KM (BCA) UCL	9333
Mean	41790	95% KM (Percentile Bootstrap) UCL	8795
Median	18679	95% KM (Chebyshev) UCL	15465
SD	59264	97.5% KM (Chebyshev) UCL	20344
k star	0.61	99% KM (Chebyshev) UCL	29929
Theta star	68524		
Nu star	231.7	**Potential UCLs to Use**	
AppChi2	197.5	97.5% KM (Chebyshev) UCL	20344
95% Gamma Approximate UCL	49034		
95% Adjusted Gamma UCL	49094		
Note: DL/2 is not a recommended method.			

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	190	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	176
		Percent Non-Detects	92.63%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	120000	Maximum Detected	11.7
Mean of Detected	18941	Mean of Detected	5.967
SD of Detected	38928	SD of Detected	3.71
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	186
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.89%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.563	Lilliefors Test Statistic	0.934
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1443	Mean	1.532
SD	11348	SD	2.187
95% DL/2 (t) UCL	2804	95% H-Stat (DL/2) UCL	68.5
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	83153	Mean in Log Scale	-11.68
SD	43826	SD in Log Scale	8.38
95% MLE (t) UCL	88409	Mean in Original Scale	1396
95% MLE (Tiku) UCL	118747	SD in Original Scale	11351
		95% Percentile Bootstrap UCL	2902
		95% BCA Bootstrap UCL	3693
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.198	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	95841		
nu star	5.534		
A-D Test Statistic	0.835	**Nonparametric Statistics**	
5% A-D Critical Value	0.877	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.877	Mean	1398
5% K-S Critical Value	0.253	SD	11321
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	852.3
		95% KM (t) UCL	2807
Assuming Gamma Distribution		95% KM (z) UCL	2800
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2756
Minimum	1E-09	95% KM (bootstrap t) UCL	8001
Maximum	120000	95% KM (BCA) UCL	3070
Mean	17257	95% KM (Percentile Bootstrap) UCL	2843
Median	21216	95% KM (Chebyshev) UCL	5113
SD	13043	97.5% KM (Chebyshev) UCL	6721
k star	0.183	99% KM (Chebyshev) UCL	9878
Theta star	94085		
Nu star	69.7	**Potential UCLs to Use**	
AppChi2	51.48	95% KM (t) UCL	2807
95% Gamma Approximate UCL	23364		
95% Adjusted Gamma UCL	23418		

Note: DL/2 is not a recommended method.

Result (1-methylnaphthalene)

General Statistics

Number of Valid Data	82	Number of Detected Data	14
Number of Distinct Detected Data	13	Number of Non-Detect Data	68
		Percent Non-Detects	82.93%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	27	Minimum Detected	3.296
Maximum Detected	32000	Maximum Detected	10.37
Mean of Detected	7508	Mean of Detected	7.285
SD of Detected	9201	SD of Detected	2.62
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	440	Maximum Non-Detect	6.087
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	72
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.807	Lilliefors Test Statistic	0.852
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1338	Mean	4.348
SD	4640	SD	1.966
95% DL/2 (t) UCL	2190	95% H-Stat (DL/2) UCL	663.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.455
		SD in Log Scale	4.696
		Mean in Original Scale	1285
		SD in Original Scale	4654
		95% Percentile Bootstrap UCL	2200
		95% BCA Bootstrap UCL	2542
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.363	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	20682		
nu star	10.16		
A-D Test Statistic	0.601	**Nonparametric Statistics**	
5% A-D Critical Value	0.812	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.812	Mean	1305
5% K-S Critical Value	0.245	SD	4620
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	529.5
		95% KM (t) UCL	2186
Assuming Gamma Distribution		95% KM (z) UCL	2176
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2160
Minimum	27	95% KM (bootstrap t) UCL	2860
Maximum	32000	95% KM (BCA) UCL	2282
Mean	7790	95% KM (Percentile Bootstrap) UCL	2212
Median	7345	95% KM (Chebyshev) UCL	3613
SD	3874	97.5% KM (Chebyshev) UCL	4612
k star	1.813	99% KM (Chebyshev) UCL	6573
Theta star	4297		
Nu star	297.3	**Potential UCLs to Use**	
AppChi2	258.4	95% KM (t) UCL	2186
95% Gamma Approximate UCL	8964		
95% Adjusted Gamma UCL	8987		

Note: DL/2 is not a recommended method.

Result (2-butanone)

General Statistics

Number of Valid Data	190	Number of Detected Data	13
Number of Distinct Detected Data	11	Number of Non-Detect Data	177
		Percent Non-Detects	93.16%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	23	Minimum Detected	3.135
Maximum Detected	160	Maximum Detected	5.075
Mean of Detected	45.19	Mean of Detected	3.647
SD of Detected	36.45	SD of Detected	0.517
Minimum Non-Detect	11	Minimum Non-Detect	2.398
Maximum Non-Detect	125000	Maximum Non-Detect	11.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	190
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.57	Lilliefors Test Statistic	0.795
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1171	Mean	4.16
SD	5493	SD	1.878
95% DL/2 (t) UCL	1830	95% H-Stat (DL/2) UCL	666.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.236
		SD in Log Scale	0.82
		Mean in Original Scale	13.49
		SD in Original Scale	15.94
		95% Percentile Bootstrap UCL	15.39
		95% BCA Bootstrap UCL	15.89
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.518	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	17.95		
nu star	65.47		
A-D Test Statistic	1.408	**Nonparametric Statistics**	
5% A-D Critical Value	0.739	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.739	Mean	26.12
5% K-S Critical Value	0.238	SD	12.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.229
		95% KM (t) UCL	28.15
Assuming Gamma Distribution		95% KM (z) UCL	28.14
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	27.72
Minimum	20.83	95% KM (bootstrap t) UCL	29.21
Maximum	160	95% KM (BCA) UCL	34.38
Mean	39.92	95% KM (Percentile Bootstrap) UCL	29.57
Median	36.81	95% KM (Chebyshev) UCL	31.47
SD	14.29	97.5% KM (Chebyshev) UCL	33.79
k star	10.36	99% KM (Chebyshev) UCL	38.34
Theta star	3.852		
Nu star	3938	**Potential UCLs to Use**	
AppChi2	3793	95% KM (t) UCL	28.15
95% Gamma Approximate UCL	41.44	95% KM (% Bootstrap) UCL	29.57
95% Adjusted Gamma UCL	41.45		

Note: DL/2 is not a recommended method.

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	82	Number of Detected Data	14
Number of Distinct Detected Data	12	Number of Non-Detect Data	68
		Percent Non-Detects	82.93%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	34	Minimum Detected	3.526
Maximum Detected	36000	Maximum Detected	10.49
Mean of Detected	11308	Mean of Detected	7.517
SD of Detected	13762	SD of Detected	2.712
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	440	Maximum Non-Detect	6.087
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	73
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.02%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.789	Lilliefors Test Statistic	0.857
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1986	Mean	4.388
SD	6965	SD	2.046
95% DL/2 (t) UCL	3266	95% H-Stat (DL/2) UCL	829.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.738
		SD in Log Scale	4.979
		Mean in Original Scale	1933
		SD in Original Scale	6980
		95% Percentile Bootstrap UCL	3241
		95% BCA Bootstrap UCL	3665
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.336	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	33625		
nu star	9.416		
A-D Test Statistic	0.639	**Nonparametric Statistics**	
5% A-D Critical Value	0.819	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.819	Mean	1959
5% K-S Critical Value	0.246	SD	6930
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	794.1
		95% KM (t) UCL	3280
Assuming Gamma Distribution		95% KM (z) UCL	3265
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3238
Minimum	34	95% KM (bootstrap t) UCL	3877
Maximum	36000	95% KM (BCA) UCL	3412
Mean	11692	95% KM (Percentile Bootstrap) UCL	3343
Median	10852	95% KM (Chebyshev) UCL	5421
SD	5791	97.5% KM (Chebyshev) UCL	6918
k star	1.655	99% KM (Chebyshev) UCL	9861
Theta star	7065		
Nu star	271.4	**Potential UCLs to Use**	
AppChi2	234.3	95% KM (t) UCL	3280
95% Gamma Approximate UCL	13546		
95% Adjusted Gamma UCL	13581		

Note: DL/2 is not a recommended method.

Result (acenaphthene)

General Statistics

Number of Valid Data	190	Number of Detected Data	31
Number of Distinct Detected Data	29	Number of Non-Detect Data	159
		Percent Non-Detects	83.68%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	2500	Maximum Detected	7.824
Mean of Detected	489.9	Mean of Detected	4.915
SD of Detected	717.3	SD of Detected	1.796
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	189
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.699	Lilliefors Test Statistic	0.957
5% Lilliefors Critical Value	0.929	5% Lilliefors Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	117.4	Mean	3.147
SD	344.2	SD	1.567
95% DL/2 (t) UCL	158.6	95% H-Stat (DL/2) UCL	85.83
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.326
		SD in Log Scale	2.399
		Mean in Original Scale	85.08
		SD in Original Scale	337.5
		95% Percentile Bootstrap UCL	128.2
		95% BCA Bootstrap UCL	138.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.47	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1041		
nu star	29.17		
A-D Test Statistic	1.115	**Nonparametric Statistics**	
5% A-D Critical Value	0.81	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.81	Mean	87.01
5% K-S Critical Value	0.167	SD	337.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	24.96
		95% KM (t) UCL	128.3
Assuming Gamma Distribution		95% KM (z) UCL	128.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	127.8
Minimum	3.75	95% KM (bootstrap t) UCL	144.7
Maximum	3453	95% KM (BCA) UCL	138
Mean	1109	95% KM (Percentile Bootstrap) UCL	132.4
Median	942.2	95% KM (Chebyshev) UCL	195.8
SD	804.8	97.5% KM (Chebyshev) UCL	242.9
k star	1.301	99% KM (Chebyshev) UCL	335.3
Theta star	852.2		
Nu star	494.4	**Potential UCLs to Use**	
AppChi2	443.8	95% KM (Chebyshev) UCL	195.8
95% Gamma Approximate UCL	1235		
95% Adjusted Gamma UCL	1236		

Note: DL/2 is not a recommended method.

Result (acenaphthylene)

General Statistics

Number of Valid Data	190	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	182
		Percent Non-Detects	95.79%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.875	Minimum Detected	1.056
Maximum Detected	280	Maximum Detected	5.635
Mean of Detected	57.2	Mean of Detected	3.114
SD of Detected	92.41	SD of Detected	1.485
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	190
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.621	Lilliefors Test Statistic	0.965
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	51.83	Mean	2.937
SD	111.7	SD	1.317
95% DL/2 (t) UCL	65.22	95% H-Stat (DL/2) UCL	56.76
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.595
		SD in Log Scale	0.967
		Mean in Original Scale	8.746
		SD in Original Scale	21.27
		95% Percentile Bootstrap UCL	11.58
		95% BCA Bootstrap UCL	13.67
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.492	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	116.2		
nu star	7.878		
A-D Test Statistic	0.407	**Nonparametric Statistics**	
5% A-D Critical Value	0.752	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.752	Mean	7.848
5% K-S Critical Value	0.306	SD	21.27
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.984
		95% KM (t) UCL	11.13
Assuming Gamma Distribution		95% KM (z) UCL	11.11
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.38
Minimum	1E-09	95% KM (bootstrap t) UCL	14.12
Maximum	280	95% KM (BCA) UCL	22.27
Mean	34.7	95% KM (Percentile Bootstrap) UCL	14.19
Median	33.46	95% KM (Chebyshev) UCL	16.5
SD	33.04	97.5% KM (Chebyshev) UCL	20.24
k star	0.125	99% KM (Chebyshev) UCL	27.59
Theta star	276.6		
Nu star	47.66	**Potential UCLs to Use**	
AppChi2	32.81	95% KM (t) UCL	11.13
95% Gamma Approximate UCL	50.39		
95% Adjusted Gamma UCL	50.54		

Note: DL/2 is not a recommended method.

Result (acetone)

General Statistics

Number of Valid Data	190	Number of Detected Data	36
Number of Distinct Detected Data	27	Number of Non-Detect Data	154
		Percent Non-Detects	81.05%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	48	Minimum Detected	3.871
Maximum Detected	250	Maximum Detected	5.521
Mean of Detected	105.2	Mean of Detected	4.567
SD of Detected	48.23	SD of Detected	0.414
Minimum Non-Detect	28	Minimum Non-Detect	3.332
Maximum Non-Detect	120000	Maximum Non-Detect	11.7
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	190
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.873	Lilliefors Test Statistic	0.962
5% Lilliefors Critical Value	0.935	5% Lilliefors Critical Value	0.935
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1526	Mean	4.427
SD	6373	SD	1.846
95% DL/2 (t) UCL	2290	95% H-Stat (DL/2) UCL	866.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.53
		SD in Log Scale	0.706
		Mean in Original Scale	44.3
		SD in Original Scale	38.12
		95% Percentile Bootstrap UCL	49.13
		95% BCA Bootstrap UCL	49.16
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.371	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	19.58		
nu star	386.7		
A-D Test Statistic	0.655	**Nonparametric Statistics**	
5% A-D Critical Value	0.75	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.75	Mean	62.27
5% K-S Critical Value	0.147	SD	32.72
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.705
		95% KM (t) UCL	66.74
Assuming Gamma Distribution		95% KM (z) UCL	66.72
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	66.16
Minimum	48	95% KM (bootstrap t) UCL	67.12
Maximum	250	95% KM (BCA) UCL	72.79
Mean	97.03	95% KM (Percentile Bootstrap) UCL	70.39
Median	90.32	95% KM (Chebyshev) UCL	74.06
SD	27.38	97.5% KM (Chebyshev) UCL	79.16
k star	15.35	99% KM (Chebyshev) UCL	89.18
Theta star	6.321		
Nu star	5833	**Potential UCLs to Use**	
AppChi2	5657	95% KM (t) UCL	66.74
95% Gamma Approximate UCL	100.1		
95% Adjusted Gamma UCL	100.1		

Note: DL/2 is not a recommended method.

Result (anthracene)

General Statistics

Number of Valid Data	190	Number of Detected Data	31
Number of Distinct Detected Data	29	Number of Non-Detect Data	159
		Percent Non-Detects	83.68%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	6500	Maximum Detected	8.78
Mean of Detected	842.3	Mean of Detected	4.776
SD of Detected	1666	SD of Detected	2.202
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	185
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.37%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.562	Lilliefors Test Statistic	0.943
5% Lilliefors Critical Value	0.929	5% Lilliefors Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	169.2	Mean	3.124
SD	729.6	SD	1.591
95% DL/2 (t) UCL	256.7	95% H-Stat (DL/2) UCL	91.07
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.773
		SD in Log Scale	2.195
		Mean in Original Scale	145
		SD in Original Scale	732
		95% Percentile Bootstrap UCL	232.2
		95% BCA Bootstrap UCL	271.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.332	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2536		
nu star	20.59		
A-D Test Statistic	1.514	**Nonparametric Statistics**	
5% A-D Critical Value	0.845	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.845	Mean	143.8
5% K-S Critical Value	0.17	SD	730.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	53.87
		95% KM (t) UCL	232.9
Assuming Gamma Distribution		95% KM (z) UCL	232.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	231.6
Minimum	1E-09	95% KM (bootstrap t) UCL	296.3
Maximum	6500	95% KM (BCA) UCL	240.6
Mean	674.5	95% KM (Percentile Bootstrap) UCL	238.4
Median	708.7	95% KM (Chebyshev) UCL	378.6
SD	708.6	97.5% KM (Chebyshev) UCL	480.2
k star	0.693	99% KM (Chebyshev) UCL	679.8
Theta star	973.9		
Nu star	263.2	**Potential UCLs to Use**	
AppChi2	226.6	97.5% KM (Chebyshev) UCL	480.2
95% Gamma Approximate UCL	783.4		
95% Adjusted Gamma UCL	784.3		

Note: DL/2 is not a recommended method.

Result (antimony)

General Statistics

Number of Valid Data	91	Number of Detected Data	33
Number of Distinct Detected Data	32	Number of Non-Detect Data	58
		Percent Non-Detects	63.74%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.877	Minimum Detected	-0.131
Maximum Detected	9.813	Maximum Detected	2.284
Mean of Detected	3.604	Mean of Detected	1.046
SD of Detected	2.459	SD of Detected	0.713
Minimum Non-Detect	0.785	Minimum Non-Detect	-0.242
Maximum Non-Detect	4.55	Maximum Non-Detect	1.515
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.91%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.886	Lilliefors Test Statistic	0.945
5% Lilliefors Critical Value	0.931	5% Lilliefors Critical Value	0.931
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.805	Mean	0.0832
SD	2.057	SD	0.977
95% DL/2 (t) UCL	2.164	95% H-Stat (DL/2) UCL	1.727
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.101
		SD in Log Scale	1.014
		Mean in Original Scale	1.632
		SD in Original Scale	2.105
		95% Percentile Bootstrap UCL	2.011
		95% BCA Bootstrap UCL	2.076
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.085	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1.728		
nu star	137.6		
A-D Test Statistic	0.633	**Nonparametric Statistics**	
5% A-D Critical Value	0.758	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.758	Mean	1.916
5% K-S Critical Value	0.155	SD	1.953
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.21
		95% KM (t) UCL	2.265
Assuming Gamma Distribution		95% KM (z) UCL	2.261
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.241
Minimum	0.877	95% KM (bootstrap t) UCL	2.285
Maximum	9.813	95% KM (BCA) UCL	2.325
Mean	3.691	95% KM (Percentile Bootstrap) UCL	2.325
Median	3.567	95% KM (Chebyshev) UCL	2.83
SD	1.523	97.5% KM (Chebyshev) UCL	3.226
k star	5.444	99% KM (Chebyshev) UCL	4.003
Theta star	0.678		
Nu star	990.7	**Potential UCLs to Use**	
AppChi2	918.7	95% KM (t) UCL	2.265
95% Gamma Approximate UCL	3.981		
95% Adjusted Gamma UCL	3.986		

Note: DL/2 is not a recommended method.

Result (arsenic)

General Statistics

Number of Valid Data	101	Number of Detected Data	86
Number of Distinct Detected Data	80	Number of Non-Detect Data	15
		Percent Non-Detects	14.85%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.538	Minimum Detected	0.43
Maximum Detected	28.13	Maximum Detected	3.337
Mean of Detected	7.425	Mean of Detected	1.902
SD of Detected	3.687	SD of Detected	0.461
Minimum Non-Detect	1.25	Minimum Non-Detect	0.223
Maximum Non-Detect	6.07	Maximum Non-Detect	1.803
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	46
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	55
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	45.54%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.119	Lilliefors Test Statistic	0.12
5% Lilliefors Critical Value	0.0955	5% Lilliefors Critical Value	0.0955
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.48	Mean	1.604
SD	4.099	SD	0.857
95% DL/2 (t) UCL	7.158	95% H-Stat (DL/2) UCL	8.205
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.012	Mean in Log Scale	1.761
SD	4.658	SD in Log Scale	0.549
95% MLE (t) UCL	6.782	Mean in Original Scale	6.714
95% MLE (Tiku) UCL	6.921	SD in Original Scale	3.811
		95% Percentile Bootstrap UCL	7.324
		95% BCA Bootstrap UCL	7.45
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.852	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	1.53		
nu star	834.6		
A-D Test Statistic	0.691	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	6.585
5% K-S Critical Value	0.0966	SD	3.947
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.396
		95% KM (t) UCL	7.241
Assuming Gamma Distribution		95% KM (z) UCL	7.235
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.182
Minimum	1E-09	95% KM (bootstrap t) UCL	7.278
Maximum	28.13	95% KM (BCA) UCL	7.412
Mean	6.725	95% KM (Percentile Bootstrap) UCL	7.274
Median	6.35	95% KM (Chebyshev) UCL	8.309
SD	3.835	97.5% KM (Chebyshev) UCL	9.055
k star	1.481	99% KM (Chebyshev) UCL	10.52
Theta star	4.542		
Nu star	299.1	**Potential UCLs to Use**	
AppChi2	260.1	95% KM (BCA) UCL	7.412
95% Gamma Approximate UCL	7.735		
95% Adjusted Gamma UCL	7.751		

Note: DL/2 is not a recommended method.

Result (barium)

General Statistics

Number of Valid Observations	101	Number of Distinct Observations	88

Raw Statistics		**Log-transformed Statistics**	
Minimum	56.3	Minimum of Log Data	4.031
Maximum	850	Maximum of Log Data	6.745
Mean	186.4	Mean of log Data	5.155
Median	180	SD of log Data	0.38
SD	84.79		
Coefficient of Variation	0.455		
Skewness	4.731		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.16	Lilliefors Test Statistic	0.134
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	200.4	95% H-UCL	199.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	217.9
95% Adjusted-CLT UCL	204.5	97.5% Chebyshev (MVUE) UCL	231.6
95% Modified-t UCL	201	99% Chebyshev (MVUE) UCL	258.5
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.85	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	27.21		
nu star	1384		
Approximate Chi Square Value (.05)	1298	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	200.3
Adjusted Chi Square Value	1297	95% Jackknife UCL	200.4
		95% Standard Bootstrap UCL	200.3
Anderson-Darling Test Statistic	2.137	95% Bootstrap-t UCL	205.9
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	269.9
Kolmogorov-Smirnov Test Statistic	0.115	95% Percentile Bootstrap UCL	200.5
Kolmogorov-Smirnov 5% Critical Value	0.0893	95% BCA Bootstrap UCL	205
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	223.2
		97.5% Chebyshev(Mean, Sd) UCL	239.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	270.3
95% Approximate Gamma UCL	198.6		
95% Adjusted Gamma UCL	198.8		
Potential UCL to Use		Use 95% Student's-t UCL	200.4
		or 95% Modified-t UCL	201

Result (benzene)

General Statistics

Number of Valid Data	190	Number of Detected Data	41
Number of Distinct Detected Data	36	Number of Non-Detect Data	149
		Percent Non-Detects	78.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.96	Minimum Detected	-0.0408
Maximum Detected	100000	Maximum Detected	11.51
Mean of Detected	3145	Mean of Detected	2.923
SD of Detected	15727	SD of Detected	2.96
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	187
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.42%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.217	Lilliefors Test Statistic	0.844
5% Lilliefors Critical Value	0.941	5% Lilliefors Critical Value	0.941
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	717.6	Mean	1.352
SD	7351	SD	2.228
95% DL/2 (t) UCL	1599	95% H-Stat (DL/2) UCL	65.38
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	70950	Mean in Log Scale	-2.916
SD	41413	SD in Log Scale	4.386
95% MLE (t) UCL	75916	Mean in Original Scale	678.9
95% MLE (Tiku) UCL	109466	SD in Original Scale	7350
		95% Percentile Bootstrap UCL	1722
		95% BCA Bootstrap UCL	2635
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.155	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	20271		
nu star	12.72		
A-D Test Statistic	6.624	**Nonparametric Statistics**	
5% A-D Critical Value	0.934	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.934	Mean	680.2
5% K-S Critical Value	0.155	SD	7331
Data not Gamma Distributed at 5% Significance Level		SE of Mean	538.5
		95% KM (t) UCL	1570
Assuming Gamma Distribution		95% KM (z) UCL	1566
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1562
Minimum	0.96	95% KM (bootstrap t) UCL	5775
Maximum	100000	95% KM (BCA) UCL	1733
Mean	4534	95% KM (Percentile Bootstrap) UCL	1721
Median	2819	95% KM (Chebyshev) UCL	3027
SD	8507	97.5% KM (Chebyshev) UCL	4043
k star	0.483	99% KM (Chebyshev) UCL	6038
Theta star	9390		
Nu star	183.5	**Potential UCLs to Use**	
AppChi2	153.2	97.5% KM (Chebyshev) UCL	4043
95% Gamma Approximate UCL	5432		
95% Adjusted Gamma UCL	5440		

Note: DL/2 is not a recommended method.

Result (benzo(a)anthracene)

General Statistics

Number of Valid Data	190	Number of Detected Data	49
Number of Distinct Detected Data	45	Number of Non-Detect Data	141
		Percent Non-Detects	74.21%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	11000	Maximum Detected	9.306
Mean of Detected	632.3	Mean of Detected	4.662
SD of Detected	1831	SD of Detected	1.922
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	187
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.42%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.365	Lilliefors Test Statistic	0.962
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	192.9	Mean	3.25
SD	960.9	SD	1.661
95% DL/2 (t) UCL	308.2	95% H-Stat (DL/2) UCL	118.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.245
		SD in Log Scale	2.142
		Mean in Original Scale	169.8
		SD in Original Scale	962.4
		95% Percentile Bootstrap UCL	299.1
		95% BCA Bootstrap UCL	360.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.363	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1741		
nu star	35.59		
A-D Test Statistic	2.638	**Nonparametric Statistics**	
5% A-D Critical Value	0.845	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.845	Mean	169.7
5% K-S Critical Value	0.136	SD	960.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	70.39
		95% KM (t) UCL	286
Assuming Gamma Distribution		95% KM (z) UCL	285.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	285.2
Minimum	3.125	95% KM (bootstrap t) UCL	581.6
Maximum	11000	95% KM (BCA) UCL	317.6
Mean	1172	95% KM (Percentile Bootstrap) UCL	283.7
Median	661.9	95% KM (Chebyshev) UCL	476.5
SD	1347	97.5% KM (Chebyshev) UCL	609.3
k star	0.791	99% KM (Chebyshev) UCL	870.1
Theta star	1482		
Nu star	300.6	**Potential UCLs to Use**	
AppChi2	261.4	95% KM (Chebyshev) UCL	476.5
95% Gamma Approximate UCL	1348		
95% Adjusted Gamma UCL	1349		

Note: DL/2 is not a recommended method.

Result (benzo(a)pyrene)

General Statistics

Number of Valid Data	189	Number of Detected Data	47
Number of Distinct Detected Data	41	Number of Non-Detect Data	142
		Percent Non-Detects	75.13%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	5900	Maximum Detected	8.683
Mean of Detected	471.7	Mean of Detected	4.506
SD of Detected	1154	SD of Detected	1.899
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	186
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.41%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.431	Lilliefors Test Statistic	0.966
5% Lilliefors Critical Value	0.946	5% Lilliefors Critical Value	0.946
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	148.4	Mean	3.211
SD	604.2	SD	1.615
95% DL/2 (t) UCL	221	95% H-Stat (DL/2) UCL	107.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.977
		SD in Log Scale	2.178
		Mean in Original Scale	122.9
		SD in Original Scale	605.1
		95% Percentile Bootstrap UCL	206
		95% BCA Bootstrap UCL	230.1
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.388	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1217		
nu star	36.44		
A-D Test Statistic	2.012	**Nonparametric Statistics**	
5% A-D Critical Value	0.838	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.838	Mean	123.4
5% K-S Critical Value	0.138	SD	603.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	44.42
		95% KM (t) UCL	196.8
Assuming Gamma Distribution		95% KM (z) UCL	196.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	196.2
Minimum	3.125	95% KM (bootstrap t) UCL	363.1
Maximum	5900	95% KM (BCA) UCL	214.4
Mean	946.5	95% KM (Percentile Bootstrap) UCL	201.7
Median	612	95% KM (Chebyshev) UCL	317
SD	992.6	97.5% KM (Chebyshev) UCL	400.8
k star	0.813	99% KM (Chebyshev) UCL	565.4
Theta star	1164		
Nu star	307.3	**Potential UCLs to Use**	
AppChi2	267.7	95% KM (Chebyshev) UCL	317
95% Gamma Approximate UCL	1087		
95% Adjusted Gamma UCL	1088		

Note: DL/2 is not a recommended method.

Result (benzo(b)fluoranthene)

General Statistics

Number of Valid Data	189	Number of Detected Data	41
Number of Distinct Detected Data	33	Number of Non-Detect Data	148
		Percent Non-Detects	78.31%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	3800	Maximum Detected	8.243
Mean of Detected	293	Mean of Detected	4.03
SD of Detected	710	SD of Detected	1.884
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	187
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.94%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.436	Lilliefors Test Statistic	0.945
5% Lilliefors Critical Value	0.941	5% Lilliefors Critical Value	0.941
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	103.9	Mean	3.147
SD	358.3	SD	1.522
95% DL/2 (t) UCL	147	95% H-Stat (DL/2) UCL	87.66
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.941
		SD in Log Scale	1.83
		Mean in Original Scale	69.71
		SD in Original Scale	348.2
		95% Percentile Bootstrap UCL	114.7
		95% BCA Bootstrap UCL	134.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.386	**Data appear Lognormal at 5% Significance Level**	
Theta Star	759.1		
nu star	31.65		
A-D Test Statistic	1.863	**Nonparametric Statistics**	
5% A-D Critical Value	0.836	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.836	Mean	69.56
5% K-S Critical Value	0.148	SD	347.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	25.64
		95% KM (t) UCL	111.9
Assuming Gamma Distribution		95% KM (z) UCL	111.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	111.5
Minimum	3.75	95% KM (bootstrap t) UCL	200.8
Maximum	3800	95% KM (BCA) UCL	114.9
Mean	363	95% KM (Percentile Bootstrap) UCL	113.2
Median	320.4	95% KM (Chebyshev) UCL	181.3
SD	346.6	97.5% KM (Chebyshev) UCL	229.7
k star	1.379	99% KM (Chebyshev) UCL	324.7
Theta star	263.3		
Nu star	521.2	**Potential UCLs to Use**	
AppChi2	469.2	95% KM (Chebyshev) UCL	181.3
95% Gamma Approximate UCL	403.1		
95% Adjusted Gamma UCL	403.5		

Note: DL/2 is not a recommended method.

Result (benzo(ghi)perylene)

General Statistics

Number of Valid Data	189	Number of Detected Data	46
Number of Distinct Detected Data	41	Number of Non-Detect Data	143
		Percent Non-Detects	75.66%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.625	Minimum Detected	0.965
Maximum Detected	1500	Maximum Detected	7.313
Mean of Detected	175.4	Mean of Detected	3.983
SD of Detected	300.9	SD of Detected	1.675
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	189
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.58	Lilliefors Test Statistic	0.945
5% Lilliefors Critical Value	0.945	5% Lilliefors Critical Value	0.945
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	81.93	Mean	3.161
SD	188.7	SD	1.479
95% DL/2 (t) UCL	104.6	95% H-Stat (DL/2) UCL	79.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.308
		SD in Log Scale	1.602
		Mean in Original Scale	50.27
		SD in Original Scale	163.8
		95% Percentile Bootstrap UCL	72.36
		95% BCA Bootstrap UCL	79.37
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.511	**Data appear Lognormal at 5% Significance Level**	
Theta Star	343.3		
nu star	47.02		
A-D Test Statistic	1.296	**Nonparametric Statistics**	
5% A-D Critical Value	0.811	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.811	Mean	50.51
5% K-S Critical Value	0.138	SD	164.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	12.23
		95% KM (t) UCL	70.73
Assuming Gamma Distribution		95% KM (z) UCL	70.63
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	70.57
Minimum	2.625	95% KM (bootstrap t) UCL	84.76
Maximum	1500	95% KM (BCA) UCL	71.76
Mean	237.3	95% KM (Percentile Bootstrap) UCL	71.71
Median	211.4	95% KM (Chebyshev) UCL	103.8
SD	179.6	97.5% KM (Chebyshev) UCL	126.9
k star	1.478	99% KM (Chebyshev) UCL	172.2
Theta star	160.6		
Nu star	558.7	**Potential UCLs to Use**	
AppChi2	504.8	95% KM (Chebyshev) UCL	103.8
95% Gamma Approximate UCL	262.6		
95% Adjusted Gamma UCL	262.8		

Note: DL/2 is not a recommended method.

Result (benzo(k)fluoranthene)

General Statistics

Number of Valid Data	189	Number of Detected Data	37
Number of Distinct Detected Data	31	Number of Non-Detect Data	152
		Percent Non-Detects	80.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	4900	Maximum Detected	8.497
Mean of Detected	382.4	Mean of Detected	4.178
SD of Detected	896.1	SD of Detected	2.053
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	187
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.94%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.46	Lilliefors Test Statistic	0.949
5% Lilliefors Critical Value	0.936	5% Lilliefors Critical Value	0.936
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	114.9	Mean	3.135
SD	427.1	SD	1.551
95% DL/2 (t) UCL	166.3	95% H-Stat (DL/2) UCL	92.53
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.037
		SD in Log Scale	1.854
		Mean in Original Scale	82.48
		SD in Original Scale	419.4
		95% Percentile Bootstrap UCL	137.8
		95% BCA Bootstrap UCL	166.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.363	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1052		
nu star	26.9		
A-D Test Statistic	1.323	**Nonparametric Statistics**	
5% A-D Critical Value	0.84	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.84	Mean	81.25
5% K-S Critical Value	0.156	SD	418.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	30.93
		95% KM (t) UCL	132.4
Assuming Gamma Distribution		95% KM (z) UCL	132.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	131.8
Minimum	3.125	95% KM (bootstrap t) UCL	225
Maximum	4900	95% KM (BCA) UCL	132.6
Mean	338.6	95% KM (Percentile Bootstrap) UCL	138.4
Median	344.1	95% KM (Chebyshev) UCL	216.1
SD	398.6	97.5% KM (Chebyshev) UCL	274.4
k star	1.453	99% KM (Chebyshev) UCL	389
Theta star	233.1		
Nu star	549.2	**Potential UCLs to Use**	
AppChi2	495.8	97.5% KM (Chebyshev) UCL	274.4
95% Gamma Approximate UCL	375.1		
95% Adjusted Gamma UCL	375.4		

Note: DL/2 is not a recommended method.

Result (beryllium)

General Statistics

Number of Valid Data	101	Number of Detected Data	96
Number of Distinct Detected Data	92	Number of Non-Detect Data	5
		Percent Non-Detects	4.95%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.275	Minimum Detected	-1.291
Maximum Detected	1.938	Maximum Detected	0.661
Mean of Detected	0.927	Mean of Detected	-0.169
SD of Detected	0.389	SD of Detected	0.447
Minimum Non-Detect	0.262	Minimum Non-Detect	-1.339
Maximum Non-Detect	0.335	Maximum Non-Detect	-1.094
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	92
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	8.91%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.159	Lilliefors Test Statistic	0.0922
5% Lilliefors Critical Value	0.0904	5% Lilliefors Critical Value	0.0904
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.888	Mean	-0.256
SD	0.416	SD	0.58
95% DL/2 (t) UCL	0.957	95% H-Stat (DL/2) UCL	0.95
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.881	Mean in Log Scale	-0.218
SD	0.428	SD in Log Scale	0.488
95% MLE (t) UCL	0.952	Mean in Original Scale	0.896
95% MLE (Tiku) UCL	0.952	SD in Original Scale	0.403
		95% Percentile Bootstrap UCL	0.962
		95% BCA Bootstrap UCL	0.966
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.388	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.172		
nu star	1034		
A-D Test Statistic	0.782	**Nonparametric Statistics**	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	0.894
5% K-S Critical Value	0.0915	SD	0.403
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0403
		95% KM (t) UCL	0.961
Assuming Gamma Distribution		95% KM (z) UCL	0.961
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.961
Minimum	1E-09	95% KM (bootstrap t) UCL	0.964
Maximum	1.938	95% KM (BCA) UCL	0.965
Mean	0.885	95% KM (Percentile Bootstrap) UCL	0.959
Median	0.839	95% KM (Chebyshev) UCL	1.07
SD	0.422	97.5% KM (Chebyshev) UCL	1.146
k star	1.093	99% KM (Chebyshev) UCL	1.296
Theta star	0.81		
Nu star	220.8	**Potential UCLs to Use**	
AppChi2	187.4	95% KM (BCA) UCL	0.965
95% Gamma Approximate UCL	1.043		
95% Adjusted Gamma UCL	1.045		

Note: DL/2 is not a recommended method.

Result (cadmium)

General Statistics

Number of Valid Data	101	Number of Detected Data	34
Number of Distinct Detected Data	34	Number of Non-Detect Data	67
		Percent Non-Detects	66.34%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0138	Minimum Detected	-4.287
Maximum Detected	11.9	Maximum Detected	2.477
Mean of Detected	0.803	Mean of Detected	-0.99
SD of Detected	2.021	SD of Detected	1.047
Minimum Non-Detect	0.159	Minimum Non-Detect	-1.84
Maximum Non-Detect	0.67	Maximum Non-Detect	-0.4
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	95
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.06%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.316	Lilliefors Test Statistic	0.863
5% Lilliefors Critical Value	0.933	5% Lilliefors Critical Value	0.933
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.458	Mean	-1.18
SD	1.187	SD	0.635
95% DL/2 (t) UCL	0.654	95% H-Stat (DL/2) UCL	0.401
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.239
		SD in Log Scale	0.685
		Mean in Original Scale	0.449
		SD in Original Scale	1.19
		95% Percentile Bootstrap UCL	0.671
		95% BCA Bootstrap UCL	0.798
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.725	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.107		
nu star	49.31		
A-D Test Statistic	4.022	**Nonparametric Statistics**	
5% A-D Critical Value	0.787	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.787	Mean	0.46
5% K-S Critical Value	0.157	SD	1.185
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.121
		95% KM (t) UCL	0.66
Assuming Gamma Distribution		95% KM (z) UCL	0.658
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.659
Minimum	0.0138	95% KM (bootstrap t) UCL	1.171
Maximum	11.9	95% KM (BCA) UCL	0.702
Mean	0.79	95% KM (Percentile Bootstrap) UCL	0.684
Median	0.786	95% KM (Chebyshev) UCL	0.987
SD	1.163	97.5% KM (Chebyshev) UCL	1.215
k star	1.995	99% KM (Chebyshev) UCL	1.663
Theta star	0.396		
Nu star	403.1	**Potential UCLs to Use**	
AppChi2	357.5	95% KM (BCA) UCL	0.702
95% Gamma Approximate UCL	0.891		
95% Adjusted Gamma UCL	0.892		

Note: DL/2 is not a recommended method.

Result (chromium)

General Statistics

Number of Valid Observations	101	Number of Distinct Observations	95

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.81	Minimum of Log Data	1.571
Maximum	340	Maximum of Log Data	5.829
Mean	40.36	Mean of log Data	3.512
Median	35.5	SD of log Data	0.588
SD	36.85		
Coefficient of Variation	0.913		
Skewness	6.057		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.28	Lilliefors Test Statistic	0.182
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	46.45	95% H-UCL	44.47
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	50.62
95% Adjusted-CLT UCL	48.75	97.5% Chebyshev (MVUE) UCL	55.33
95% Modified-t UCL	46.81	99% Chebyshev (MVUE) UCL	64.59
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.763	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	14.61		
nu star	558.1		
Approximate Chi Square Value (.05)	504.3	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	46.39
Adjusted Chi Square Value	503.5	95% Jackknife UCL	46.45
		95% Standard Bootstrap UCL	46.29
Anderson-Darling Test Statistic	5.004	95% Bootstrap-t UCL	53.52
Anderson-Darling 5% Critical Value	0.76	95% Hall's Bootstrap UCL	75.55
Kolmogorov-Smirnov Test Statistic	0.176	95% Percentile Bootstrap UCL	47.05
Kolmogorov-Smirnov 5% Critical Value	0.0899	95% BCA Bootstrap UCL	50.04
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	56.34
		97.5% Chebyshev(Mean, Sd) UCL	63.26
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	76.84
95% Approximate Gamma UCL	44.66		
95% Adjusted Gamma UCL	44.73		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	56.34

Result (chrysene)

General Statistics

Number of Valid Data	190	Number of Detected Data	72
Number of Distinct Detected Data	62	Number of Non-Detect Data	118
		Percent Non-Detects	62.11%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	14000	Maximum Detected	9.547
Mean of Detected	694.1	Mean of Detected	4.797
SD of Detected	1940	SD of Detected	1.99
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	182
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.79%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.361	Lilliefors Test Statistic	0.095
5% Lilliefors Critical Value	0.104	5% Lilliefors Critical Value	0.104
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	285.4	Mean	3.487
SD	1232	SD	1.851
95% DL/2 (t) UCL	433.2	95% H-Stat (DL/2) UCL	198.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.872
		SD in Log Scale	2.228
		Mean in Original Scale	270
		SD in Original Scale	1234
		95% Percentile Bootstrap UCL	425.9
		95% BCA Bootstrap UCL	516.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.374	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1858		
nu star	53.78		
A-D Test Statistic	2.552	**Nonparametric Statistics**	
5% A-D Critical Value	0.846	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.846	Mean	269.4
5% K-S Critical Value	0.113	SD	1231
Data not Gamma Distributed at 5% Significance Level		SE of Mean	89.98
		95% KM (t) UCL	418.1
Assuming Gamma Distribution		95% KM (z) UCL	417.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	417.5
Minimum	1E-09	95% KM (bootstrap t) UCL	596.9
Maximum	14000	95% KM (BCA) UCL	446.4
Mean	922	95% KM (Percentile Bootstrap) UCL	428.3
Median	282.9	95% KM (Chebyshev) UCL	661.6
SD	1605	97.5% KM (Chebyshev) UCL	831.3
k star	0.12	99% KM (Chebyshev) UCL	1165
Theta star	7660		
Nu star	45.74	**Potential UCLs to Use**	
AppChi2	31.22	95% KM (Chebyshev) UCL	661.6
95% Gamma Approximate UCL	1351		
95% Adjusted Gamma UCL	1355		

Note: DL/2 is not a recommended method.

Result (cobalt)

General Statistics

Number of Valid Observations	101	Number of Distinct Observations	83

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.97	Minimum of Log Data	1.379
Maximum	37.7	Maximum of Log Data	3.63
Mean	15.54	Mean of log Data	2.675
Median	15.8	SD of log Data	0.39
SD	5.614		
Coefficient of Variation	0.361		
Skewness	0.904		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0897	Lilliefors Test Statistic	0.128
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	16.47	95% H-UCL	16.78
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18.38
95% Adjusted-CLT UCL	16.52	97.5% Chebyshev (MVUE) UCL	19.57
95% Modified-t UCL	16.48	99% Chebyshev (MVUE) UCL	21.89
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.207	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2.157		
nu star	1456		
Approximate Chi Square Value (.05)	1368	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	16.46
Adjusted Chi Square Value	1367	95% Jackknife UCL	16.47
		95% Standard Bootstrap UCL	16.47
Anderson-Darling Test Statistic	1.632	95% Bootstrap-t UCL	16.52
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	16.6
Kolmogorov-Smirnov Test Statistic	0.103	95% Percentile Bootstrap UCL	16.45
Kolmogorov-Smirnov 5% Critical Value	0.0892	95% BCA Bootstrap UCL	16.55
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17.98
		97.5% Chebyshev(Mean, Sd) UCL	19.03
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	21.1
95% Approximate Gamma UCL	16.54		
95% Adjusted Gamma UCL	16.55		
Potential UCL to Use		Use 95% Student's-t UCL	16.47
		or 95% Modified-t UCL	16.48

Result (copper)

General Statistics

Number of Valid Data	101	Number of Detected Data	92
Number of Distinct Detected Data	83	Number of Non-Detect Data	9
		Percent Non-Detects	8.91%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	8.26	Minimum Detected	2.111
Maximum Detected	3420	Maximum Detected	8.137
Mean of Detected	86.35	Mean of Detected	3.577
SD of Detected	364.8	SD of Detected	0.821
Minimum Non-Detect	1.25	Minimum Non-Detect	0.223
Maximum Non-Detect	20	Maximum Non-Detect	2.996
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	20
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	81
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	19.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.421	Lilliefors Test Statistic	0.244
5% Lilliefors Critical Value	0.0924	5% Lilliefors Critical Value	0.0924
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	78.8	Mean	3.244
SD	348.9	SD	1.352
95% DL/2 (t) UCL	136.4	95% H-Stat (DL/2) UCL	75.64
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	18.83	Mean in Log Scale	3.432
SD	393.2	SD in Log Scale	0.916
95% MLE (t) UCL	83.79	Mean in Original Scale	79.3
95% MLE (Tiku) UCL	82.01	SD in Original Scale	348.8
		95% Percentile Bootstrap UCL	145
		95% BCA Bootstrap UCL	198.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.673	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	128.4		
nu star	123.7		
A-D Test Statistic	16.61	**Nonparametric Statistics**	
5% A-D Critical Value	0.8	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.8	Mean	79.42
5% K-S Critical Value	0.0973	SD	347
Data not Gamma Distributed at 5% Significance Level		SE of Mean	34.72
		95% KM (t) UCL	137.1
Assuming Gamma Distribution		95% KM (z) UCL	136.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	136.9
Minimum	1E-09	95% KM (bootstrap t) UCL	581.8
Maximum	3420	95% KM (BCA) UCL	144.7
Mean	78.65	95% KM (Percentile Bootstrap) UCL	144.5
Median	30.5	95% KM (Chebyshev) UCL	230.8
SD	348.9	97.5% KM (Chebyshev) UCL	296.2
k star	0.241	99% KM (Chebyshev) UCL	424.9
Theta star	326		
Nu star	48.73	**Potential UCLs to Use**	
AppChi2	33.71	95% KM (BCA) UCL	144.7
95% Gamma Approximate UCL	113.7		
95% Adjusted Gamma UCL	114.3		

Note: DL/2 is not a recommended method.

Result (dibenzo(a,h)anthracene)

General Statistics

Number of Valid Data	189	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	179
		Percent Non-Detects	94.71%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	6.25	Minimum Detected	1.833
Maximum Detected	570	Maximum Detected	6.346
Mean of Detected	150.6	Mean of Detected	4.394
SD of Detected	168.9	SD of Detected	1.32
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	189
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.783	Lilliefors Test Statistic	0.964
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	54.99	Mean	2.975
SD	117	SD	1.337
95% DL/2 (t) UCL	69.07	95% H-Stat (DL/2) UCL	58
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.487
		SD in Log Scale	1.42
		Mean in Original Scale	14.88
		SD in Original Scale	49.72
		95% Percentile Bootstrap UCL	21.35
		95% BCA Bootstrap UCL	23.23
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.722	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	208.5		
nu star	14.45		
A-D Test Statistic	0.205	**Nonparametric Statistics**	
5% A-D Critical Value	0.75	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.75	Mean	15.12
5% K-S Critical Value	0.274	SD	50.59
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4.034
		95% KM (t) UCL	21.79
Assuming Gamma Distribution		95% KM (z) UCL	21.76
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	23.82
Minimum	1E-09	95% KM (bootstrap t) UCL	25.73
Maximum	570	95% KM (BCA) UCL	66.88
Mean	66.72	95% KM (Percentile Bootstrap) UCL	61.06
Median	50.27	95% KM (Chebyshev) UCL	32.71
SD	70.06	97.5% KM (Chebyshev) UCL	40.32
k star	0.114	99% KM (Chebyshev) UCL	55.26
Theta star	585.1		
Nu star	43.1	**Potential UCLs to Use**	
AppChi2	29.05	95% KM (t) UCL	21.79
95% Gamma Approximate UCL	99		
95% Adjusted Gamma UCL	99.3		

Note: DL/2 is not a recommended method.

Result (ethylbenzene)

General Statistics

Number of Valid Data	190	Number of Detected Data	29
Number of Distinct Detected Data	28	Number of Non-Detect Data	161
		Percent Non-Detects	84.74%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	55000	Maximum Detected	10.92
Mean of Detected	7468	Mean of Detected	5.736
SD of Detected	15258	SD of Detected	3.396
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	182
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.79%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.556	Lilliefors Test Statistic	0.94
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1162	Mean	1.437
SD	6461	SD	2.563
95% DL/2 (t) UCL	1936	95% H-Stat (DL/2) UCL	137.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.173
		SD in Log Scale	6.632
		Mean in Original Scale	1140
		SD in Original Scale	6461
		95% Percentile Bootstrap UCL	1976
		95% BCA Bootstrap UCL	2329
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.226	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	33010		
nu star	13.12		
A-D Test Statistic	0.895	**Nonparametric Statistics**	
5% A-D Critical Value	0.887	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.887	Mean	1141
5% K-S Critical Value	0.179	SD	6444
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	475.7
		95% KM (t) UCL	1928
Assuming Gamma Distribution		95% KM (z) UCL	1924
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1916
Minimum	1E-09	95% KM (bootstrap t) UCL	2791
Maximum	55000	95% KM (BCA) UCL	2077
Mean	6300	95% KM (Percentile Bootstrap) UCL	1927
Median	7477	95% KM (Chebyshev) UCL	3215
SD	6609	97.5% KM (Chebyshev) UCL	4112
k star	0.181	99% KM (Chebyshev) UCL	5875
Theta star	34892		
Nu star	68.61	**Potential UCLs to Use**	
AppChi2	50.54	95% KM (t) UCL	1928
95% Gamma Approximate UCL	8552		
95% Adjusted Gamma UCL	8572		

Note: DL/2 is not a recommended method.

Result (fluoranthene)

General Statistics

Number of Valid Data	190	Number of Detected Data	60
Number of Distinct Detected Data	56	Number of Non-Detect Data	130
		Percent Non-Detects	68.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	18000	Maximum Detected	9.798
Mean of Detected	896.2	Mean of Detected	4.713
SD of Detected	2850	SD of Detected	2.146
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	181
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.26%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.377	Lilliefors Test Statistic	0.0743
5% Lilliefors Critical Value	0.114	5% Lilliefors Critical Value	0.114
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	307.7	Mean	3.365
SD	1643	SD	1.804
95% DL/2 (t) UCL	504.7	95% H-Stat (DL/2) UCL	169.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.64
		SD in Log Scale	2.216
		Mean in Original Scale	291.2
		SD in Original Scale	1645
		95% Percentile Bootstrap UCL	519
		95% BCA Bootstrap UCL	588.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.321	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2792		
nu star	38.51		
A-D Test Statistic	2.661	**Nonparametric Statistics**	
5% A-D Critical Value	0.857	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.857	Mean	289.4
5% K-S Critical Value	0.124	SD	1641
Data not Gamma Distributed at 5% Significance Level		SE of Mean	120.1
		95% KM (t) UCL	487.8
Assuming Gamma Distribution		95% KM (z) UCL	486.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	486.7
Minimum	3.125	95% KM (bootstrap t) UCL	1054
Maximum	18000	95% KM (BCA) UCL	501.6
Mean	1547	95% KM (Percentile Bootstrap) UCL	497.3
Median	644.7	95% KM (Chebyshev) UCL	812.7
SD	2278	97.5% KM (Chebyshev) UCL	1039
k star	0.551	99% KM (Chebyshev) UCL	1484
Theta star	2809		
Nu star	209.3	**Potential UCLs to Use**	
AppChi2	176.8	97.5% KM (Chebyshev) UCL	1039
95% Gamma Approximate UCL	1831		
95% Adjusted Gamma UCL	1833		

Note: DL/2 is not a recommended method.

Result (fluorene)

General Statistics

Number of Valid Data	190	Number of Detected Data	28
Number of Distinct Detected Data	27	Number of Non-Detect Data	162
		Percent Non-Detects	85.26%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.375	Minimum Detected	1.476
Maximum Detected	4300	Maximum Detected	8.366
Mean of Detected	1043	Mean of Detected	5.843
SD of Detected	1232	SD of Detected	1.868
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	181
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.26%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.792	Lilliefors Test Statistic	0.938
5% Lilliefors Critical Value	0.924	5% Lilliefors Critical Value	0.924
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	184.7	Mean	3.206
SD	589.9	SD	1.711
95% DL/2 (t) UCL	255.4	95% H-Stat (DL/2) UCL	115.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.859
		SD in Log Scale	2.537
		Mean in Original Scale	164.1
		SD in Original Scale	592.9
		95% Percentile Bootstrap UCL	235.6
		95% BCA Bootstrap UCL	255.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.527	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1981		
nu star	29.5		
A-D Test Statistic	0.52	**Nonparametric Statistics**	
5% A-D Critical Value	0.804	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.804	Mean	161.9
5% K-S Critical Value	0.174	SD	591.8
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	43.79
		95% KM (t) UCL	234.3
Assuming Gamma Distribution		95% KM (z) UCL	233.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	233.4
Minimum	4.375	95% KM (bootstrap t) UCL	256.8
Maximum	4300	95% KM (BCA) UCL	253.6
Mean	1633	95% KM (Percentile Bootstrap) UCL	238.9
Median	1558	95% KM (Chebyshev) UCL	352.8
SD	816.5	97.5% KM (Chebyshev) UCL	435.3
k star	2.198	99% KM (Chebyshev) UCL	597.6
Theta star	743		
Nu star	835.3	**Potential UCLs to Use**	
AppChi2	769.3	95% KM (t) UCL	234.3
95% Gamma Approximate UCL	1774		
95% Adjusted Gamma UCL	1775		

Note: DL/2 is not a recommended method.

Result (indeno(1,2,3-cd)pyrene)

General Statistics

Number of Valid Data	189	Number of Detected Data	27
Number of Distinct Detected Data	23	Number of Non-Detect Data	162
		Percent Non-Detects	85.71%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	2400	Maximum Detected	7.783
Mean of Detected	309.3	Mean of Detected	4.39
SD of Detected	574.5	SD of Detected	1.844
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	188
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.54	Lilliefors Test Statistic	0.951
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	86.73	Mean	3.108
SD	255.4	SD	1.474
95% DL/2 (t) UCL	117.4	95% H-Stat (DL/2) UCL	78.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.274
		SD in Log Scale	2.063
		Mean in Original Scale	48.96
		SD in Original Scale	238.9
		95% Percentile Bootstrap UCL	78.95
		95% BCA Bootstrap UCL	93.71
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.448	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	690.7		
nu star	24.18		
A-D Test Statistic	0.812	**Nonparametric Statistics**	
5% A-D Critical Value	0.813	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.813	Mean	49.25
5% K-S Critical Value	0.178	SD	238.9
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	17.78
		95% KM (t) UCL	78.64
Assuming Gamma Distribution		95% KM (z) UCL	78.49
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	78.17
Minimum	3.125	95% KM (bootstrap t) UCL	129.2
Maximum	2400	95% KM (BCA) UCL	81.86
Mean	350.6	95% KM (Percentile Bootstrap) UCL	78.82
Median	341.9	95% KM (Chebyshev) UCL	126.7
SD	219.5	97.5% KM (Chebyshev) UCL	160.3
k star	2.596	99% KM (Chebyshev) UCL	226.1
Theta star	135		
Nu star	981.4	**Potential UCLs to Use**	
AppChi2	909.7	95% KM (t) UCL	78.64
95% Gamma Approximate UCL	378.2		
95% Adjusted Gamma UCL	378.5		

Note: DL/2 is not a recommended method.

Result (isopropylbenzene)

General Statistics

Number of Valid Data	190	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	170
		Percent Non-Detects	89.47%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	8400	Maximum Detected	9.036
Mean of Detected	1870	Mean of Detected	5.116
SD of Detected	2664	SD of Detected	3.216
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	188
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.95%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.744	Lilliefors Test Statistic	0.883
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	223.1	Mean	1.219
SD	1043	SD	2.18
95% DL/2 (t) UCL	348.2	95% H-Stat (DL/2) UCL	44.56
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.861
		SD in Log Scale	5.905
		Mean in Original Scale	197.2
		SD in Original Scale	1022
		95% Percentile Bootstrap UCL	326.2
		95% BCA Bootstrap UCL	363.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.277	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	6739		
nu star	11.1		
A-D Test Statistic	0.606	**Nonparametric Statistics**	
5% A-D Critical Value	0.85	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.85	Mean	198.7
5% K-S Critical Value	0.211	SD	1020
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	75.99
		95% KM (t) UCL	324.3
Assuming Gamma Distribution		95% KM (z) UCL	323.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	321.2
Minimum	1E-09	95% KM (bootstrap t) UCL	390.8
Maximum	8400	95% KM (BCA) UCL	347.3
Mean	1581	95% KM (Percentile Bootstrap) UCL	331.7
Median	1825	95% KM (Chebyshev) UCL	529.9
SD	1112	97.5% KM (Chebyshev) UCL	673.2
k star	0.243	99% KM (Chebyshev) UCL	954.8
Theta star	6505		
Nu star	92.38	**Potential UCLs to Use**	
AppChi2	71.22	95% KM (t) UCL	324.3
95% Gamma Approximate UCL	2051		
95% Adjusted Gamma UCL	2055		

Note: DL/2 is not a recommended method.

Result (lead)

General Statistics

Number of Valid Observations	101	Number of Distinct Observations	97

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.57	Minimum of Log Data	1.52
Maximum	4690	Maximum of Log Data	8.453
Mean	93.76	Mean of log Data	3.266
Median	19.8	SD of log Data	1.116
SD	469.6		
Coefficient of Variation	5.009		
Skewness	9.58		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.425	Lilliefors Test Statistic	0.114
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	171.3	95% H-UCL	63.27
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	77.46
95% Adjusted-CLT UCL	218.2	97.5% Chebyshev (MVUE) UCL	90.04
95% Modified-t UCL	178.8	99% Chebyshev (MVUE) UCL	114.7
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.49	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	191.2		
nu star	99.07		
Approximate Chi Square Value (.05)	77.11	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	170.6
Adjusted Chi Square Value	76.83	95% Jackknife UCL	171.3
		95% Standard Bootstrap UCL	170.2
Anderson-Darling Test Statistic	13.32	95% Bootstrap-t UCL	537.1
Anderson-Darling 5% Critical Value	0.819	95% Hall's Bootstrap UCL	431.8
Kolmogorov-Smirnov Test Statistic	0.274	95% Percentile Bootstrap UCL	182.9
Kolmogorov-Smirnov 5% Critical Value	0.0944	95% BCA Bootstrap UCL	238.2
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	297.4
		97.5% Chebyshev(Mean, Sd) UCL	385.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	558.7
95% Approximate Gamma UCL	120.5		
95% Adjusted Gamma UCL	120.9		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	385.6

Result (mercury)

General Statistics

Number of Valid Data	101	Number of Detected Data	59
Number of Distinct Detected Data	37	Number of Non-Detect Data	42
		Percent Non-Detects	41.58%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.025	Minimum Detected	-3.689
Maximum Detected	1.94	Maximum Detected	0.663
Mean of Detected	0.175	Mean of Detected	-2.181
SD of Detected	0.276	SD of Detected	0.815
Minimum Non-Detect	0.0873	Minimum Non-Detect	-2.438
Maximum Non-Detect	0.175	Maximum Non-Detect	-1.743
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	91
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.10%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.332	Lilliefors Test Statistic	0.128
5% Lilliefors Critical Value	0.115	5% Lilliefors Critical Value	0.115
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.124	Mean	-2.506
SD	0.219	SD	0.743
95% DL/2 (t) UCL	0.16	95% H-Stat (DL/2) UCL	0.11
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.464
		SD in Log Scale	0.719
		Mean in Original Scale	0.127
		SD in Original Scale	0.218
		95% Percentile Bootstrap UCL	0.167
		95% BCA Bootstrap UCL	0.185
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.227	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.143		
nu star	144.8		
A-D Test Statistic	3.181	**Nonparametric Statistics**	
5% A-D Critical Value	0.773	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.773	Mean	0.127
5% K-S Critical Value	0.118	SD	0.217
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0219
		95% KM (t) UCL	0.164
Assuming Gamma Distribution		95% KM (z) UCL	0.164
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.164
Minimum	0.025	95% KM (bootstrap t) UCL	0.207
Maximum	1.94	95% KM (BCA) UCL	0.166
Mean	0.177	95% KM (Percentile Bootstrap) UCL	0.166
Median	0.166	95% KM (Chebyshev) UCL	0.223
SD	0.211	97.5% KM (Chebyshev) UCL	0.264
k star	1.991	99% KM (Chebyshev) UCL	0.345
Theta star	0.0888		
Nu star	402.1	**Potential UCLs to Use**	
AppChi2	356.7	95% KM (t) UCL	0.164
95% Gamma Approximate UCL	0.199	95% KM (% Bootstrap) UCL	0.166
95% Adjusted Gamma UCL	0.2		

Note: DL/2 is not a recommended method.

Result (methyl-t-butyl ether (mtbe))

General Statistics

Number of Valid Data	190	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	184
		Percent Non-Detects	96.84%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	7.375	Maximum Detected	1.998
Mean of Detected	4.329	Mean of Detected	1.388
SD of Detected	1.877	SD of Detected	0.429
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	6250	Maximum Non-Detect	8.74

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	190
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.902	Lilliefors Test Statistic	0.92
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	80.75	Mean	1.401
SD	340.8	SD	1.834
95% DL/2 (t) UCL	121.6	95% H-Stat (DL/2) UCL	32.46
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.307
		SD in Log Scale	0.733
		Mean in Original Scale	0.982
		SD in Original Scale	0.946
		95% Percentile Bootstrap UCL	1.102
		95% BCA Bootstrap UCL	1.114

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.436	**Data appear Normal at 5% Significance Level**	
Theta Star	1.26		
nu star	41.24		
A-D Test Statistic	0.337	**Nonparametric Statistics**	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	2.616
5% K-S Critical Value	0.333	SD	0.572
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0648
		95% KM (t) UCL	2.723
Assuming Gamma Distribution		95% KM (z) UCL	2.723
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.708
Minimum	2.5	95% KM (bootstrap t) UCL	2.739
Maximum	7.375	95% KM (BCA) UCL	5.125
Mean	4.441	95% KM (Percentile Bootstrap) UCL	5
Median	4.504	95% KM (Chebyshev) UCL	2.898
SD	0.395	97.5% KM (Chebyshev) UCL	3.02
k star	120.6	99% KM (Chebyshev) UCL	3.26
Theta star	0.0368		
Nu star	45832	**Potential UCLs to Use**	
AppChi2	45335	95% KM (t) UCL	2.723
95% Gamma Approximate UCL	4.49	95% KM (Percentile Bootstrap) UCL	5
95% Adjusted Gamma UCL	4.49		

Note: DL/2 is not a recommended method.

Result (molybdenum)			
General Statistics			
Number of Valid Data	101	Number of Detected Data	36
Number of Distinct Detected Data	36	Number of Non-Detect Data	65
		Percent Non-Detects	64.36%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.297	Minimum Detected	-1.214
Maximum Detected	101	Maximum Detected	4.615
Mean of Detected	8.692	Mean of Detected	0.961
SD of Detected	19.84	SD of Detected	1.394
Minimum Non-Detect	0.195	Minimum Non-Detect	-1.635
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	75
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	26
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	74.26%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.45	Lilliefors Test Statistic	0.933
5% Lilliefors Critical Value	0.935	5% Lilliefors Critical Value	0.935
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.306	Mean	-0.553
SD	12.41	SD	1.513
95% DL/2 (t) UCL	5.356	95% H-Stat (DL/2) UCL	2.019
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.591
		SD in Log Scale	2.287
		Mean in Original Scale	3.161
		SD in Original Scale	12.45
		95% Percentile Bootstrap UCL	5.47
		95% BCA Bootstrap UCL	6.183
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.5	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	17.4		
nu star	35.97		
A-D Test Statistic	3.033	**Nonparametric Statistics**	
5% A-D Critical Value	0.81	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.81	Mean	3.308
5% K-S Critical Value	0.155	SD	12.35
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.246
		95% KM (t) UCL	5.377
Assuming Gamma Distribution		95% KM (z) UCL	5.357
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.314
Minimum	0.297	95% KM (bootstrap t) UCL	10.14
Maximum	101	95% KM (BCA) UCL	5.847
Mean	9.221	95% KM (Percentile Bootstrap) UCL	5.536
Median	8.167	95% KM (Chebyshev) UCL	8.74
SD	12.14	97.5% KM (Chebyshev) UCL	11.09
k star	1.173	99% KM (Chebyshev) UCL	15.71
Theta star	7.859		
Nu star	237	**Potential UCLs to Use**	
AppChi2	202.4	95% KM (BCA) UCL	5.847
95% Gamma Approximate UCL	10.8		
95% Adjusted Gamma UCL	10.82		
Note: DL/2 is not a recommended method.			

Result (naphthalene)

General Statistics

Number of Valid Data	190	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	182
		Percent Non-Detects	95.79%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	6.75	Minimum Detected	1.91
Maximum Detected	53000	Maximum Detected	10.88
Mean of Detected	9727	Mean of Detected	6.276
SD of Detected	18539	SD of Detected	3.315
Minimum Non-Detect	5.7	Minimum Non-Detect	1.74
Maximum Non-Detect	24000	Maximum Non-Detect	10.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	189
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.47%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.624	Lilliefors Test Statistic	0.945
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	611.7	Mean	2.155
SD	4203	SD	2.009
95% DL/2 (t) UCL	1116	95% H-Stat (DL/2) UCL	89.57
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-12.09
		SD in Log Scale	7.366
		Mean in Original Scale	409.6
		SD in Original Scale	4070
		95% Percentile Bootstrap UCL	1003
		95% BCA Bootstrap UCL	1333
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.237	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	41126		
nu star	3.784		
A-D Test Statistic	0.361	**Nonparametric Statistics**	
5% A-D Critical Value	0.818	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.818	Mean	417.7
5% K-S Critical Value	0.32	SD	4060
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	315
		95% KM (t) UCL	938.5
Assuming Gamma Distribution		95% KM (z) UCL	935.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	896.3
Minimum	1E-09	95% KM (bootstrap t) UCL	4168
Maximum	53000	95% KM (BCA) UCL	1261
Mean	4014	95% KM (Percentile Bootstrap) UCL	1076
Median	1E-09	95% KM (Chebyshev) UCL	1791
SD	6014	97.5% KM (Chebyshev) UCL	2385
k star	0.0573	99% KM (Chebyshev) UCL	3552
Theta star	70068		
Nu star	21.77	**Potential UCLs to Use**	
AppChi2	12.16	95% KM (t) UCL	938.5
95% Gamma Approximate UCL	7183		
95% Adjusted Gamma UCL	7215		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)			
General Statistics			
Number of Valid Data	190	Number of Detected Data	19
Number of Distinct Detected Data	18	Number of Non-Detect Data	171
		Percent Non-Detects	90.00%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.7	Minimum Detected	0.531
Maximum Detected	38000	Maximum Detected	10.55
Mean of Detected	3688	Mean of Detected	5.168
SD of Detected	9146	SD of Detected	3.001
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	188
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.95%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.467	Lilliefors Test Statistic	0.96
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	404.6	Mean	1.248
SD	3039	SD	2.202
95% DL/2 (t) UCL	769	95% H-Stat (DL/2) UCL	50.74
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.863
		SD in Log Scale	6.253
		Mean in Original Scale	369
		SD in Original Scale	3033
		95% Percentile Bootstrap UCL	803.1
		95% BCA Bootstrap UCL	1135
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.233	**Data appear Lognormal at 5% Significance Level**	
Theta Star	15799		
nu star	8.87		
A-D Test Statistic	0.942	**Nonparametric Statistics**	
5% A-D Critical Value	0.872	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.872	Mean	371.1
5% K-S Critical Value	0.218	SD	3025
Data not Gamma Distributed at 5% Significance Level		SE of Mean	225.5
		95% KM (t) UCL	743.8
Assuming Gamma Distribution		95% KM (z) UCL	742
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	733.6
Minimum	1E-09	95% KM (bootstrap t) UCL	2082
Maximum	38000	95% KM (BCA) UCL	798.9
Mean	3106	95% KM (Percentile Bootstrap) UCL	745.2
Median	3766	95% KM (Chebyshev) UCL	1354
SD	3292	97.5% KM (Chebyshev) UCL	1779
k star	0.16	99% KM (Chebyshev) UCL	2615
Theta star	19386		
Nu star	60.88	**Potential UCLs to Use**	
AppChi2	43.94	97.5% KM (Chebyshev) UCL	1779
95% Gamma Approximate UCL	4304		
95% Adjusted Gamma UCL	4314		
Note: DL/2 is not a recommended method.			

Result (nickel)

General Statistics

Number of Valid Observations	101	Number of Distinct Observations	93

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.96	Minimum of Log Data	1.601
Maximum	3620	Maximum of Log Data	8.194
Mean	60.56	Mean of log Data	3.183
Median	25	SD of log Data	0.67
SD	357.9		
Coefficient of Variation	5.909		
Skewness	10.04		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.491	Lilliefors Test Statistic	0.223
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	119.7	95% H-UCL	34.36
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	39.68
95% Adjusted-CLT UCL	157.1	97.5% Chebyshev (MVUE) UCL	43.83
95% Modified-t UCL	125.6	99% Chebyshev (MVUE) UCL	51.98
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.648	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	93.41		
nu star	131		
Approximate Chi Square Value (.05)	105.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	119.1
Adjusted Chi Square Value	105.2	95% Jackknife UCL	119.7
		95% Standard Bootstrap UCL	118.9
Anderson-Darling Test Statistic	9.901E+28	95% Bootstrap-t UCL	1676
Anderson-Darling 5% Critical Value	0.803	95% Hall's Bootstrap UCL	548.1
Kolmogorov-Smirnov Test Statistic	0.415	95% Percentile Bootstrap UCL	131.6
Kolmogorov-Smirnov 5% Critical Value	0.0933	95% BCA Bootstrap UCL	168.4
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	215.8
		97.5% Chebyshev(Mean, Sd) UCL	282.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	414.9
95% Approximate Gamma UCL	75.16		
95% Adjusted Gamma UCL	75.39		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	215.8

Result (n-propylbenzene)

General Statistics

Number of Valid Data	190	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	168
		Percent Non-Detects	88.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.375	Minimum Detected	0.865
Maximum Detected	47000	Maximum Detected	10.76
Mean of Detected	5811	Mean of Detected	6.13
SD of Detected	12222	SD of Detected	2.941
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	185
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.37%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.527	Lilliefors Test Statistic	0.954
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	695.6	Mean	1.371
SD	4483	SD	2.351
95% DL/2 (t) UCL	1233	95% H-Stat (DL/2) UCL	71.98
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.193
		SD in Log Scale	6.069
		Mean in Original Scale	673.2
		SD in Original Scale	4480
		95% Percentile Bootstrap UCL	1272
		95% BCA Bootstrap UCL	1513
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.268	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	21663		
nu star	11.8		
A-D Test Statistic	0.568	**Nonparametric Statistics**	
5% A-D Critical Value	0.858	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.858	Mean	675.6
5% K-S Critical Value	0.202	SD	4468
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	331.8
		95% KM (t) UCL	1224
Assuming Gamma Distribution		95% KM (z) UCL	1221
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1210
Minimum	1E-09	95% KM (bootstrap t) UCL	2668
Maximum	47000	95% KM (BCA) UCL	1360
Mean	5253	95% KM (Percentile Bootstrap) UCL	1263
Median	6074	95% KM (Chebyshev) UCL	2122
SD	4491	97.5% KM (Chebyshev) UCL	2748
k star	0.384	99% KM (Chebyshev) UCL	3977
Theta star	13690		
Nu star	145.8	**Potential UCLs to Use**	
AppChi2	118.9	95% KM (t) UCL	1224
95% Gamma Approximate UCL	6442		
95% Adjusted Gamma UCL	6452		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	190	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	176
		Percent Non-Detects	92.63%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	34000	Maximum Detected	10.43
Mean of Detected	3827	Mean of Detected	4.225
SD of Detected	9433	SD of Detected	3.677
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	188
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.95%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.479	Lilliefors Test Statistic	0.893
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	325	Mean	1.213
SD	2677	SD	2.124
95% DL/2 (t) UCL	646	95% H-Stat (DL/2) UCL	45.76
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-9.477
		SD in Log Scale	6.682
		Mean in Original Scale	282.2
		SD in Original Scale	2669
		95% Percentile Bootstrap UCL	640.3
		95% BCA Bootstrap UCL	849.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.193	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	19829		
nu star	5.404		
A-D Test Statistic	0.956	**Nonparametric Statistics**	
5% A-D Critical Value	0.879	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.879	Mean	283.5
5% K-S Critical Value	0.254	SD	2662
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	200.4
		95% KM (t) UCL	614.8
Assuming Gamma Distribution		95% KM (z) UCL	613.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	603.3
Minimum	1E-09	95% KM (bootstrap t) UCL	3831
Maximum	34000	95% KM (BCA) UCL	640.5
Mean	3112	95% KM (Percentile Bootstrap) UCL	639.3
Median	3618	95% KM (Chebyshev) UCL	1157
SD	3288	97.5% KM (Chebyshev) UCL	1535
k star	0.106	99% KM (Chebyshev) UCL	2278
Theta star	29227		
Nu star	40.46	**Potential UCLs to Use**	
AppChi2	26.89	95% KM (t) UCL	614.8
95% Gamma Approximate UCL	4684		
95% Adjusted Gamma UCL	4699		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	190	Number of Detected Data	22
Number of Distinct Detected Data	21	Number of Non-Detect Data	168
		Percent Non-Detects	88.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	150000	Maximum Detected	11.92
Mean of Detected	20112	Mean of Detected	4.989
SD of Detected	45235	SD of Detected	4.09
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	184
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.84%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.507	Lilliefors Test Statistic	0.84
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2369	Mean	1.602
SD	16397	SD	2.32
95% DL/2 (t) UCL	4335	95% H-Stat (DL/2) UCL	98.69
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-7.788
		SD in Log Scale	7.239
		Mean in Original Scale	2329
		SD in Original Scale	16401
		95% Percentile Bootstrap UCL	4467
		95% BCA Bootstrap UCL	5346
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.165	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	122247		
nu star	7.239		
A-D Test Statistic	2.02	**Nonparametric Statistics**	
5% A-D Critical Value	0.91	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.91	Mean	2331
5% K-S Critical Value	0.207	SD	16357
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1215
		95% KM (t) UCL	4339
Assuming Gamma Distribution		95% KM (z) UCL	4329
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4297
Minimum	2	95% KM (bootstrap t) UCL	8244
Maximum	493753	95% KM (BCA) UCL	4527
Mean	45063	95% KM (Percentile Bootstrap) UCL	4475
Median	6354	95% KM (Chebyshev) UCL	7625
SD	90647	97.5% KM (Chebyshev) UCL	9916
k star	0.353	99% KM (Chebyshev) UCL	14416
Theta star	127665		
Nu star	134.1	**Potential UCLs to Use**	
AppChi2	108.4	97.5% KM (Chebyshev) UCL	9916
95% Gamma Approximate UCL	55772		
95% Adjusted Gamma UCL	55863		

Note: DL/2 is not a recommended method.

Result (pcb-1254)

General Statistics

Number of Valid Data	52	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	42
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	56	Minimum Detected	4.025
Maximum Detected	20000	Maximum Detected	9.903
Mean of Detected	2318	Mean of Detected	5.788
SD of Detected	6225	SD of Detected	1.767
Minimum Non-Detect	37.5	Minimum Non-Detect	3.624
Maximum Non-Detect	65	Maximum Non-Detect	4.174
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	43
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	82.69%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.413	Lilliefors Test Statistic	0.859
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	462	Mean	3.531
SD	2770	SD	1.345
95% DL/2 (t) UCL	1106	95% H-Stat (DL/2) UCL	115.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.361
		SD in Log Scale	4.134
		Mean in Original Scale	447.4
		SD in Original Scale	2772
		95% Percentile Bootstrap UCL	1203
		95% BCA Bootstrap UCL	1648
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.308	**Data appear Lognormal at 5% Significance Level**	
Theta Star	7537		
nu star	6.15		
A-D Test Statistic	1.473	**Nonparametric Statistics**	
5% A-D Critical Value	0.806	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.806	Mean	490.9
5% K-S Critical Value	0.286	SD	2739
Data not Gamma Distributed at 5% Significance Level		SE of Mean	400.3
		95% KM (t) UCL	1162
Assuming Gamma Distribution		95% KM (z) UCL	1149
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1123
Minimum	1E-09	95% KM (bootstrap t) UCL	8461
Maximum	897354	95% KM (BCA) UCL	1630
Mean	168713	95% KM (Percentile Bootstrap) UCL	1253
Median	56553	95% KM (Chebyshev) UCL	2236
SD	239026	97.5% KM (Chebyshev) UCL	2991
k star	0.165	99% KM (Chebyshev) UCL	4474
Theta star	1025396		
Nu star	17.11	**Potential UCLs to Use**	
AppChi2	8.752	95% KM (Chebyshev) UCL	2236
95% Gamma Approximate UCL	329861		
95% Adjusted Gamma UCL	336436		

Note: DL/2 is not a recommended method.

Result (phenanthrene)

General Statistics

Number of Valid Data	190	Number of Detected Data	59
Number of Distinct Detected Data	52	Number of Non-Detect Data	131
		Percent Non-Detects	68.95%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.75	Minimum Detected	1.012
Maximum Detected	29000	Maximum Detected	10.28
Mean of Detected	2044	Mean of Detected	5.123
SD of Detected	5464	SD of Detected	2.504
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	176
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.63%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.39	Lilliefors Test Statistic	0.0874
5% Lilliefors Critical Value	0.115	5% Lilliefors Critical Value	0.115
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	657.4	Mean	3.43
SD	3168	SD	2.028
95% DL/2 (t) UCL	1037	95% H-Stat (DL/2) UCL	278.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.668
		SD in Log Scale	2.578
		Mean in Original Scale	643.7
		SD in Original Scale	3170
		95% Percentile Bootstrap UCL	1055
		95% BCA Bootstrap UCL	1230
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.276	**Data appear Lognormal at 5% Significance Level**	
Theta Star	7399		
nu star	32.6		
A-D Test Statistic	2.691	**Nonparametric Statistics**	
5% A-D Critical Value	0.873	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.873	Mean	640.4
5% K-S Critical Value	0.126	SD	3162
Data not Gamma Distributed at 5% Significance Level		SE of Mean	231.4
		95% KM (t) UCL	1023
Assuming Gamma Distribution		95% KM (z) UCL	1021
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1021
Minimum	2.75	95% KM (bootstrap t) UCL	1360
Maximum	29000	95% KM (BCA) UCL	1042
Mean	3262	95% KM (Percentile Bootstrap) UCL	1063
Median	1331	95% KM (Chebyshev) UCL	1649
SD	4364	97.5% KM (Chebyshev) UCL	2085
k star	0.559	99% KM (Chebyshev) UCL	2943
Theta star	5836		
Nu star	212.4	**Potential UCLs to Use**	
AppChi2	179.7	97.5% KM (Chebyshev) UCL	2085
95% Gamma Approximate UCL	3857		
95% Adjusted Gamma UCL	3862		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	190	Number of Detected Data	12
Number of Distinct Detected Data	11	Number of Non-Detect Data	178
		Percent Non-Detects	93.68%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.375	Minimum Detected	0.865
Maximum Detected	6700	Maximum Detected	8.81
Mean of Detected	1360	Mean of Detected	4.998
SD of Detected	2124	SD of Detected	2.833
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	189
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.707	Lilliefors Test Statistic	0.909
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	133.4	Mean	1.19
SD	660.9	SD	2.081
95% DL/2 (t) UCL	212.7	95% H-Stat (DL/2) UCL	40.58
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-7.761
		SD in Log Scale	5.756
		Mean in Original Scale	86.07
		SD in Original Scale	610.5
		95% Percentile Bootstrap UCL	162.1
		95% BCA Bootstrap UCL	203.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.288	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	4731		
nu star	6.902		
A-D Test Statistic	0.526	**Nonparametric Statistics**	
5% A-D Critical Value	0.822	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.822	Mean	88.87
5% K-S Critical Value	0.265	SD	609.5
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	46.26
		95% KM (t) UCL	165.3
Assuming Gamma Distribution		95% KM (z) UCL	165
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	159.2
Minimum	2.375	95% KM (bootstrap t) UCL	301.4
Maximum	6700	95% KM (BCA) UCL	191
Mean	1563	95% KM (Percentile Bootstrap) UCL	171.3
Median	1286	95% KM (Chebyshev) UCL	290.5
SD	813	97.5% KM (Chebyshev) UCL	377.8
k star	2.58	99% KM (Chebyshev) UCL	549.2
Theta star	605.5		
Nu star	980.6	**Potential UCLs to Use**	
AppChi2	908.9	95% KM (t) UCL	165.3
95% Gamma Approximate UCL	1686		
95% Adjusted Gamma UCL	1687		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	190	Number of Detected Data	82
Number of Distinct Detected Data	69	Number of Non-Detect Data	108
		Percent Non-Detects	56.84%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	18000	Maximum Detected	9.798
Mean of Detected	1095	Mean of Detected	5.001
SD of Detected	3002	SD of Detected	2.178
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	1100	Maximum Non-Detect	7.003
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	175
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	15
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.11%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.358	Lilliefors Test Statistic	0.0752
5% Lilliefors Critical Value	0.0978	5% Lilliefors Critical Value	0.0978
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	490.9	Mean	3.627
SD	2035	SD	2.048
95% DL/2 (t) UCL	735	95% H-Stat (DL/2) UCL	339.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.192
		SD in Log Scale	2.395
		Mean in Original Scale	480.3
		SD in Original Scale	2037
		95% Percentile Bootstrap UCL	728.6
		95% BCA Bootstrap UCL	860.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.334	**Data appear Lognormal at 5% Significance Level**	
Theta Star	3279		
nu star	54.8		
A-D Test Statistic	2.953	**Nonparametric Statistics**	
5% A-D Critical Value	0.857	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.857	Mean	478.4
5% K-S Critical Value	0.107	SD	2032
Data not Gamma Distributed at 5% Significance Level		SE of Mean	148.4
		95% KM (t) UCL	723.6
Assuming Gamma Distribution		95% KM (z) UCL	722.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	722.8
Minimum	3.125	95% KM (bootstrap t) UCL	910.3
Maximum	18000	95% KM (BCA) UCL	738.8
Mean	1098	95% KM (Percentile Bootstrap) UCL	737.3
Median	1057	95% KM (Chebyshev) UCL	1125
SD	1965	97.5% KM (Chebyshev) UCL	1405
k star	0.693	99% KM (Chebyshev) UCL	1955
Theta star	1585		
Nu star	263.2	**Potential UCLs to Use**	
AppChi2	226.6	97.5% KM (Chebyshev) UCL	1405
95% Gamma Approximate UCL	1275		
95% Adjusted Gamma UCL	1276		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	190	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	168
		Percent Non-Detects	88.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.625	Minimum Detected	0.486
Maximum Detected	7100	Maximum Detected	8.868
Mean of Detected	1237	Mean of Detected	4.789
SD of Detected	1870	SD of Detected	2.996
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	189
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.721	Lilliefors Test Statistic	0.883
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	169.4	Mean	1.213
SD	769.5	SD	2.138
95% DL/2 (t) UCL	261.6	95% H-Stat (DL/2) UCL	40.47
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.127
		SD in Log Scale	5.489
		Mean in Original Scale	143.5
		SD in Original Scale	738.9
		95% Percentile Bootstrap UCL	231.5
		95% BCA Bootstrap UCL	274.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.286	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	4319		
nu star	12.6		
A-D Test Statistic	0.753	**Nonparametric Statistics**	
5% A-D Critical Value	0.849	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.849	Mean	145.4
5% K-S Critical Value	0.201	SD	737.7
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	54.86
		95% KM (t) UCL	236
Assuming Gamma Distribution		95% KM (z) UCL	235.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	233.8
Minimum	1.625	95% KM (bootstrap t) UCL	298.3
Maximum	9291	95% KM (BCA) UCL	240.8
Mean	1840	95% KM (Percentile Bootstrap) UCL	243.7
Median	939	95% KM (Chebyshev) UCL	384.5
SD	2069	97.5% KM (Chebyshev) UCL	487.9
k star	0.796	99% KM (Chebyshev) UCL	691.2
Theta star	2311		
Nu star	302.6	**Potential UCLs to Use**	
AppChi2	263.3	95% KM (t) UCL	236
95% Gamma Approximate UCL	2115		
95% Adjusted Gamma UCL	2117		

Note: DL/2 is not a recommended method.

Result (selenium)

General Statistics

Number of Valid Data	101	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	81
		Percent Non-Detects	80.20%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.01	Minimum Detected	0.00995
Maximum Detected	13.4	Maximum Detected	2.595
Mean of Detected	2.578	Mean of Detected	0.727
SD of Detected	2.65	SD of Detected	0.578
Minimum Non-Detect	0.785	Minimum Non-Detect	-0.242
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	84
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.17%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.484	Lilliefors Test Statistic	0.848
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.925	Mean	-0.4
SD	1.422	SD	0.639
95% DL/2 (t) UCL	1.16	95% H-Stat (DL/2) UCL	0.851
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.992
		SD in Log Scale	1.067
		Mean in Original Scale	0.746
		SD in Original Scale	1.484
		95% Percentile Bootstrap UCL	1.008
		95% BCA Bootstrap UCL	1.154
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.099	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.228		
nu star	83.94		
A-D Test Statistic	1.528	**Nonparametric Statistics**	
5% A-D Critical Value	0.75	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.75	Mean	1.321
5% K-S Critical Value	0.196	SD	1.308
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.134
		95% KM (t) UCL	1.543
Assuming Gamma Distribution		95% KM (z) UCL	1.541
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.514
Minimum	1.01	95% KM (bootstrap t) UCL	1.851
Maximum	13.4	95% KM (BCA) UCL	1.692
Mean	2.573	95% KM (Percentile Bootstrap) UCL	1.599
Median	2.579	95% KM (Chebyshev) UCL	1.903
SD	1.163	97.5% KM (Chebyshev) UCL	2.155
k star	10.98	99% KM (Chebyshev) UCL	2.65
Theta star	0.234		
Nu star	2217	**Potential UCLs to Use**	
AppChi2	2109	95% KM (t) UCL	1.543
95% Gamma Approximate UCL	2.705	95% KM (% Bootstrap) UCL	1.599
95% Adjusted Gamma UCL	2.707		

Note: DL/2 is not a recommended method.

Result (tert-butyl alcohol (tba))

General Statistics

Number of Valid Data	190	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	178
		Percent Non-Detects	93.68%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	12.5	Minimum Detected	2.526
Maximum Detected	151.3	Maximum Detected	5.019
Mean of Detected	50.56	Mean of Detected	3.667
SD of Detected	39.99	SD of Detected	0.743
Minimum Non-Detect	11	Minimum Non-Detect	2.398
Maximum Non-Detect	62500	Maximum Non-Detect	11.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	190
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.839	Lilliefors Test Statistic	0.973
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	808.6	Mean	3.724
SD	3408	SD	1.835
95% DL/2 (t) UCL	1217	95% H-Stat (DL/2) UCL	338
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.866
		SD in Log Scale	0.943
		Mean in Original Scale	10.65
		SD in Original Scale	15.88
		95% Percentile Bootstrap UCL	12.59
		95% BCA Bootstrap UCL	13.24
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.632	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	30.97		
nu star	39.18		
A-D Test Statistic	0.293	**Nonparametric Statistics**	
5% A-D Critical Value	0.741	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.741	Mean	16.78
5% K-S Critical Value	0.248	SD	15.01
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.427
		95% KM (t) UCL	19.14
Assuming Gamma Distribution		95% KM (z) UCL	19.13
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	20.46
Minimum	12.5	95% KM (bootstrap t) UCL	19.58
Maximum	151.3	95% KM (BCA) UCL	26.01
Mean	53.99	95% KM (Percentile Bootstrap) UCL	24.18
Median	55.7	95% KM (Chebyshev) UCL	23
SD	14.68	97.5% KM (Chebyshev) UCL	25.69
k star	12.58	99% KM (Chebyshev) UCL	30.98
Theta star	4.292		
Nu star	4780	**Potential UCLs to Use**	
AppChi2	4620	95% KM (t) UCL	19.14
95% Gamma Approximate UCL	55.86		
95% Adjusted Gamma UCL	55.87		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics

Number of Valid Data	190	Number of Detected Data	18
Number of Distinct Detected Data	18	Number of Non-Detect Data	172
		Percent Non-Detects	90.53%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.375	Minimum Detected	0.318
Maximum Detected	3188	Maximum Detected	8.067
Mean of Detected	182.4	Mean of Detected	1.719
SD of Detected	750	SD of Detected	1.785
Minimum Non-Detect	0.57	Minimum Non-Detect	-0.562
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	190
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.258	Lilliefors Test Statistic	0.673
5% Lilliefors Critical Value	0.897	5% Lilliefors Critical Value	0.897
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	68.67	Mean	1.193
SD	344.8	SD	1.915
95% DL/2 (t) UCL	110	95% H-Stat (DL/2) UCL	31.79
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.463
		SD in Log Scale	2.4
		Mean in Original Scale	17.63
		SD in Original Scale	231.2
		95% Percentile Bootstrap UCL	51.13
		95% BCA Bootstrap UCL	84.39
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.212	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	862.1		
nu star	7.619		
A-D Test Statistic	4.759	**Nonparametric Statistics**	
5% A-D Critical Value	0.88	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.88	Mean	18.85
5% K-S Critical Value	0.225	SD	231.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	17.3
		95% KM (t) UCL	47.44
Assuming Gamma Distribution		95% KM (z) UCL	47.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	46.61
Minimum	1E-09	95% KM (bootstrap t) UCL	2246
Maximum	11438	95% KM (BCA) UCL	53.33
Mean	1117	95% KM (Percentile Bootstrap) UCL	52.37
Median	72.71	95% KM (Chebyshev) UCL	94.25
SD	2256	97.5% KM (Chebyshev) UCL	126.9
k star	0.0875	99% KM (Chebyshev) UCL	191
Theta star	12763		
Nu star	33.26	**Potential UCLs to Use**	
AppChi2	21.07	95% KM (Chebyshev) UCL	94.25
95% Gamma Approximate UCL	1763		
95% Adjusted Gamma UCL	1769		

Note: DL/2 is not a recommended method.

Result (vanadium)

General Statistics

Number of Valid Observations	101	Number of Distinct Observations	91

Raw Statistics		**Log-transformed Statistics**	
Minimum	17.7	Minimum of Log Data	2.874
Maximum	128	Maximum of Log Data	4.852
Mean	53.41	Mean of log Data	3.908
Median	51.7	SD of log Data	0.39
SD	19.32		
Coefficient of Variation	0.362		
Skewness	0.638		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0987	Lilliefors Test Statistic	0.122
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	56.6	95% H-UCL	57.58
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	63.08
95% Adjusted-CLT UCL	56.7	97.5% Chebyshev (MVUE) UCL	67.14
95% Modified-t UCL	56.62	99% Chebyshev (MVUE) UCL	75.12
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.13	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	7.49		
nu star	1440		
Approximate Chi Square Value (.05)	1353	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	56.57
Adjusted Chi Square Value	1352	95% Jackknife UCL	56.6
		95% Standard Bootstrap UCL	56.55
Anderson-Darling Test Statistic	0.817	95% Bootstrap-t UCL	56.66
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	56.73
Kolmogorov-Smirnov Test Statistic	0.0962	95% Percentile Bootstrap UCL	56.46
Kolmogorov-Smirnov 5% Critical Value	0.0892	95% BCA Bootstrap UCL	56.56
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	61.78
		97.5% Chebyshev(Mean, Sd) UCL	65.41
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	72.53
95% Approximate Gamma UCL	56.84		
95% Adjusted Gamma UCL	56.9		
Potential UCL to Use		Use 95% Student's-t UCL	56.6
		or 95% Modified-t UCL	56.62

Result (xylenes, total)

General Statistics

Number of Valid Data	190	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	168
		Percent Non-Detects	88.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	184000	Maximum Detected	12.12
Mean of Detected	22545	Mean of Detected	5.18
SD of Detected	52065	SD of Detected	4.014
Minimum Non-Detect	1.1	Minimum Non-Detect	0.0953
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	184
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.84%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.5	Lilliefors Test Statistic	0.865
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2651	Mean	1.624
SD	18798	SD	2.339
95% DL/2 (t) UCL	4905	95% H-Stat (DL/2) UCL	104.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-8.863
		SD in Log Scale	7.759
		Mean in Original Scale	2611
		SD in Original Scale	18802
		95% Percentile Bootstrap UCL	5059
		95% BCA Bootstrap UCL	6098
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.166	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	135521		
nu star	7.32		
A-D Test Statistic	1.918	**Nonparametric Statistics**	
5% A-D Critical Value	0.909	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.909	Mean	2613
5% K-S Critical Value	0.207	SD	18752
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1392
		95% KM (t) UCL	4914
Assuming Gamma Distribution		95% KM (z) UCL	4903
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4867
Minimum	2	95% KM (bootstrap t) UCL	9256
Maximum	440782	95% KM (BCA) UCL	5310
Mean	42187	95% KM (Percentile Bootstrap) UCL	5124
Median	6104	95% KM (Chebyshev) UCL	8682
SD	82512	97.5% KM (Chebyshev) UCL	11309
k star	0.326	99% KM (Chebyshev) UCL	16467
Theta star	129602		
Nu star	123.7	**Potential UCLs to Use**	
AppChi2	99.01	97.5% KM (Chebyshev) UCL	11309
95% Gamma Approximate UCL	52705		
95% Adjusted Gamma UCL	52795		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	101	Number of Distinct Observations	99

Raw Statistics		**Log-transformed Statistics**	
Minimum	25.9	Minimum of Log Data	3.254
Maximum	1810	Maximum of Log Data	7.501
Mean	133.5	Mean of log Data	4.528
Median	81.38	SD of log Data	0.652
SD	223.5		
Coefficient of Variation	1.674		
Skewness	5.595		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.371	Lilliefors Test Statistic	0.236
Lilliefors Critical Value	0.0882	Lilliefors Critical Value	0.0882
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	170.4	95% H-UCL	129.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	149.4
95% Adjusted-CLT UCL	183.3	97.5% Chebyshev (MVUE) UCL	164.7
95% Modified-t UCL	172.5	99% Chebyshev (MVUE) UCL	194.6
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.472	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	90.71		
nu star	297.3		
Approximate Chi Square Value (.05)	258.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0476	95% CLT UCL	170.1
Adjusted Chi Square Value	257.9	95% Jackknife UCL	170.4
		95% Standard Bootstrap UCL	170.1
Anderson-Darling Test Statistic	14.71	95% Bootstrap-t UCL	205.7
Anderson-Darling 5% Critical Value	0.77	95% Hall's Bootstrap UCL	209.1
Kolmogorov-Smirnov Test Statistic	0.31	95% Percentile Bootstrap UCL	171.1
Kolmogorov-Smirnov 5% Critical Value	0.0908	95% BCA Bootstrap UCL	191
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	230.5
		97.5% Chebyshev(Mean, Sd) UCL	272.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	354.8
95% Approximate Gamma UCL	153.6		
95% Adjusted Gamma UCL	154		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	230.5

	General UCL Statistics for Data Sets with Non-Detects		
User Selected Options			
From File	WorkSheet.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Result (benzene)			
	General Statistics		
Number of Valid Data	63	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	56
		Percent Non-Detects	88.89%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	380	Maximum Detected	5.94
Mean of Detected	65.13	Mean of Detected	2.214
SD of Detected	139.7	SD of Detected	2.155
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
	UCL Statistics		
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.537	Lilliefors Test Statistic	0.869
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.681	Mean	-0.37
SD	48.03	SD	1.139
95% DL/2 (t) UCL	17.79	95% H-Stat (DL/2) UCL	2.306
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-8.683
		SD in Log Scale	6.34
		Mean in Original Scale	7.251
		SD in Original Scale	48.1
		95% Percentile Bootstrap UCL	19.36
		95% BCA Bootstrap UCL	26.38
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.292	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	223.3		
nu star	4.083		
A-D Test Statistic	0.761	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	8.214
5% K-S Critical Value	0.333	SD	47.57
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	6.473
		95% KM (t) UCL	19.02
Assuming Gamma Distribution		95% KM (z) UCL	18.86
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	17.75
Minimum	1E-09	95% KM (bootstrap t) UCL	84.41
Maximum	412467	95% KM (BCA) UCL	26.76
Mean	86074	95% KM (Percentile Bootstrap) UCL	20.78
Median	25934	95% KM (Chebyshev) UCL	36.43
SD	115865	97.5% KM (Chebyshev) UCL	48.64
k star	0.205	99% KM (Chebyshev) UCL	72.62
Theta star	419587		
Nu star	25.85	**Potential UCLs to Use**	
AppChi2	15.26	95% KM (t) UCL	19.02
95% Gamma Approximate UCL	145774		
95% Adjusted Gamma UCL	147621		

Appendix D
ProUCL Generated Output for Detected Constituents in Soil Gas
Area 2
Baseline Human Health Risk Assessment
Isola Law Group, LLC
Former CENCO Refinery

Note: DL/2 is not a recommended method.

Result (ethylbenzene)

General Statistics

Number of Valid Data	63	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	57
		Percent Non-Detects	90.48%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.6	Minimum Detected	0.47
Maximum Detected	38	Maximum Detected	3.638
Mean of Detected	15.68	Mean of Detected	2.311
SD of Detected	13.66	SD of Detected	1.161
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.928	Lilliefors Test Statistic	0.957
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.946	Mean	-0.407
SD	5.936	SD	0.948
95% DL/2 (t) UCL	3.195	95% H-Stat (DL/2) UCL	1.092
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.835
		SD in Log Scale	3.433
		Mean in Original Scale	1.627
		SD in Original Scale	6.023
		95% Percentile Bootstrap UCL	3.007
		95% BCA Bootstrap UCL	3.743
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.748	**Data appear Normal at 5% Significance Level**	
Theta Star	20.97		
nu star	8.976		
A-D Test Statistic	0.17	**Nonparametric Statistics**	
5% A-D Critical Value	0.711	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.711	Mean	2.941
5% K-S Critical Value	0.339	SD	5.648
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.78
		95% KM (t) UCL	4.243
Assuming Gamma Distribution		95% KM (z) UCL	4.223
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4.894
Minimum	1E-09	95% KM (bootstrap t) UCL	4.815
Maximum	789.4	95% KM (BCA) UCL	14.56
Mean	311	95% KM (Percentile Bootstrap) UCL	12.6
Median	273.2	95% KM (Chebyshev) UCL	6.339
SD	248.3	97.5% KM (Chebyshev) UCL	7.809
k star	0.589	99% KM (Chebyshev) UCL	10.7
Theta star	528.2		
Nu star	74.19	**Potential UCLs to Use**	
AppChi2	55.35	95% KM (t) UCL	4.243
95% Gamma Approximate UCL	416.8	95% KM (Percentile Bootstrap) UCL	12.6
95% Adjusted Gamma UCL	419.7		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	63	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	58
		Percent Non-Detects	92.06%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	3.5	Maximum Detected	1.253
Mean of Detected	2.42	Mean of Detected	0.827
SD of Detected	0.835	SD of Detected	0.398
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.976	Lilliefors Test Statistic	0.913
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.652	Mean	-0.573
SD	0.565	SD	0.426
95% DL/2 (t) UCL	0.771	95% H-Stat (DL/2) UCL	0.63
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	2.545	Mean in Log Scale	-1.418
SD	0.747	SD in Log Scale	1.199
95% MLE (t) UCL	2.702	Mean in Original Scale	0.482
95% MLE (Tiku) UCL	3.098	SD in Original Scale	0.673
		95% Percentile Bootstrap UCL	0.629
		95% BCA Bootstrap UCL	0.679
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.698	**Data appear Normal at 5% Significance Level**	
Theta Star	0.654		
nu star	36.98		
A-D Test Statistic	0.306	**Nonparametric Statistics**	
5% A-D Critical Value	0.679	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.679	Mean	1.297
5% K-S Critical Value	0.358	SD	0.391
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0551
		95% KM (t) UCL	1.389
Assuming Gamma Distribution		95% KM (z) UCL	1.387
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.918
Minimum	1.2	95% KM (bootstrap t) UCL	1.368
Maximum	9.515	95% KM (BCA) UCL	2.7
Mean	6.457	95% KM (Percentile Bootstrap) UCL	2.551
Median	6.991	95% KM (Chebyshev) UCL	1.537
SD	2.341	97.5% KM (Chebyshev) UCL	1.641
k star	5.156	99% KM (Chebyshev) UCL	1.845
Theta star	1.252		
Nu star	649.7	**Potential UCLs to Use**	
AppChi2	591.5	95% KM (t) UCL	1.389
95% Gamma Approximate UCL	7.092	95% KM (Percentile Bootstrap) UCL	2.551
95% Adjusted Gamma UCL	7.107		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	63	Number of Detected Data	13
Number of Distinct Detected Data	11	Number of Non-Detect Data	50
		Percent Non-Detects	79.37%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	24	Maximum Detected	3.178
Mean of Detected	5.454	Mean of Detected	1.133
SD of Detected	6.502	SD of Detected	1.089
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.711	Lilliefors Test Statistic	0.875
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.522	Mean	-0.316
SD	3.502	SD	0.886
95% DL/2 (t) UCL	2.259	95% H-Stat (DL/2) UCL	1.091
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.453
		SD in Log Scale	2.564
		Mean in Original Scale	1.218
		SD in Original Scale	3.598
		95% Percentile Bootstrap UCL	1.99
		95% BCA Bootstrap UCL	2.459
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.838	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	6.509		
nu star	21.79		
A-D Test Statistic	0.824	**Nonparametric Statistics**	
5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	1.919
5% K-S Critical Value	0.243	SD	3.362
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.441
		95% KM (t) UCL	2.655
Assuming Gamma Distribution		95% KM (z) UCL	2.644
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.632
Minimum	1E-09	95% KM (bootstrap t) UCL	3.39
Maximum	83.58	95% KM (BCA) UCL	2.719
Mean	30.74	95% KM (Percentile Bootstrap) UCL	2.768
Median	24.15	95% KM (Chebyshev) UCL	3.841
SD	26.6	97.5% KM (Chebyshev) UCL	4.672
k star	0.385	99% KM (Chebyshev) UCL	6.305
Theta star	79.8		
Nu star	48.54	**Potential UCLs to Use**	
AppChi2	33.54	95% KM (t) UCL	2.655
95% Gamma Approximate UCL	44.48		
95% Adjusted Gamma UCL	44.87		
Note: DL/2 is not a recommended method.			

Result (toluene)

General Statistics

Number of Valid Data	63	Number of Detected Data	7
Number of Distinct Detected Data	6	Number of Non-Detect Data	56
		Percent Non-Detects	88.89%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	35	Maximum Detected	3.555
Mean of Detected	6.9	Mean of Detected	0.981
SD of Detected	12.54	SD of Detected	1.297
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.555	Lilliefors Test Statistic	0.781
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.211	Mean	-0.507
SD	4.395	SD	0.666
95% DL/2 (t) UCL	2.136	95% H-Stat (DL/2) UCL	0.792
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.439
		SD in Log Scale	3.736
		Mean in Original Scale	0.795
		SD in Original Scale	4.466
		95% Percentile Bootstrap UCL	1.9
		95% BCA Bootstrap UCL	2.893
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.463	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	14.91		
nu star	6.479		
A-D Test Statistic	1.067	**Nonparametric Statistics**	
5% A-D Critical Value	0.743	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.743	Mean	1.656
5% K-S Critical Value	0.325	SD	4.29
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.584
		95% KM (t) UCL	2.63
Assuming Gamma Distribution		95% KM (z) UCL	2.616
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.491
Minimum	1E-09	95% KM (bootstrap t) UCL	19.68
Maximum	2514	95% KM (BCA) UCL	3.454
Mean	725.6	95% KM (Percentile Bootstrap) UCL	2.824
Median	436.8	95% KM (Chebyshev) UCL	4.2
SD	766.4	97.5% KM (Chebyshev) UCL	5.301
k star	0.324	99% KM (Chebyshev) UCL	7.464
Theta star	2240		
Nu star	40.81	**Potential UCLs to Use**	
AppChi2	27.17	95% KM (BCA) UCL	3.454
95% Gamma Approximate UCL	1090		
95% Adjusted Gamma UCL	1100		

Note: DL/2 is not a recommended method.

Result (xylenes, total)

General Statistics

Number of Valid Data	63	Number of Detected Data	13
Number of Distinct Detected Data	11	Number of Non-Detect Data	50
		Percent Non-Detects	79.37%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	26.7	Maximum Detected	3.285
Mean of Detected	6.385	Mean of Detected	1.215
SD of Detected	7.578	SD of Detected	1.182
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.745	Lilliefors Test Statistic	0.862
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.714	Mean	-0.299
SD	4.108	SD	0.936
95% DL/2 (t) UCL	2.579	95% H-Stat (DL/2) UCL	1.166
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.662
		SD in Log Scale	2.772
		Mean in Original Scale	1.4
		SD in Original Scale	4.207
		95% Percentile Bootstrap UCL	2.352
		95% BCA Bootstrap UCL	2.68
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.754	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	8.471		
nu star	19.6		
A-D Test Statistic	0.888	**Nonparametric Statistics**	
5% A-D Critical Value	0.762	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.762	Mean	2.111
5% K-S Critical Value	0.244	SD	3.961
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.519
		95% KM (t) UCL	2.978
Assuming Gamma Distribution		95% KM (z) UCL	2.965
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.951
Minimum	1E-09	95% KM (bootstrap t) UCL	3.726
Maximum	121.5	95% KM (BCA) UCL	3.084
Mean	42.26	95% KM (Percentile Bootstrap) UCL	3.006
Median	31.15	95% KM (Chebyshev) UCL	4.375
SD	38.46	97.5% KM (Chebyshev) UCL	5.355
k star	0.367	99% KM (Chebyshev) UCL	7.279
Theta star	115.2		
Nu star	46.22	**Potential UCLs to Use**	
AppChi2	31.62	95% KM (BCA) UCL	3.084
95% Gamma Approximate UCL	61.77		
95% Adjusted Gamma UCL	62.32		
Note: DL/2 is not a recommended method.			

	General UCL Statistics for Data Sets with Non-Detects			
User Selected Options				
From File	C:\Documents and Settings\sselden\Desktop\cenco\Area 3 0-2 proucl input.wst			
Full Precision	OFF			
Confidence Coefficient	95%			
Number of Bootstrap Operations	2000			
Result (1,2,4-trimethylbenzene)				
General Statistics				
Number of Valid Data	143		Number of Detected Data	30
Number of Distinct Detected Data	29		Number of Non-Detect Data	113
			Percent Non-Detects	79.02%
Raw Statistics			**Log-transformed Statistics**	
Minimum Detected	2.5		Minimum Detected	0.916
Maximum Detected	60000		Maximum Detected	11
Mean of Detected	2982		Mean of Detected	4.776
SD of Detected	11019		SD of Detected	2.601
Minimum Non-Detect	1		Minimum Non-Detect	0
Maximum Non-Detect	490		Maximum Non-Detect	6.194
Note: Data have multiple DLs - Use of KM Method is recommended			Number treated as Non-Detect	134
For all methods (except KM, DL/2, and ROS Methods),			Number treated as Detected	9
Observations < Largest ND are treated as NDs			Single DL Non-Detect Percentage	93.71%
UCL Statistics				
Normal Distribution Test with Detected Values Only			**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.296		Lilliefors Test Statistic	0.955
5% Lilliefors Critical Value	0.927		5% Lilliefors Critical Value	0.927
Data not Normal at 5% Significance Level			**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution			**Assuming Lognormal Distribution**	
DL/2 Substitution Method			DL/2 Substitution Method	
Mean	637.5		Mean	1.664
SD	5125		SD	2.475
95% DL/2 (t) UCL	1347		95% H-Stat (DL/2) UCL	146.9
Maximum Likelihood Estimate(MLE) Method	N/A		Log ROS Method	
MLE yields a negative mean			Mean in Log Scale	-2.399
			SD in Log Scale	4.576
			Mean in Original Scale	625.6
			SD in Original Scale	5127
			95% Percentile Bootstrap UCL	1452
			95% BCA Bootstrap UCL	2248
Gamma Distribution Test with Detected Values Only			**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.224		**Data appear Lognormal at 5% Significance Level**	
Theta Star	13310			
nu star	13.44			
A-D Test Statistic	2.631		**Nonparametric Statistics**	
5% A-D Critical Value	0.887		Kaplan-Meier (KM) Method	
K-S Test Statistic	0.887		Mean	628.2
5% K-S Critical Value	0.176		SD	5108
Data not Gamma Distributed at 5% Significance Level			SE of Mean	434.5
			95% KM (t) UCL	1348
Assuming Gamma Distribution			95% KM (z) UCL	1343
Gamma ROS Statistics using Extrapolated Data			95% KM (jackknife) UCL	1338
Minimum	1E-09		95% KM (bootstrap t) UCL	4478
Maximum	60000		95% KM (BCA) UCL	1433
Mean	2872		95% KM (Percentile Bootstrap) UCL	1451
Median	3025		95% KM (Chebyshev) UCL	2522
SD	5084		97.5% KM (Chebyshev) UCL	3342
k star	0.338		99% KM (Chebyshev) UCL	4951
Theta star	8494			
Nu star	96.7		**Potential UCLs to Use**	
AppChi2	75.01		97.5% KM (Chebyshev) UCL	3342
95% Gamma Approximate UCL	3702			
95% Adjusted Gamma UCL	3711			
Note: DL/2 is not a recommended method.				

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	143	Number of Detected Data	17
Number of Distinct Detected Data	15	Number of Non-Detect Data	126
		Percent Non-Detects	88.11%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.6	Minimum Detected	1.281
Maximum Detected	28000	Maximum Detected	10.24
Mean of Detected	2243	Mean of Detected	4.746
SD of Detected	6760	SD of Detected	2.69
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	490	Maximum Non-Detect	6.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	137
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.37	Lilliefors Test Statistic	0.925
5% Lilliefors Critical Value	0.892	5% Lilliefors Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	281.9	Mean	1.473
SD	2382	SD	2.236
95% DL/2 (t) UCL	611.7	95% H-Stat (DL/2) UCL	77.47
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.635
		SD in Log Scale	5.099
		Mean in Original Scale	266.6
		SD in Original Scale	2383
		95% Percentile Bootstrap UCL	647
		95% BCA Bootstrap UCL	946.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.237	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	9445		
nu star	8.073		
A-D Test Statistic	1.279	**Nonparametric Statistics**	
5% A-D Critical Value	0.866	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.866	Mean	270
5% K-S Critical Value	0.23	SD	2375
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	204.7
		95% KM (t) UCL	608.9
Assuming Gamma Distribution		95% KM (z) UCL	606.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	599.3
Minimum	1E-09	95% KM (bootstrap t) UCL	3976
Maximum	28000	95% KM (BCA) UCL	665.9
Mean	2095	95% KM (Percentile Bootstrap) UCL	651.6
Median	2376	95% KM (Chebyshev) UCL	1162
SD	2436	97.5% KM (Chebyshev) UCL	1548
k star	0.272	99% KM (Chebyshev) UCL	2307
Theta star	7715		
Nu star	77.66	**Potential UCLs to Use**	
AppChi2	58.36	95% KM (t) UCL	608.9
95% Gamma Approximate UCL	2788		
95% Adjusted Gamma UCL	2796		

Note: DL/2 is not a recommended method.

Result (1-methylnaphthalene)

General Statistics

Number of Valid Data	143	Number of Detected Data	37
Number of Distinct Detected Data	34	Number of Non-Detect Data	106
		Percent Non-Detects	74.13%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	85	Minimum Detected	4.443
Maximum Detected	240000	Maximum Detected	12.39
Mean of Detected	19389	Mean of Detected	7.317
SD of Detected	50796	SD of Detected	2.227
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	126
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.11%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.446	Lilliefors Test Statistic	0.908
5% Lilliefors Critical Value	0.936	5% Lilliefors Critical Value	0.936
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5076	Mean	4.857
SD	26947	SD	1.995
95% DL/2 (t) UCL	8807	95% H-Stat (DL/2) UCL	937.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.871
		SD in Log Scale	4.097
		Mean in Original Scale	5023
		SD in Original Scale	26957
		95% Percentile Bootstrap UCL	9089
		95% BCA Bootstrap UCL	10468
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.27	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	71896		
nu star	19.96		
A-D Test Statistic	3.621	**Nonparametric Statistics**	
5% A-D Critical Value	0.868	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.868	Mean	5082
5% K-S Critical Value	0.158	SD	26852
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2276
		95% KM (t) UCL	8851
Assuming Gamma Distribution		95% KM (z) UCL	8827
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8806
Minimum	1E-09	95% KM (bootstrap t) UCL	14277
Maximum	240000	95% KM (BCA) UCL	9521
Mean	17800	95% KM (Percentile Bootstrap) UCL	9177
Median	18095	95% KM (Chebyshev) UCL	15005
SD	26702	97.5% KM (Chebyshev) UCL	19299
k star	0.214	99% KM (Chebyshev) UCL	27733
Theta star	83234		
Nu star	61.16	**Potential UCLs to Use**	
AppChi2	44.18	97.5% KM (Chebyshev) UCL	19299
95% Gamma Approximate UCL	24645		
95% Adjusted Gamma UCL	24727		

Note: DL/2 is not a recommended method.

Result (2-butanone)

General Statistics

Number of Valid Data	143	Number of Detected Data	54
Number of Distinct Detected Data	37	Number of Non-Detect Data	89
		Percent Non-Detects	62.24%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	18	Minimum Detected	2.89
Maximum Detected	150	Maximum Detected	5.011
Mean of Detected	44.33	Mean of Detected	3.678
SD of Detected	24.19	SD of Detected	0.463
Minimum Non-Detect	8.1	Minimum Non-Detect	2.092
Maximum Non-Detect	10000	Maximum Non-Detect	9.21
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.149	Lilliefors Test Statistic	0.105
5% Lilliefors Critical Value	0.121	5% Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	238	Mean	4.015
SD	546	SD	1.68
95% DL/2 (t) UCL	313.6	95% H-Stat (DL/2) UCL	449
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.165
		SD in Log Scale	0.586
		Mean in Original Scale	28.5
		SD in Original Scale	20.37
		95% Percentile Bootstrap UCL	31.36
		95% BCA Bootstrap UCL	31.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.301	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	10.31		
nu star	464.5		
A-D Test Statistic	0.935	**Nonparametric Statistics**	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	32.36
5% K-S Critical Value	0.121	SD	21.76
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	2.189
		95% KM (t) UCL	35.99
Assuming Gamma Distribution		95% KM (z) UCL	35.96
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	35.39
Minimum	18	95% KM (bootstrap t) UCL	36.1
Maximum	150	95% KM (BCA) UCL	37.89
Mean	47.43	95% KM (Percentile Bootstrap) UCL	36.84
Median	47	95% KM (Chebyshev) UCL	41.9
SD	18.02	97.5% KM (Chebyshev) UCL	46.03
k star	7.349	99% KM (Chebyshev) UCL	54.14
Theta star	6.455		
Nu star	2102	**Potential UCLs to Use**	
AppChi2	1996	95% KM (t) UCL	35.99
95% Gamma Approximate UCL	49.94		
95% Adjusted Gamma UCL	49.97		

Note: DL/2 is not a recommended method.

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	143	Number of Detected Data	39
Number of Distinct Detected Data	35	Number of Non-Detect Data	104
		Percent Non-Detects	72.73%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	40	Minimum Detected	3.689
Maximum Detected	360000	Maximum Detected	12.79
Mean of Detected	24689	Mean of Detected	7.246
SD of Detected	70566	SD of Detected	2.34
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	126
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.11%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.412	Lilliefors Test Statistic	0.91
5% Lilliefors Critical Value	0.939	5% Lilliefors Critical Value	0.939
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6792	Mean	4.892
SD	38125	SD	2.033
95% DL/2 (t) UCL	12070	95% H-Stat (DL/2) UCL	1023
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.762
		SD in Log Scale	4.261
		Mean in Original Scale	6739
		SD in Original Scale	38135
		95% Percentile Bootstrap UCL	12490
		95% BCA Bootstrap UCL	14492
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.246	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	100369		
nu star	19.19		
A-D Test Statistic	4.248	**Nonparametric Statistics**	
5% A-D Critical Value	0.881	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.881	Mean	6767
5% K-S Critical Value	0.155	SD	37996
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3219
		95% KM (t) UCL	12096
Assuming Gamma Distribution		95% KM (z) UCL	12061
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12039
Minimum	1E-09	95% KM (bootstrap t) UCL	21785
Maximum	360000	95% KM (BCA) UCL	12387
Mean	23255	95% KM (Percentile Bootstrap) UCL	12338
Median	24218	95% KM (Chebyshev) UCL	20798
SD	37436	97.5% KM (Chebyshev) UCL	26869
k star	0.277	99% KM (Chebyshev) UCL	38795
Theta star	83871		
Nu star	79.3	**Potential UCLs to Use**	
AppChi2	59.78	97.5% KM (Chebyshev) UCL	26869
95% Gamma Approximate UCL	30847		
95% Adjusted Gamma UCL	30936		

Note: DL/2 is not a recommended method.

Result (acenaphthene)

General Statistics

Number of Valid Data	143	Number of Detected Data	20
Number of Distinct Detected Data	16	Number of Non-Detect Data	123
		Percent Non-Detects	86.01%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	120	Minimum Detected	4.787
Maximum Detected	14000	Maximum Detected	9.547
Mean of Detected	1387	Mean of Detected	6.199
SD of Detected	3146	SD of Detected	1.214
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.43	Lilliefors Test Statistic	0.845
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	405.2	Mean	4.441
SD	1691	SD	1.351
95% DL/2 (t) UCL	639.4	95% H-Stat (DL/2) UCL	246.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.079
		SD in Log Scale	2.333
		Mean in Original Scale	204.2
		SD in Original Scale	1246
		95% Percentile Bootstrap UCL	403.1
		95% BCA Bootstrap UCL	531.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.541	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2564		
nu star	21.63		
A-D Test Statistic	2.472	**Nonparametric Statistics**	
5% A-D Critical Value	0.794	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.794	Mean	300.8
5% K-S Critical Value	0.204	SD	1233
Data not Gamma Distributed at 5% Significance Level		SE of Mean	106.2
		95% KM (t) UCL	476.6
Assuming Gamma Distribution		95% KM (z) UCL	475.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	445
Minimum	120	95% KM (bootstrap t) UCL	1034
Maximum	14000	95% KM (BCA) UCL	571.4
Mean	1413	95% KM (Percentile Bootstrap) UCL	513
Median	1327	95% KM (Chebyshev) UCL	763.7
SD	1196	97.5% KM (Chebyshev) UCL	964
k star	3.037	99% KM (Chebyshev) UCL	1357
Theta star	465.2		
Nu star	868.6	**Potential UCLs to Use**	
AppChi2	801.2	95% KM (BCA) UCL	571.4
95% Gamma Approximate UCL	1532		
95% Adjusted Gamma UCL	1533		

Note: DL/2 is not a recommended method.

Result (acenaphthylene)

General Statistics

Number of Valid Data	143	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	136
		Percent Non-Detects	95.10%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	120	Minimum Detected	4.787
Maximum Detected	6200	Maximum Detected	8.732
Mean of Detected	1229	Mean of Detected	6.021
SD of Detected	2238	SD of Detected	1.448
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.584	Lilliefors Test Statistic	0.832
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	282.3	Mean	4.279
SD	1280	SD	1.189
95% DL/2 (t) UCL	459.5	95% H-Stat (DL/2) UCL	182.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.205
		SD in Log Scale	3.03
		Mean in Original Scale	62.39
		SD in Original Scale	531.3
		95% Percentile Bootstrap UCL	147.8
		95% BCA Bootstrap UCL	209.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.421	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2920		
nu star	5.891		
A-D Test Statistic	0.899	**Nonparametric Statistics**	
5% A-D Critical Value	0.747	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.747	Mean	175.7
5% K-S Critical Value	0.326	SD	520.8
Data not Gamma Distributed at 5% Significance Level		SE of Mean	47.39
		95% KM (t) UCL	254.2
Assuming Gamma Distribution		95% KM (z) UCL	253.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	236.4
Minimum	1E-09	95% KM (bootstrap t) UCL	1261
Maximum	6200	95% KM (BCA) UCL	420.9
Mean	1015	95% KM (Percentile Bootstrap) UCL	297.8
Median	1127	95% KM (Chebyshev) UCL	382.3
SD	681.6	97.5% KM (Chebyshev) UCL	471.6
k star	0.327	99% KM (Chebyshev) UCL	647.2
Theta star	3106		
Nu star	93.48	**Potential UCLs to Use**	
AppChi2	72.18	95% KM (BCA) UCL	420.9
95% Gamma Approximate UCL	1315		
95% Adjusted Gamma UCL	1318		

Note: DL/2 is not a recommended method.

Result (acetone)

General Statistics

Number of Valid Data	143	Number of Detected Data	56
Number of Distinct Detected Data	33	Number of Non-Detect Data	87
		Percent Non-Detects	60.84%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	41	Minimum Detected	3.714
Maximum Detected	540	Maximum Detected	6.292
Mean of Detected	134.4	Mean of Detected	4.772
SD of Detected	78.81	SD of Detected	0.5
Minimum Non-Detect	27	Minimum Non-Detect	3.296
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.144	Lilliefors Test Statistic	0.0849
5% Lilliefors Critical Value	0.118	5% Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	862.9	Mean	5.75
SD	1421	SD	1.572
95% DL/2 (t) UCL	1060	95% H-Stat (DL/2) UCL	2922
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.512
		SD in Log Scale	0.511
		Mean in Original Scale	104.3
		SD in Original Scale	61.93
		95% Percentile Bootstrap UCL	113
		95% BCA Bootstrap UCL	113.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.838	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	35.03		
nu star	429.8		
A-D Test Statistic	0.598	**Nonparametric Statistics**	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	112
5% K-S Critical Value	0.119	SD	78
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	9.11
		95% KM (t) UCL	127.1
Assuming Gamma Distribution		95% KM (z) UCL	127
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	126.2
Minimum	34.61	95% KM (bootstrap t) UCL	129.9
Maximum	540	95% KM (BCA) UCL	130
Mean	141.8	95% KM (Percentile Bootstrap) UCL	128.2
Median	146.6	95% KM (Chebyshev) UCL	151.7
SD	66.22	97.5% KM (Chebyshev) UCL	168.9
k star	4.436	99% KM (Chebyshev) UCL	202.6
Theta star	31.97		
Nu star	1269	**Potential UCLs to Use**	
AppChi2	1187	95% KM (t) UCL	127.1
95% Gamma Approximate UCL	151.6		
95% Adjusted Gamma UCL	151.7		

Note: DL/2 is not a recommended method.

Result (anthracene)

General Statistics

Number of Valid Data	143	Number of Detected Data	13
Number of Distinct Detected Data	12	Number of Non-Detect Data	130
		Percent Non-Detects	90.91%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	120	Minimum Detected	4.787
Maximum Detected	7300	Maximum Detected	8.896
Mean of Detected	1107	Mean of Detected	6.107
SD of Detected	1996	SD of Detected	1.242
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.547	Lilliefors Test Statistic	0.87
5% Lilliefors Critical Value	0.866	5% Lilliefors Critical Value	0.866
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	317.9	Mean	4.333
SD	1334	SD	1.273
95% DL/2 (t) UCL	502.6	95% H-Stat (DL/2) UCL	197.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.836
		SD in Log Scale	2.599
		Mean in Original Scale	106.5
		SD in Original Scale	661.5
		95% Percentile Bootstrap UCL	203.5
		95% BCA Bootstrap UCL	284.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.569	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1945		
nu star	14.8		
A-D Test Statistic	1.324	**Nonparametric Statistics**	
5% A-D Critical Value	0.776	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.776	Mean	212.1
5% K-S Critical Value	0.247	SD	648.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	56.87
		95% KM (t) UCL	306.2
Assuming Gamma Distribution		95% KM (z) UCL	305.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	290
Minimum	120	95% KM (bootstrap t) UCL	522.9
Maximum	7300	95% KM (BCA) UCL	364.7
Mean	1038	95% KM (Percentile Bootstrap) UCL	332.6
Median	1074	95% KM (Chebyshev) UCL	460
SD	672	97.5% KM (Chebyshev) UCL	567.2
k star	3.312	99% KM (Chebyshev) UCL	778
Theta star	313.5		
Nu star	947.3	**Potential UCLs to Use**	
AppChi2	876.9	95% KM (BCA) UCL	364.7
95% Gamma Approximate UCL	1122		
95% Adjusted Gamma UCL	1123		

Note: DL/2 is not a recommended method.

Result (antimony)

General Statistics

Number of Valid Data	134	Number of Detected Data	19
Number of Distinct Detected Data	19	Number of Non-Detect Data	115
		Percent Non-Detects	85.82%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.86	Minimum Detected	-0.151
Maximum Detected	14.2	Maximum Detected	2.653
Mean of Detected	2.577	Mean of Detected	0.604
SD of Detected	3.104	SD of Detected	0.736
Minimum Non-Detect	0.774	Minimum Non-Detect	-0.256
Maximum Non-Detect	1.19	Maximum Non-Detect	0.174
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	121
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	13
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.30%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.559	Lilliefors Test Statistic	0.868
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.729	Mean	-0.653
SD	1.369	SD	0.582
95% DL/2 (t) UCL	0.925	95% H-Stat (DL/2) UCL	0.612
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.202
		SD in Log Scale	1.321
		Mean in Original Scale	0.438
		SD in Original Scale	1.438
		95% Percentile Bootstrap UCL	0.654
		95% BCA Bootstrap UCL	0.774
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.388	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.856		
nu star	52.75		
A-D Test Statistic	1.446	**Nonparametric Statistics**	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	1.104
5% K-S Critical Value	0.202	SD	1.286
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.114
		95% KM (t) UCL	1.293
Assuming Gamma Distribution		95% KM (z) UCL	1.291
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.278
Minimum	1E-09	95% KM (bootstrap t) UCL	1.587
Maximum	14.2	95% KM (BCA) UCL	1.379
Mean	2.635	95% KM (Percentile Bootstrap) UCL	1.324
Median	2.639	95% KM (Chebyshev) UCL	1.601
SD	1.81	97.5% KM (Chebyshev) UCL	1.816
k star	0.358	99% KM (Chebyshev) UCL	2.239
Theta star	7.366		
Nu star	95.88	**Potential UCLs to Use**	
AppChi2	74.3	95% KM (t) UCL	1.293
95% Gamma Approximate UCL	3.401	95% KM (% Bootstrap) UCL	1.324
95% Adjusted Gamma UCL	3.41		

Note: DL/2 is not a recommended method.

Result (arsenic)

General Statistics

Number of Valid Data	143	Number of Detected Data	142
Number of Distinct Detected Data	135	Number of Non-Detect Data	1
		Percent Non-Detects	0.70%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.874	Minimum Detected	-0.135
Maximum Detected	40.9	Maximum Detected	3.711
Mean of Detected	6.677	Mean of Detected	1.787
SD of Detected	4.035	SD of Detected	0.464
Minimum Non-Detect	0.819	Minimum Non-Detect	-0.2
Maximum Non-Detect	0.819	Maximum Non-Detect	-0.2

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.172	Lilliefors Test Statistic	0.101
5% Lilliefors Critical Value	0.0744	5% Lilliefors Critical Value	0.0744
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.633	Mean	1.768
SD	4.055	SD	0.514
95% DL/2 (t) UCL	7.194	95% H-Stat (DL/2) UCL	7.138
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.623	Mean in Log Scale	1.778
SD	4.06	SD in Log Scale	0.474
95% MLE (t) UCL	7.185	Mean in Original Scale	6.642
95% MLE (Tiku) UCL	7.169	SD in Original Scale	4.042
		95% Percentile Bootstrap UCL	7.224
		95% BCA Bootstrap UCL	7.357
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.546	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.469		
nu star	1291		
A-D Test Statistic	2.783	**Nonparametric Statistics**	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	6.636
5% K-S Critical Value	0.0788	SD	4.036
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.339
		95% KM (t) UCL	7.197
Assuming Gamma Distribution		95% KM (z) UCL	7.193
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.194
Minimum	1E-09	95% KM (bootstrap t) UCL	7.407
Maximum	40.9	95% KM (BCA) UCL	7.202
Mean	6.63	95% KM (Percentile Bootstrap) UCL	7.204
Median	5.95	95% KM (Chebyshev) UCL	8.112
SD	4.059	97.5% KM (Chebyshev) UCL	8.751
k star	2.021	99% KM (Chebyshev) UCL	10.01
Theta star	3.281		
Nu star	578	**Potential UCLs to Use**	
AppChi2	523.2	95% KM (BCA) UCL	7.202
95% Gamma Approximate UCL	7.324		
95% Adjusted Gamma UCL	7.331		

Note: DL/2 is not a recommended method.

Result (barium)

General Statistics

Number of Valid Observations	143	Number of Distinct Observations	95

Raw Statistics		**Log-transformed Statistics**	
Minimum	47	Minimum of Log Data	3.85
Maximum	1800	Maximum of Log Data	7.496
Mean	182.1	Mean of log Data	5.091
Median	159	SD of log Data	0.388
SD	161.2		
Coefficient of Variation	0.885		
Skewness	8.147		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.313	Lilliefors Test Statistic	0.152
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	204.4	95% H-UCL	185.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	200.9
95% Adjusted-CLT UCL	214	97.5% Chebyshev (MVUE) UCL	212
95% Modified-t UCL	205.9	99% Chebyshev (MVUE) UCL	233.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.496	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	40.49		
nu star	1286		
Approximate Chi Square Value (.05)	1204	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	204.2
Adjusted Chi Square Value	1203	95% Jackknife UCL	204.4
		95% Standard Bootstrap UCL	203.5
Anderson-Darling Test Statistic	10.75	95% Bootstrap-t UCL	243.9
Anderson-Darling 5% Critical Value	0.756	95% Hall's Bootstrap UCL	307.3
Kolmogorov-Smirnov Test Statistic	0.214	95% Percentile Bootstrap UCL	206.2
Kolmogorov-Smirnov 5% Critical Value	0.0786	95% BCA Bootstrap UCL	218.6
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	240.8
		97.5% Chebyshev(Mean, Sd) UCL	266.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	316.2
95% Approximate Gamma UCL	194.5		
95% Adjusted Gamma UCL	194.6		
Potential UCL to Use		Use 95% Student's-t UCL	204.4
		or 95% Modified-t UCL	205.9

Result (benzene)

General Statistics

Number of Valid Data	143	Number of Detected Data	53
Number of Distinct Detected Data	46	Number of Non-Detect Data	90
		Percent Non-Detects	62.94%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.71	Minimum Detected	-0.342
Maximum Detected	4300	Maximum Detected	8.366
Mean of Detected	261.7	Mean of Detected	3.145
SD of Detected	698	SD of Detected	2.493
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	131
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.61%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.354	Lilliefors Test Statistic	0.13
5% Lilliefors Critical Value	0.122	5% Lilliefors Critical Value	0.122
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	102.4	Mean	1.403
SD	440.1	SD	2.46
95% DL/2 (t) UCL	163.4	95% H-Stat (DL/2) UCL	109.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.589
		SD in Log Scale	3.535
		Mean in Original Scale	97.11
		SD in Original Scale	441
		95% Percentile Bootstrap UCL	163.5
		95% BCA Bootstrap UCL	193.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.283	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	924.4		
nu star	30.01		
A-D Test Statistic	2.271	**Nonparametric Statistics**	
5% A-D Critical Value	0.869	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.869	Mean	98.02
5% K-S Critical Value	0.133	SD	439.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	37.09
		95% KM (t) UCL	159.4
Assuming Gamma Distribution		95% KM (z) UCL	159
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	159
Minimum	0.71	95% KM (bootstrap t) UCL	266.7
Maximum	4300	95% KM (BCA) UCL	170.7
Mean	280.2	95% KM (Percentile Bootstrap) UCL	160.9
Median	107.9	95% KM (Chebyshev) UCL	259.7
SD	483.1	97.5% KM (Chebyshev) UCL	329.6
k star	0.454	99% KM (Chebyshev) UCL	467
Theta star	616.7		
Nu star	129.9	**Potential UCLs to Use**	
AppChi2	104.6	97.5% KM (Chebyshev) UCL	329.6
95% Gamma Approximate UCL	348		
95% Adjusted Gamma UCL	348.8		

Note: DL/2 is not a recommended method.

Result (benzo(a)anthracene)

General Statistics

Number of Valid Data	143	Number of Detected Data	24
Number of Distinct Detected Data	21	Number of Non-Detect Data	119
		Percent Non-Detects	83.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	120	Minimum Detected	4.787
Maximum Detected	7400	Maximum Detected	8.909
Mean of Detected	1026	Mean of Detected	6.044
SD of Detected	1842	SD of Detected	1.199
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.535	Lilliefors Test Statistic	0.867
5% Lilliefors Critical Value	0.916	5% Lilliefors Critical Value	0.916
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	377.9	Mean	4.449
SD	1418	SD	1.362
95% DL/2 (t) UCL	574.2	95% H-Stat (DL/2) UCL	252.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.429
		SD in Log Scale	2.219
		Mean in Original Scale	183.8
		SD in Original Scale	832.9
		95% Percentile Bootstrap UCL	307.1
		95% BCA Bootstrap UCL	354.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.625	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1643		
nu star	29.98		
A-D Test Statistic	2.273	**Nonparametric Statistics**	
5% A-D Critical Value	0.789	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.789	Mean	276.5
5% K-S Critical Value	0.186	SD	818.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	70.41
		95% KM (t) UCL	393
Assuming Gamma Distribution		95% KM (z) UCL	392.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	391
Minimum	120	95% KM (bootstrap t) UCL	632.7
Maximum	7400	95% KM (BCA) UCL	412.6
Mean	1021	95% KM (Percentile Bootstrap) UCL	402.6
Median	1018	95% KM (Chebyshev) UCL	583.4
SD	742.1	97.5% KM (Chebyshev) UCL	716.2
k star	3.425	99% KM (Chebyshev) UCL	977
Theta star	298.2		
Nu star	979.6	**Potential UCLs to Use**	
AppChi2	908	95% KM (BCA) UCL	412.6
95% Gamma Approximate UCL	1102		
95% Adjusted Gamma UCL	1103		

Note: DL/2 is not a recommended method.

Result (benzo(a)pyrene)

General Statistics

Number of Valid Data	143	Number of Detected Data	24
Number of Distinct Detected Data	23	Number of Non-Detect Data	119
		Percent Non-Detects	83.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	24	Minimum Detected	3.178
Maximum Detected	5100	Maximum Detected	8.537
Mean of Detected	797.2	Mean of Detected	5.8
SD of Detected	1315	SD of Detected	1.332
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.577	Lilliefors Test Statistic	0.96
5% Lilliefors Critical Value	0.916	5% Lilliefors Critical Value	0.916
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	345	Mean	4.461
SD	1303	SD	1.324
95% DL/2 (t) UCL	525.4	95% H-Stat (DL/2) UCL	252.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.034
		SD in Log Scale	2.339
		Mean in Original Scale	142.5
		SD in Original Scale	605.9
		95% Percentile Bootstrap UCL	229.2
		95% BCA Bootstrap UCL	281.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.629	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1267		
nu star	30.21		
A-D Test Statistic	1.247	**Nonparametric Statistics**	
5% A-D Critical Value	0.788	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.788	Mean	161
5% K-S Critical Value	0.186	SD	605.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	52.2
		95% KM (t) UCL	247.5
Assuming Gamma Distribution		95% KM (z) UCL	246.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	243.2
Minimum	24	95% KM (bootstrap t) UCL	350.9
Maximum	5100	95% KM (BCA) UCL	307.6
Mean	804.8	95% KM (Percentile Bootstrap) UCL	270.2
Median	786	95% KM (Chebyshev) UCL	388.6
SD	536.1	97.5% KM (Chebyshev) UCL	487
k star	3.348	99% KM (Chebyshev) UCL	680.4
Theta star	240.4		
Nu star	957.6	**Potential UCLs to Use**	
AppChi2	886.7	95% KM (BCA) UCL	307.6
95% Gamma Approximate UCL	869.1		
95% Adjusted Gamma UCL	869.8		

Note: DL/2 is not a recommended method.

Result (benzo(b)fluoranthene)

General Statistics

Number of Valid Data	143	Number of Detected Data	20
Number of Distinct Detected Data	19	Number of Non-Detect Data	123
		Percent Non-Detects	86.01%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	32	Minimum Detected	3.466
Maximum Detected	5900	Maximum Detected	8.683
Mean of Detected	768.6	Mean of Detected	5.761
SD of Detected	1401	SD of Detected	1.269
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.525	Lilliefors Test Statistic	0.95
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	320.4	Mean	4.407
SD	1293	SD	1.273
95% DL/2 (t) UCL	499.5	95% H-Stat (DL/2) UCL	226.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.815
		SD in Log Scale	2.289
		Mean in Original Scale	116.1
		SD in Original Scale	576.6
		95% Percentile Bootstrap UCL	202.6
		95% BCA Bootstrap UCL	241.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.616	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1248		
nu star	24.64		
A-D Test Statistic	1.427	**Nonparametric Statistics**	
5% A-D Critical Value	0.785	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.785	Mean	141.1
5% K-S Critical Value	0.202	SD	574.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	49.76
		95% KM (t) UCL	223.4
Assuming Gamma Distribution		95% KM (z) UCL	222.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	216.1
Minimum	1E-09	95% KM (bootstrap t) UCL	356.1
Maximum	5900	95% KM (BCA) UCL	290.8
Mean	905.2	95% KM (Percentile Bootstrap) UCL	254.8
Median	739.8	95% KM (Chebyshev) UCL	358
SD	902.2	97.5% KM (Chebyshev) UCL	451.8
k star	0.183	99% KM (Chebyshev) UCL	636.2
Theta star	4952		
Nu star	52.28	**Potential UCLs to Use**	
AppChi2	36.67	95% KM (BCA) UCL	290.8
95% Gamma Approximate UCL	1291		
95% Adjusted Gamma UCL	1295		

Note: DL/2 is not a recommended method.

Result (benzo(ghi)perylene)

General Statistics

Number of Valid Data	143	Number of Detected Data	31
Number of Distinct Detected Data	26	Number of Non-Detect Data	112
		Percent Non-Detects	78.32%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	27	Minimum Detected	3.296
Maximum Detected	4000	Maximum Detected	8.294
Mean of Detected	477	Mean of Detected	5.4
SD of Detected	857.2	SD of Detected	1.144
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.501	Lilliefors Test Statistic	0.958
5% Lilliefors Critical Value	0.929	5% Lilliefors Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	310.7	Mean	4.473
SD	1239	SD	1.243
95% DL/2 (t) UCL	482.3	95% H-Stat (DL/2) UCL	231.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.026
		SD in Log Scale	1.751
		Mean in Original Scale	119.6
		SD in Original Scale	437.4
		95% Percentile Bootstrap UCL	183.4
		95% BCA Bootstrap UCL	217.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.723	**Data appear Lognormal at 5% Significance Level**	
Theta Star	659.8		
nu star	44.82		
A-D Test Statistic	1.885	**Nonparametric Statistics**	
5% A-D Critical Value	0.786	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.786	Mean	136.9
5% K-S Critical Value	0.164	SD	436.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	37.58
		95% KM (t) UCL	199.1
Assuming Gamma Distribution		95% KM (z) UCL	198.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	194.2
Minimum	1E-09	95% KM (bootstrap t) UCL	285.2
Maximum	4000	95% KM (BCA) UCL	222.7
Mean	436.5	95% KM (Percentile Bootstrap) UCL	210.3
Median	390	95% KM (Chebyshev) UCL	300.7
SD	438.3	97.5% KM (Chebyshev) UCL	371.5
k star	0.679	99% KM (Chebyshev) UCL	510.7
Theta star	643		
Nu star	194.1	**Potential UCLs to Use**	
AppChi2	162.9	95% KM (BCA) UCL	222.7
95% Gamma Approximate UCL	520.2		
95% Adjusted Gamma UCL	521.2		

Note: DL/2 is not a recommended method.

Result (benzo(k)fluoranthene)

General Statistics

Number of Valid Data	143	Number of Detected Data	16
Number of Distinct Detected Data	14	Number of Non-Detect Data	127
		Percent Non-Detects	88.81%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	24	Minimum Detected	3.178
Maximum Detected	5400	Maximum Detected	8.594
Mean of Detected	808.9	Mean of Detected	5.631
SD of Detected	1562	SD of Detected	1.409
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.491	Lilliefors Test Statistic	0.883
5% Lilliefors Critical Value	0.887	5% Lilliefors Critical Value	0.887
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	308.1	Mean	4.358
SD	1291	SD	1.244
95% DL/2 (t) UCL	486.9	95% H-Stat (DL/2) UCL	204.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.858
		SD in Log Scale	2.569
		Mean in Original Scale	95.62
		SD in Original Scale	567.8
		95% Percentile Bootstrap UCL	180.9
		95% BCA Bootstrap UCL	217.1
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.515	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1570		
nu star	16.48		
A-D Test Statistic	1.823	**Nonparametric Statistics**	
5% A-D Critical Value	0.789	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.789	Mean	116.3
5% K-S Critical Value	0.226	SD	567
Data not Gamma Distributed at 5% Significance Level		SE of Mean	49.38
		95% KM (t) UCL	198.1
Assuming Gamma Distribution		95% KM (z) UCL	197.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	192.7
Minimum	24	95% KM (bootstrap t) UCL	580.8
Maximum	5400	95% KM (BCA) UCL	288.2
Mean	893	95% KM (Percentile Bootstrap) UCL	235.9
Median	826.4	95% KM (Chebyshev) UCL	331.5
SD	584.9	97.5% KM (Chebyshev) UCL	424.7
k star	3.068	99% KM (Chebyshev) UCL	607.6
Theta star	291		
Nu star	877.6	**Potential UCLs to Use**	
AppChi2	809.8	95% KM (BCA) UCL	288.2
95% Gamma Approximate UCL	967.7		
95% Adjusted Gamma UCL	968.5		

Note: DL/2 is not a recommended method.

Result (beryllium)

General Statistics

Number of Valid Data	143	Number of Detected Data	135
Number of Distinct Detected Data	123	Number of Non-Detect Data	8
		Percent Non-Detects	5.59%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.269	Minimum Detected	-1.313
Maximum Detected	4.6	Maximum Detected	1.526
Mean of Detected	0.6	Mean of Detected	-0.608
SD of Detected	0.451	SD of Detected	0.369
Minimum Non-Detect	0.261	Minimum Non-Detect	-1.343
Maximum Non-Detect	0.329	Maximum Non-Detect	-1.112
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	16
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	127
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	11.19%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.277	Lilliefors Test Statistic	0.113
5% Lilliefors Critical Value	0.0763	5% Lilliefors Critical Value	0.0763
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.575	Mean	-0.684
SD	0.451	SD	0.476
95% DL/2 (t) UCL	0.637	95% H-Stat (DL/2) UCL	0.591
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.552	Mean in Log Scale	-0.651
SD	0.478	SD in Log Scale	0.4
95% MLE (t) UCL	0.618	Mean in Original Scale	0.581
95% MLE (Tiku) UCL	0.614	SD in Original Scale	0.446
		95% Percentile Bootstrap UCL	0.648
		95% BCA Bootstrap UCL	0.676
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.172	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.116		
nu star	1396		
A-D Test Statistic	7.139	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	0.582
5% K-S Critical Value	0.0805	SD	0.444
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0372
		95% KM (t) UCL	0.644
Assuming Gamma Distribution		95% KM (z) UCL	0.643
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.643
Minimum	0.0833	95% KM (bootstrap t) UCL	0.734
Maximum	4.6	95% KM (BCA) UCL	0.654
Mean	0.574	95% KM (Percentile Bootstrap) UCL	0.65
Median	0.529	95% KM (Chebyshev) UCL	0.744
SD	0.452	97.5% KM (Chebyshev) UCL	0.814
k star	3.73	99% KM (Chebyshev) UCL	0.952
Theta star	0.154		
Nu star	1067	**Potential UCLs to Use**	
AppChi2	991.8	95% KM (BCA) UCL	0.654
95% Gamma Approximate UCL	0.617		
95% Adjusted Gamma UCL	0.617		

Note: DL/2 is not a recommended method.

Result (bromodichloromethane)

General Statistics

Number of Valid Data	143	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	138
		Percent Non-Detects	96.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.2	Minimum Detected	0.788
Maximum Detected	140	Maximum Detected	4.942
Mean of Detected	65.64	Mean of Detected	3.545
SD of Detected	53.97	SD of Detected	1.664
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	520	Maximum Non-Detect	6.254
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.952	Lilliefors Test Statistic	0.838
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.81	Mean	0.524
SD	31.2	SD	1.929
95% DL/2 (t) UCL	17.13	95% H-Stat (DL/2) UCL	17.11
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-4.88
		SD in Log Scale	2.713
		Mean in Original Scale	2.348
		SD in Original Scale	15.11
		95% Percentile Bootstrap UCL	4.622
		95% BCA Bootstrap UCL	5.455
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.499	**Data appear Normal at 5% Significance Level**	
Theta Star	131.7		
nu star	4.985		
A-D Test Statistic	0.382	**Nonparametric Statistics**	
5% A-D Critical Value	0.694	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.694	Mean	4.553
5% K-S Critical Value	0.365	SD	15.04
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.436
		95% KM (t) UCL	6.931
Assuming Gamma Distribution		95% KM (z) UCL	6.916
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	19.02
Minimum	2.2	95% KM (bootstrap t) UCL	6.693
Maximum	140	95% KM (BCA) UCL	82
Mean	65.64	95% KM (Percentile Bootstrap) UCL	80.35
Median	65.64	95% KM (Chebyshev) UCL	10.81
SD	9.058	97.5% KM (Chebyshev) UCL	13.52
k star	22.07	99% KM (Chebyshev) UCL	18.84
Theta star	2.974		
Nu star	6312	**Potential UCLs to Use**	
AppChi2	6128	95% KM (t) UCL	6.931
95% Gamma Approximate UCL	67.61	95% KM (Percentile Bootstrap) UCL	80.35
95% Adjusted Gamma UCL	67.63		

Note: DL/2 is not a recommended method.

Result (cadmium)			
General Statistics			
Number of Valid Data	143	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	121
		Percent Non-Detects	84.62%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.591	Minimum Detected	-0.526
Maximum Detected	3.93	Maximum Detected	1.369
Mean of Detected	1.363	Mean of Detected	0.0915
SD of Detected	1.066	SD of Detected	0.629
Minimum Non-Detect	0.517	Minimum Non-Detect	-0.66
Maximum Non-Detect	0.693	Maximum Non-Detect	-0.367
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	128
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	15
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.51%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.718	Lilliefors Test Statistic	0.846
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.449	Mean	-1.055
SD	0.567	SD	0.549
95% DL/2 (t) UCL	0.528	95% H-Stat (DL/2) UCL	0.404
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.176
		SD in Log Scale	1.153
		Mean in Original Scale	0.286
		SD in Original Scale	0.619
		95% Percentile Bootstrap UCL	0.377
		95% BCA Bootstrap UCL	0.404
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.139	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.637		
nu star	94.13		
A-D Test Statistic	1.673	**Nonparametric Statistics**	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	0.71
5% K-S Critical Value	0.187	SD	0.495
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0423
		95% KM (t) UCL	0.78
Assuming Gamma Distribution		95% KM (z) UCL	0.78
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.774
Minimum	0.591	95% KM (bootstrap t) UCL	0.816
Maximum	3.93	95% KM (BCA) UCL	0.799
Mean	1.363	95% KM (Percentile Bootstrap) UCL	0.786
Median	1.373	95% KM (Chebyshev) UCL	0.894
SD	0.427	97.5% KM (Chebyshev) UCL	0.974
k star	13.22	99% KM (Chebyshev) UCL	1.131
Theta star	0.103		
Nu star	3780	**Potential UCLs to Use**	
AppChi2	3638	95% KM (t) UCL	0.78
95% Gamma Approximate UCL	1.416	95% KM (% Bootstrap) UCL	0.786
95% Adjusted Gamma UCL	1.417		
Note: DL/2 is not a recommended method.			

Result (carbon disulfide)

General Statistics

Number of Valid Data	143	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	138
		Percent Non-Detects	96.50%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	10	Minimum Detected	2.303
Maximum Detected	43	Maximum Detected	3.761
Mean of Detected	24.2	Mean of Detected	3.002
SD of Detected	15.97	SD of Detected	0.681
Minimum Non-Detect	4	Minimum Non-Detect	1.386
Maximum Non-Detect	5200	Maximum Non-Detect	8.556
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Lilliefors Test Statistic	0.806	Lilliefors Test Statistic	0.855
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	110.5	Mean	2.807
SD	281.6	SD	1.854
95% DL/2 (t) UCL	149.5	95% H-Stat (DL/2) UCL	149.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.93
		SD in Log Scale	1.307
		Mean in Original Scale	1.425
		SD in Original Scale	5.173
		95% Percentile Bootstrap UCL	2.205
		95% BCA Bootstrap UCL	2.579
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.281	**Data appear Normal at 5% Significance Level**	
Theta Star	18.9		
nu star	12.81		
A-D Test Statistic	0.526	**Nonparametric Statistics**	
5% A-D Critical Value	0.683	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.683	Mean	10.71
5% K-S Critical Value	0.36	SD	4.427
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.493
		95% KM (t) UCL	11.52
Assuming Gamma Distribution		95% KM (z) UCL	11.52
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12.05
Minimum	1E-09	95% KM (bootstrap t) UCL	12.68
Maximum	45.68	95% KM (BCA) UCL	40.03
Mean	24.44	95% KM (Percentile Bootstrap) UCL	40
Median	25.77	95% KM (Chebyshev) UCL	12.85
SD	10.13	97.5% KM (Chebyshev) UCL	13.78
k star	0.971	99% KM (Chebyshev) UCL	15.61
Theta star	25.18		
Nu star	277.7	**Potential UCLs to Use**	
AppChi2	240.1	95% KM (t) UCL	11.52
95% Gamma Approximate UCL	28.27	95% KM (Percentile Bootstrap) UCL	40
95% Adjusted Gamma UCL	28.31		

Note: DL/2 is not a recommended method.

Result (chloroform)

General Statistics

Number of Valid Data	143	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	134
		Percent Non-Detects	93.71%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	260	Maximum Detected	5.561
Mean of Detected	72.24	Mean of Detected	2.684
SD of Detected	104.5	SD of Detected	2.181
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	520	Maximum Non-Detect	6.254
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.712	Lilliefors Test Statistic	0.859
5% Lilliefors Critical Value	0.829	5% Lilliefors Critical Value	0.829
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	14.87	Mean	0.561
SD	40.3	SD	1.95
95% DL/2 (t) UCL	20.45	95% H-Stat (DL/2) UCL	18.85
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.935
		SD in Log Scale	3.661
		Mean in Original Scale	4.557
		SD in Original Scale	30.42
		95% Percentile Bootstrap UCL	9.145
		95% BCA Bootstrap UCL	12.03
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.348	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	207.7		
nu star	6.261		
A-D Test Statistic	0.624	**Nonparametric Statistics**	
5% A-D Critical Value	0.787	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.787	Mean	5.989
5% K-S Critical Value	0.297	SD	30.33
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.71
		95% KM (t) UCL	10.48
Assuming Gamma Distribution		95% KM (z) UCL	10.45
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	10.15
Minimum	1.4	95% KM (bootstrap t) UCL	20.77
Maximum	301.7	95% KM (BCA) UCL	11.97
Mean	90.73	95% KM (Percentile Bootstrap) UCL	11.26
Median	74.95	95% KM (Chebyshev) UCL	17.8
SD	63.03	97.5% KM (Chebyshev) UCL	22.91
k star	2	99% KM (Chebyshev) UCL	32.95
Theta star	45.36		
Nu star	572.1	**Potential UCLs to Use**	
AppChi2	517.6	95% KM (t) UCL	10.48
95% Gamma Approximate UCL	100.3		
95% Adjusted Gamma UCL	100.4		

Note: DL/2 is not a recommended method.

Result (chromium)

General Statistics			
Number of Valid Observations	143	Number of Distinct Observations	128
Raw Statistics		**Log-transformed Statistics**	
Minimum	4.47	Minimum of Log Data	1.497
Maximum	2690	Maximum of Log Data	7.897
Mean	80.32	Mean of log Data	3.666
Median	32.7	SD of log Data	0.901
SD	245.2		
Coefficient of Variation	3.053		
Skewness	9.044		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.379	Lilliefors Test Statistic	0.122
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	114.3	95% H-UCL	68.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	80.92
95% Adjusted-CLT UCL	130.6	97.5% Chebyshev (MVUE) UCL	90.65
95% Modified-t UCL	116.9	99% Chebyshev (MVUE) UCL	109.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.809	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	99.33		
nu star	231.3		
Approximate Chi Square Value (.05)	197.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	114
Adjusted Chi Square Value	196.7	95% Jackknife UCL	114.3
		95% Standard Bootstrap UCL	113.6
Anderson-Darling Test Statistic	15.54	95% Bootstrap-t UCL	175.6
Anderson-Darling 5% Critical Value	0.792	95% Hall's Bootstrap UCL	235.2
Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	118.4
Kolmogorov-Smirnov 5% Critical Value	0.0812	95% BCA Bootstrap UCL	140.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	169.7
		97.5% Chebyshev(Mean, Sd) UCL	208.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	284.4
95% Approximate Gamma UCL	94.26		
95% Adjusted Gamma UCL	94.41		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	169.7

Result (chrysene)

General Statistics

Number of Valid Data	143	Number of Detected Data	53
Number of Distinct Detected Data	45	Number of Non-Detect Data	90
		Percent Non-Detects	62.94%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	36	Minimum Detected	3.584
Maximum Detected	7500	Maximum Detected	8.923
Mean of Detected	897.2	Mean of Detected	5.941
SD of Detected	1647	SD of Detected	1.209
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.338	Lilliefors Test Statistic	0.0963
5% Lilliefors Critical Value	0.122	5% Lilliefors Critical Value	0.122
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	525.7	Mean	4.84
SD	1562	SD	1.5
95% DL/2 (t) UCL	742	95% H-Stat (DL/2) UCL	419.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.05
		SD in Log Scale	1.846
		Mean in Original Scale	352
		SD in Original Scale	1082
		95% Percentile Bootstrap UCL	513.9
		95% BCA Bootstrap UCL	546
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.677	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1326		
nu star	71.72		
A-D Test Statistic	3.335	**Nonparametric Statistics**	
5% A-D Critical Value	0.797	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.797	Mean	370.5
5% K-S Critical Value	0.127	SD	1082
Data not Gamma Distributed at 5% Significance Level		SE of Mean	92.09
		95% KM (t) UCL	523
Assuming Gamma Distribution		95% KM (z) UCL	522
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	520.3
Minimum	36	95% KM (bootstrap t) UCL	611.3
Maximum	7500	95% KM (BCA) UCL	551.8
Mean	874.6	95% KM (Percentile Bootstrap) UCL	539.2
Median	790.6	95% KM (Chebyshev) UCL	772
SD	1007	97.5% KM (Chebyshev) UCL	945.6
k star	1.613	99% KM (Chebyshev) UCL	1287
Theta star	542.3		
Nu star	461.2	**Potential UCLs to Use**	
AppChi2	412.4	95% KM (BCA) UCL	551.8
95% Gamma Approximate UCL	978.1		
95% Adjusted Gamma UCL	979.2		

Note: DL/2 is not a recommended method.

Result (cobalt)

General Statistics

Number of Valid Observations	143	Number of Distinct Observations	102

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.07	Minimum of Log Data	0.0677
Maximum	71.5	Maximum of Log Data	4.27
Mean	11.66	Mean of log Data	2.368
Median	10.8	SD of log Data	0.401
SD	6.981		
Coefficient of Variation	0.599		
Skewness	6.167		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.239	Lilliefors Test Statistic	0.14
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	12.62	95% H-UCL	12.27
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13.31
95% Adjusted-CLT UCL	12.94	97.5% Chebyshev (MVUE) UCL	14.07
95% Modified-t UCL	12.67	99% Chebyshev (MVUE) UCL	15.56
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.715	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2.04		
nu star	1634		
Approximate Chi Square Value (.05)	1542	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	12.62
Adjusted Chi Square Value	1541	95% Jackknife UCL	12.62
		95% Standard Bootstrap UCL	12.6
Anderson-Darling Test Statistic	6.326	95% Bootstrap-t UCL	13.57
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	17.92
Kolmogorov-Smirnov Test Statistic	0.144	95% Percentile Bootstrap UCL	12.69
Kolmogorov-Smirnov 5% Critical Value	0.0785	95% BCA Bootstrap UCL	13
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14.2
		97.5% Chebyshev(Mean, Sd) UCL	15.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	17.47
95% Approximate Gamma UCL	12.36		
95% Adjusted Gamma UCL	12.37		
Potential UCL to Use		Use 95% Student's-t UCL	12.62
		or 95% Modified-t UCL	12.67

Result (copper)

General Statistics

Number of Valid Observations	143	Number of Distinct Observations	126

Raw Statistics		**Log-transformed Statistics**	
Minimum	10.5	Minimum of Log Data	2.351
Maximum	1370	Maximum of Log Data	7.223
Mean	82.13	Mean of log Data	3.862
Median	37.6	SD of log Data	0.848
SD	155.8		
Coefficient of Variation	1.897		
Skewness	5.57		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.33	Lilliefors Test Statistic	0.162
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	103.7	95% H-UCL	78.82
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	92.13
95% Adjusted-CLT UCL	110	97.5% Chebyshev (MVUE) UCL	102.6
95% Modified-t UCL	104.7	99% Chebyshev (MVUE) UCL	123.2
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.033	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	79.48		
nu star	295.5		
Approximate Chi Square Value (.05)	256.7	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	103.6
Adjusted Chi Square Value	256.4	95% Jackknife UCL	103.7
		95% Standard Bootstrap UCL	103.4
Anderson-Darling Test Statistic	13.49	95% Bootstrap-t UCL	113.6
Anderson-Darling 5% Critical Value	0.782	95% Hall's Bootstrap UCL	128.8
Kolmogorov-Smirnov Test Statistic	0.248	95% Percentile Bootstrap UCL	104.5
Kolmogorov-Smirnov 5% Critical Value	0.0806	95% BCA Bootstrap UCL	110.8
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	138.9
		97.5% Chebyshev(Mean, Sd) UCL	163.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	211.8
95% Approximate Gamma UCL	94.55		
95% Adjusted Gamma UCL	94.68		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	138.9

Result (dibenzo(a,h)anthracene)

General Statistics

Number of Valid Data	143	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	138
		Percent Non-Detects	96.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	270	Minimum Detected	5.598
Maximum Detected	3500	Maximum Detected	8.161
Mean of Detected	986	Mean of Detected	6.321
SD of Detected	1407	SD of Detected	1.045
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.598	Lilliefors Test Statistic	0.723
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	259.4	Mean	4.252
SD	1207	SD	1.184
95% DL/2 (t) UCL	426.5	95% H-Stat (DL/2) UCL	172.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.189
		SD in Log Scale	2.51
		Mean in Original Scale	38.83
		SD in Original Scale	297.7
		95% Percentile Bootstrap UCL	87.55
		95% BCA Bootstrap UCL	131.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.536	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1838		
nu star	5.365		
A-D Test Statistic	0.975	**Nonparametric Statistics**	
5% A-D Critical Value	0.691	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.691	Mean	295.6
5% K-S Critical Value	0.364	SD	271.5
Data not Gamma Distributed at 5% Significance Level		SE of Mean	25.57
		95% KM (t) UCL	337.9
Assuming Gamma Distribution		95% KM (z) UCL	337.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	341
Minimum	1E-09	95% KM (bootstrap t) UCL	672.7
Maximum	3500	95% KM (BCA) UCL	471.6
Mean	859.2	95% KM (Percentile Bootstrap) UCL	450
Median	948.9	95% KM (Chebyshev) UCL	407
SD	593.3	97.5% KM (Chebyshev) UCL	455.2
k star	0.197	99% KM (Chebyshev) UCL	549.9
Theta star	4361		
Nu star	56.35	**Potential UCLs to Use**	
AppChi2	40.09	95% KM (BCA) UCL	471.6
95% Gamma Approximate UCL	1207		
95% Adjusted Gamma UCL	1212		

Note: DL/2 is not a recommended method.

Result (ethylbenzene)			
General Statistics			
Number of Valid Data	143	Number of Detected Data	33
Number of Distinct Detected Data	32	Number of Non-Detect Data	110
		Percent Non-Detects	76.92%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.98	Minimum Detected	-0.0202
Maximum Detected	19000	Maximum Detected	9.852
Mean of Detected	1258	Mean of Detected	4.386
SD of Detected	3689	SD of Detected	2.569
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	133
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.01%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.391	Lilliefors Test Statistic	0.972
5% Lilliefors Critical Value	0.931	5% Lilliefors Critical Value	0.931
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	296.2	Mean	1.16
SD	1829	SD	2.604
95% DL/2 (t) UCL	549.5	95% H-Stat (DL/2) UCL	126.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.24
		SD in Log Scale	4.383
		Mean in Original Scale	290.3
		SD in Original Scale	1830
		95% Percentile Bootstrap UCL	583.2
		95% BCA Bootstrap UCL	752.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.254	**Data appear Lognormal at 5% Significance Level**	
Theta Star	4955		
nu star	16.75		
A-D Test Statistic	1.953	**Nonparametric Statistics**	
5% A-D Critical Value	0.874	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.874	Mean	291.4
5% K-S Critical Value	0.168	SD	1823
Data not Gamma Distributed at 5% Significance Level		SE of Mean	154.9
		95% KM (t) UCL	547.8
Assuming Gamma Distribution		95% KM (z) UCL	546.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	544.1
Minimum	0.98	95% KM (bootstrap t) UCL	1281
Maximum	19000	95% KM (BCA) UCL	603.9
Mean	1274	95% KM (Percentile Bootstrap) UCL	562.7
Median	1235	95% KM (Chebyshev) UCL	966.4
SD	1753	97.5% KM (Chebyshev) UCL	1258
k star	0.901	99% KM (Chebyshev) UCL	1832
Theta star	1413		
Nu star	257.8	**Potential UCLs to Use**	
AppChi2	221.6	97.5% KM (Chebyshev) UCL	1258
95% Gamma Approximate UCL	1482		
95% Adjusted Gamma UCL	1484		
Note: DL/2 is not a recommended method.			

Result (fluoranthene)

General Statistics

Number of Valid Data	143	Number of Detected Data	26
Number of Distinct Detected Data	19	Number of Non-Detect Data	117
		Percent Non-Detects	81.82%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	130	Minimum Detected	4.868
Maximum Detected	15000	Maximum Detected	9.616
Mean of Detected	1318	Mean of Detected	6.216
SD of Detected	3054	SD of Detected	1.176
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.403	Lilliefors Test Statistic	0.887
5% Lilliefors Critical Value	0.92	5% Lilliefors Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	444.7	Mean	4.509
SD	1785	SD	1.415
95% DL/2 (t) UCL	691.9	95% H-Stat (DL/2) UCL	287
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.798
		SD in Log Scale	2.154
		Mean in Original Scale	254.2
		SD in Original Scale	1377
		95% Percentile Bootstrap UCL	464.2
		95% BCA Bootstrap UCL	580.8

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.586	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2251		
nu star	30.46		
A-D Test Statistic	2.55	**Nonparametric Statistics**	
5% A-D Critical Value	0.796	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.796	Mean	350.8
5% K-S Critical Value	0.18	SD	1362
Data not Gamma Distributed at 5% Significance Level		SE of Mean	116.7
		95% KM (t) UCL	544
Assuming Gamma Distribution		95% KM (z) UCL	542.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	541
Minimum	130	95% KM (bootstrap t) UCL	1323
Maximum	15000	95% KM (BCA) UCL	573.6
Mean	1268	95% KM (Percentile Bootstrap) UCL	555.2
Median	1244	95% KM (Chebyshev) UCL	859.5
SD	1323	97.5% KM (Chebyshev) UCL	1080
k star	2.396	99% KM (Chebyshev) UCL	1512
Theta star	529.5		
Nu star	685.2	**Potential UCLs to Use**	
AppChi2	625.5	95% KM (BCA) UCL	573.6
95% Gamma Approximate UCL	1390		
95% Adjusted Gamma UCL	1391		

Note: DL/2 is not a recommended method.

Result (fluorene)

General Statistics

Number of Valid Data	143	Number of Detected Data	27
Number of Distinct Detected Data	23	Number of Non-Detect Data	116
		Percent Non-Detects	81.12%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	27	Minimum Detected	3.296
Maximum Detected	39000	Maximum Detected	10.57
Mean of Detected	3436	Mean of Detected	6.815
SD of Detected	8262	SD of Detected	1.552
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	141
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.60%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.426	Lilliefors Test Statistic	0.969
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	750.4	Mean	4.567
SD	3795	SD	1.54
95% DL/2 (t) UCL	1276	95% H-Stat (DL/2) UCL	328.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.198
		SD in Log Scale	2.961
		Mean in Original Scale	659.2
		SD in Original Scale	3782
		95% Percentile Bootstrap UCL	1265
		95% BCA Bootstrap UCL	1502
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.453	**Data appear Lognormal at 5% Significance Level**	
Theta Star	7592		
nu star	24.44		
A-D Test Statistic	1.935	**Nonparametric Statistics**	
5% A-D Critical Value	0.812	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.812	Mean	673.9
5% K-S Critical Value	0.178	SD	3767
Data not Gamma Distributed at 5% Significance Level		SE of Mean	321.1
		95% KM (t) UCL	1206
Assuming Gamma Distribution		95% KM (z) UCL	1202
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1144
Minimum	27	95% KM (bootstrap t) UCL	2959
Maximum	39000	95% KM (BCA) UCL	1411
Mean	3567	95% KM (Percentile Bootstrap) UCL	1268
Median	2698	95% KM (Chebyshev) UCL	2073
SD	4120	97.5% KM (Chebyshev) UCL	2679
k star	1.276	99% KM (Chebyshev) UCL	3869
Theta star	2795		
Nu star	365	**Potential UCLs to Use**	
AppChi2	321.7	95% KM (Chebyshev) UCL	2073
95% Gamma Approximate UCL	4046		
95% Adjusted Gamma UCL	4051		

Note: DL/2 is not a recommended method.

Result (indeno(1,2,3-cd)pyrene)

General Statistics

Number of Valid Data	143	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	131
		Percent Non-Detects	91.61%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	38	Minimum Detected	3.638
Maximum Detected	4000	Maximum Detected	8.294
Mean of Detected	806.5	Mean of Detected	5.804
SD of Detected	1321	SD of Detected	1.296
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.568	Lilliefors Test Statistic	0.892
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	286.4	Mean	4.313
SD	1241	SD	1.221
95% DL/2 (t) UCL	458.2	95% H-Stat (DL/2) UCL	188.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.429
		SD in Log Scale	2.618
		Mean in Original Scale	72.22
		SD in Original Scale	430.1
		95% Percentile Bootstrap UCL	140.5
		95% BCA Bootstrap UCL	176.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.567	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1422		
nu star	13.62		
A-D Test Statistic	1.339	**Nonparametric Statistics**	
5% A-D Critical Value	0.771	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.771	Mean	105.5
5% K-S Critical Value	0.256	SD	426.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	37.6
		95% KM (t) UCL	167.8
Assuming Gamma Distribution		95% KM (z) UCL	167.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	168.5
Minimum	1E-09	95% KM (bootstrap t) UCL	408.3
Maximum	4000	95% KM (BCA) UCL	273.2
Mean	695.3	95% KM (Percentile Bootstrap) UCL	236.7
Median	681.8	95% KM (Chebyshev) UCL	269.4
SD	576.4	97.5% KM (Chebyshev) UCL	340.3
k star	0.171	99% KM (Chebyshev) UCL	479.6
Theta star	4072		
Nu star	48.84	**Potential UCLs to Use**	
AppChi2	33.79	95% KM (BCA) UCL	273.2
95% Gamma Approximate UCL	1005		
95% Adjusted Gamma UCL	1009		

Note: DL/2 is not a recommended method.

Result (isopropylbenzene)

General Statistics

Number of Valid Data	143	Number of Detected Data	33
Number of Distinct Detected Data	31	Number of Non-Detect Data	110
		Percent Non-Detects	76.92%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.91	Minimum Detected	-0.0943
Maximum Detected	4800	Maximum Detected	8.476
Mean of Detected	691.9	Mean of Detected	4.28
SD of Detected	1254	SD of Detected	2.723
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	126
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.11%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.604	Lilliefors Test Statistic	0.909
5% Lilliefors Critical Value	0.931	5% Lilliefors Critical Value	0.931
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	163.5	Mean	1.036
SD	662.3	SD	2.572
95% DL/2 (t) UCL	255.2	95% H-Stat (DL/2) UCL	96.72
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.605
		SD in Log Scale	4.6
		Mean in Original Scale	159.7
		SD in Original Scale	663.2
		95% Percentile Bootstrap UCL	256.2
		95% BCA Bootstrap UCL	283.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.297	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	2330		
nu star	19.6		
A-D Test Statistic	0.933	**Nonparametric Statistics**	
5% A-D Critical Value	0.854	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.854	Mean	160.5
5% K-S Critical Value	0.166	SD	660.7
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	56.1
		95% KM (t) UCL	253.4
Assuming Gamma Distribution		95% KM (z) UCL	252.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	251.6
Minimum	1E-09	95% KM (bootstrap t) UCL	312.6
Maximum	4800	95% KM (BCA) UCL	259
Mean	656.3	95% KM (Percentile Bootstrap) UCL	259.4
Median	665.9	95% KM (Chebyshev) UCL	405.1
SD	617.3	97.5% KM (Chebyshev) UCL	510.9
k star	0.767	99% KM (Chebyshev) UCL	718.8
Theta star	855.9		
Nu star	219.3	**Potential UCLs to Use**	
AppChi2	186	95% KM (t) UCL	253.4
95% Gamma Approximate UCL	773.7		
95% Adjusted Gamma UCL	775		

Note: DL/2 is not a recommended method.

Result (lead)

General Statistics

Number of Valid Observations	143	Number of Distinct Observations	134

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.1	Minimum of Log Data	1.131
Maximum	47300	Maximum of Log Data	10.76
Mean	686.6	Mean of log Data	4.394
Median	79.6	SD of log Data	1.425
SD	4495		
Coefficient of Variation	6.547		
Skewness	9.203		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.46	Lilliefors Test Statistic	0.0812
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	1309	95% H-UCL	304.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	378
95% Adjusted-CLT UCL	1614	97.5% Chebyshev (MVUE) UCL	446.2
95% Modified-t UCL	1357	99% Chebyshev (MVUE) UCL	580.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.317	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2164		
nu star	90.75		
Approximate Chi Square Value (.05)	69.78	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	1305
Adjusted Chi Square Value	69.6	95% Jackknife UCL	1309
		95% Standard Bootstrap UCL	1297
Anderson-Darling Test Statistic	22.27	95% Bootstrap-t UCL	5730
Anderson-Darling 5% Critical Value	0.864	95% Hall's Bootstrap UCL	5728
Kolmogorov-Smirnov Test Statistic	0.305	95% Percentile Bootstrap UCL	1372
Kolmogorov-Smirnov 5% Critical Value	0.0849	95% BCA Bootstrap UCL	1807
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2325
		97.5% Chebyshev(Mean, Sd) UCL	3034
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4427
95% Approximate Gamma UCL	892.8		
95% Adjusted Gamma UCL	895.2		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	3034

Result (mercury)

General Statistics

Number of Valid Data	143	Number of Detected Data	90
Number of Distinct Detected Data	83	Number of Non-Detect Data	53
		Percent Non-Detects	37.06%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0978	Minimum Detected	-2.325
Maximum Detected	53.5	Maximum Detected	3.98
Mean of Detected	1.912	Mean of Detected	-0.86
SD of Detected	6.849	SD of Detected	1.314
Minimum Non-Detect	0.0862	Minimum Non-Detect	-2.451
Maximum Non-Detect	0.11	Maximum Non-Detect	-2.207
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	87
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	39.16%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.396	Lilliefors Test Statistic	0.14
5% Lilliefors Critical Value	0.0934	5% Lilliefors Critical Value	0.0934
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.221	Mean	-1.671
SD	5.497	SD	1.487
95% DL/2 (t) UCL	1.982	95% H-Stat (DL/2) UCL	0.505
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.964
		SD in Log Scale	1.786
		Mean in Original Scale	1.211
		SD in Original Scale	5.499
		95% Percentile Bootstrap UCL	1.969
		95% BCA Bootstrap UCL	2.378
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.424	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	4.507		
nu star	76.35		
A-D Test Statistic	12.34	**Nonparametric Statistics**	
5% A-D Critical Value	0.835	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.835	Mean	1.239
5% K-S Critical Value	0.101	SD	5.474
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.46
		95% KM (t) UCL	2.002
Assuming Gamma Distribution		95% KM (z) UCL	1.997
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.998
Minimum	1E-09	95% KM (bootstrap t) UCL	3.056
Maximum	53.5	95% KM (BCA) UCL	2.03
Mean	1.205	95% KM (Percentile Bootstrap) UCL	2.076
Median	0.143	95% KM (Chebyshev) UCL	3.246
SD	5.5	97.5% KM (Chebyshev) UCL	4.114
k star	0.101	99% KM (Chebyshev) UCL	5.819
Theta star	11.93		
Nu star	28.87	**Potential UCLs to Use**	
AppChi2	17.61	95% KM (Chebyshev) UCL	3.246
95% Gamma Approximate UCL	1.976		
95% Adjusted Gamma UCL	1.986		

Note: DL/2 is not a recommended method.

Result (methyl-t-butyl ether (mtbe))

General Statistics

Number of Valid Data	143	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	138
		Percent Non-Detects	96.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.3	Minimum Detected	1.459
Maximum Detected	230	Maximum Detected	5.438
Mean of Detected	52.24	Mean of Detected	2.674
SD of Detected	99.41	SD of Detected	1.592
Minimum Non-Detect	0.81	Minimum Non-Detect	-0.211
Maximum Non-Detect	1000	Maximum Non-Detect	6.908
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.579	Lilliefors Test Statistic	0.77
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	23.53	Mean	1.24
SD	57.56	SD	1.881
95% DL/2 (t) UCL	31.49	95% H-Stat (DL/2) UCL	34.59
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.976
		SD in Log Scale	2.911
		Mean in Original Scale	1.845
		SD in Original Scale	19.26
		95% Percentile Bootstrap UCL	5.098
		95% BCA Bootstrap UCL	8.135
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.332	**Data appear Lognormal at 5% Significance Level**	
Theta Star	157.4		
nu star	3.318		
A-D Test Statistic	0.925	**Nonparametric Statistics**	
5% A-D Critical Value	0.711	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.711	Mean	6.059
5% K-S Critical Value	0.372	SD	19.08
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.81
		95% KM (t) UCL	9.056
Assuming Gamma Distribution		95% KM (z) UCL	9.036
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8.239
Minimum	1E-09	95% KM (bootstrap t) UCL	40.55
Maximum	230	95% KM (BCA) UCL	14.91
Mean	38.92	95% KM (Percentile Bootstrap) UCL	13.11
Median	24.08	95% KM (Chebyshev) UCL	13.95
SD	40.91	97.5% KM (Chebyshev) UCL	17.36
k star	0.0997	99% KM (Chebyshev) UCL	24.07
Theta star	390.2		
Nu star	28.53	**Potential UCLs to Use**	
AppChi2	17.34	95% KM (Chebyshev) UCL	13.95
95% Gamma Approximate UCL	64.03		
95% Adjusted Gamma UCL	64.36		

Note: DL/2 is not a recommended method.

Result (molybdenum)			
General Statistics			
Number of Valid Data	143	Number of Detected Data	88
Number of Distinct Detected Data	85	Number of Non-Detect Data	55
		Percent Non-Detects	38.46%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.279	Minimum Detected	-1.277
Maximum Detected	67.9	Maximum Detected	4.218
Mean of Detected	4.533	Mean of Detected	0.533
SD of Detected	9.852	SD of Detected	1.251
Minimum Non-Detect	0.258	Minimum Non-Detect	-1.355
Maximum Non-Detect	0.324	Maximum Non-Detect	-1.127
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	87
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	39.16%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.333	Lilliefors Test Statistic	0.117
5% Lilliefors Critical Value	0.0944	5% Lilliefors Critical Value	0.0944
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.844	Mean	-0.424
SD	8.004	SD	1.561
95% DL/2 (t) UCL	3.952	95% H-Stat (DL/2) UCL	2.062
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.601
		SD in Log Scale	1.759
		Mean in Original Scale	2.827
		SD in Original Scale	8.01
		95% Percentile Bootstrap UCL	4.023
		95% BCA Bootstrap UCL	4.31
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.613	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	7.391		
nu star	107.9		
A-D Test Statistic	5.636	**Nonparametric Statistics**	
5% A-D Critical Value	0.806	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.806	Mean	2.897
5% K-S Critical Value	0.0999	SD	7.958
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.669
		95% KM (t) UCL	4.005
Assuming Gamma Distribution		95% KM (z) UCL	3.998
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.987
Minimum	1E-09	95% KM (bootstrap t) UCL	4.785
Maximum	67.9	95% KM (BCA) UCL	4.194
Mean	2.987	95% KM (Percentile Bootstrap) UCL	4.06
Median	0.818	95% KM (Chebyshev) UCL	5.815
SD	7.98	97.5% KM (Chebyshev) UCL	7.077
k star	0.119	99% KM (Chebyshev) UCL	9.557
Theta star	25.01		
Nu star	34.16	**Potential UCLs to Use**	
AppChi2	21.79	95% KM (Chebyshev) UCL	5.815
95% Gamma Approximate UCL	4.683		
95% Adjusted Gamma UCL	4.705		
Note: DL/2 is not a recommended method.			

Result (naphthalene)

General Statistics

Number of Valid Data	143	Number of Detected Data	25
Number of Distinct Detected Data	23	Number of Non-Detect Data	118
		Percent Non-Detects	82.52%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	9.2	Minimum Detected	2.219
Maximum Detected	43000	Maximum Detected	10.67
Mean of Detected	6795	Mean of Detected	6.181
SD of Detected	12173	SD of Detected	3.015
Minimum Non-Detect	5.1	Minimum Non-Detect	1.629
Maximum Non-Detect	2500	Maximum Non-Detect	7.824
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	135
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.41%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.624	Lilliefors Test Statistic	0.883
5% Lilliefors Critical Value	0.918	5% Lilliefors Critical Value	0.918
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1247	Mean	3.15
SD	5625	SD	2.4
95% DL/2 (t) UCL	2026	95% H-Stat (DL/2) UCL	555.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.745
		SD in Log Scale	5.152
		Mean in Original Scale	1188
		SD in Original Scale	5635
		95% Percentile Bootstrap UCL	2045
		95% BCA Bootstrap UCL	2227
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.261	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	26052		
nu star	13.04		
A-D Test Statistic	1.016	**Nonparametric Statistics**	
5% A-D Critical Value	0.867	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.867	Mean	1197
5% K-S Critical Value	0.191	SD	5614
Data not Gamma Distributed at 5% Significance Level		SE of Mean	479.1
		95% KM (t) UCL	1990
Assuming Gamma Distribution		95% KM (z) UCL	1985
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1974
Minimum	9.2	95% KM (bootstrap t) UCL	2561
Maximum	56416	95% KM (BCA) UCL	2103
Mean	10258	95% KM (Percentile Bootstrap) UCL	2009
Median	6117	95% KM (Chebyshev) UCL	3285
SD	12145	97.5% KM (Chebyshev) UCL	4189
k star	0.686	99% KM (Chebyshev) UCL	5964
Theta star	14961		
Nu star	196.1	**Potential UCLs to Use**	
AppChi2	164.7	97.5% KM (Chebyshev) UCL	4189
95% Gamma Approximate UCL	12214		
95% Adjusted Gamma UCL	12236		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)

General Statistics

Number of Valid Data	143	Number of Detected Data	29
Number of Distinct Detected Data	29	Number of Non-Detect Data	114
		Percent Non-Detects	79.72%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.89	Minimum Detected	-0.117
Maximum Detected	11000	Maximum Detected	9.306
Mean of Detected	1211	Mean of Detected	4.611
SD of Detected	2316	SD of Detected	3.021
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	127
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.81%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.581	Lilliefors Test Statistic	0.911
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	249.7	Mean	0.995
SD	1138	SD	2.647
95% DL/2 (t) UCL	407.2	95% H-Stat (DL/2) UCL	119.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.723
		SD in Log Scale	5.205
		Mean in Original Scale	245.6
		SD in Original Scale	1139
		95% Percentile Bootstrap UCL	422
		95% BCA Bootstrap UCL	506.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.274	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	4415		
nu star	15.91		
A-D Test Statistic	0.677	**Nonparametric Statistics**	
5% A-D Critical Value	0.864	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.864	Mean	246.4
5% K-S Critical Value	0.177	SD	1134
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	96.54
		95% KM (t) UCL	406.3
Assuming Gamma Distribution		95% KM (z) UCL	405.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	403.7
Minimum	0.89	95% KM (bootstrap t) UCL	590.2
Maximum	11000	95% KM (BCA) UCL	421.6
Mean	1201	95% KM (Percentile Bootstrap) UCL	418
Median	1215	95% KM (Chebyshev) UCL	667.2
SD	1030	97.5% KM (Chebyshev) UCL	849.3
k star	1.107	99% KM (Chebyshev) UCL	1207
Theta star	1085		
Nu star	316.6	**Potential UCLs to Use**	
AppChi2	276.3	95% KM (t) UCL	406.3
95% Gamma Approximate UCL	1376		
95% Adjusted Gamma UCL	1377		

Note: DL/2 is not a recommended method.

Result (nickel)

General Statistics

Number of Valid Observations	143	Number of Distinct Observations	105

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.66	Minimum of Log Data	0.978
Maximum	71.5	Maximum of Log Data	4.27
Mean	21.72	Mean of log Data	2.98
Median	19.2	SD of log Data	0.448
SD	10.71		
Coefficient of Variation	0.493		
Skewness	2.301		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.185	Lilliefors Test Statistic	0.12
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	23.2	95% H-UCL	23.28
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	25.46
95% Adjusted-CLT UCL	23.38	97.5% Chebyshev (MVUE) UCL	27.07
95% Modified-t UCL	23.23	99% Chebyshev (MVUE) UCL	30.23
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.157	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	4.212		
nu star	1475		
Approximate Chi Square Value (.05)	1387	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	23.19
Adjusted Chi Square Value	1386	95% Jackknife UCL	23.2
		95% Standard Bootstrap UCL	23.23
Anderson-Darling Test Statistic	4.156	95% Bootstrap-t UCL	23.5
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	23.51
Kolmogorov-Smirnov Test Statistic	0.122	95% Percentile Bootstrap UCL	23.26
Kolmogorov-Smirnov 5% Critical Value	0.0785	95% BCA Bootstrap UCL	23.28
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	25.62
		97.5% Chebyshev(Mean, Sd) UCL	27.31
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	30.63
95% Approximate Gamma UCL	23.1		
95% Adjusted Gamma UCL	23.12		
Potential UCL to Use		Use 95% Student's-t UCL	23.2
		or 95% Modified-t UCL	23.23

Result (n-propylbenzene)

General Statistics

Number of Valid Data	143	Number of Detected Data	39
Number of Distinct Detected Data	37	Number of Non-Detect Data	104
		Percent Non-Detects	72.73%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.62	Minimum Detected	-0.478
Maximum Detected	6600	Maximum Detected	8.795
Mean of Detected	981.5	Mean of Detected	4.477
SD of Detected	1751	SD of Detected	2.755
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	123
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	20
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	86.01%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.625	Lilliefors Test Statistic	0.928
5% Lilliefors Critical Value	0.939	5% Lilliefors Critical Value	0.939
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	270.9	Mean	1.228
SD	1005	SD	2.737
95% DL/2 (t) UCL	410.1	95% H-Stat (DL/2) UCL	184.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.694
		SD in Log Scale	4.512
		Mean in Original Scale	267.8
		SD in Original Scale	1006
		95% Percentile Bootstrap UCL	414.3
		95% BCA Bootstrap UCL	446.1
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.283	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	3471		
nu star	22.06		
A-D Test Statistic	1.272	**Nonparametric Statistics**	
5% A-D Critical Value	0.863	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.863	Mean	268.3
5% K-S Critical Value	0.154	SD	1003
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	84.93
		95% KM (t) UCL	408.9
Assuming Gamma Distribution		95% KM (z) UCL	408
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	406.9
Minimum	0.62	95% KM (bootstrap t) UCL	477.2
Maximum	6600	95% KM (BCA) UCL	433.6
Mean	1007	95% KM (Percentile Bootstrap) UCL	419.5
Median	957.1	95% KM (Chebyshev) UCL	638.5
SD	914.9	97.5% KM (Chebyshev) UCL	798.7
k star	0.868	99% KM (Chebyshev) UCL	1113
Theta star	1160		
Nu star	248.1	**Potential UCLs to Use**	
AppChi2	212.7	95% KM (t) UCL	408.9
95% Gamma Approximate UCL	1175		
95% Adjusted Gamma UCL	1177		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	143	Number of Detected Data	34
Number of Distinct Detected Data	31	Number of Non-Detect Data	109
		Percent Non-Detects	76.22%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	40000	Maximum Detected	10.6
Mean of Detected	1472	Mean of Detected	3.5
SD of Detected	6890	SD of Detected	2.613
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	137
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.228	Lilliefors Test Statistic	0.936
5% Lilliefors Critical Value	0.933	5% Lilliefors Critical Value	0.933
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	355.9	Mean	0.96
SD	3380	SD	2.394
95% DL/2 (t) UCL	823.9	95% H-Stat (DL/2) UCL	56.59
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.863
		SD in Log Scale	4.308
		Mean in Original Scale	350.1
		SD in Original Scale	3381
		95% Percentile Bootstrap UCL	904.3
		95% BCA Bootstrap UCL	1523
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.197	**Data appear Lognormal at 5% Significance Level**	
Theta Star	7467		
nu star	13.41		
A-D Test Statistic	4.062	**Nonparametric Statistics**	
5% A-D Critical Value	0.902	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.902	Mean	351.3
5% K-S Critical Value	0.167	SD	3369
Data not Gamma Distributed at 5% Significance Level		SE of Mean	285.9
		95% KM (t) UCL	824.7
Assuming Gamma Distribution		95% KM (z) UCL	821.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	819.3
Minimum	1E-09	95% KM (bootstrap t) UCL	11385
Maximum	40000	95% KM (BCA) UCL	898.6
Mean	1286	95% KM (Percentile Bootstrap) UCL	905.9
Median	967.4	95% KM (Chebyshev) UCL	1598
SD	3394	97.5% KM (Chebyshev) UCL	2137
k star	0.173	99% KM (Chebyshev) UCL	3196
Theta star	7445		
Nu star	49.41	**Potential UCLs to Use**	
AppChi2	34.27	97.5% KM (Chebyshev) UCL	2137
95% Gamma Approximate UCL	1854		
95% Adjusted Gamma UCL	1861		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	143	Number of Detected Data	35
Number of Distinct Detected Data	33	Number of Non-Detect Data	108
		Percent Non-Detects	75.52%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.7	Minimum Detected	0.531
Maximum Detected	89000	Maximum Detected	11.4
Mean of Detected	2965	Mean of Detected	3.984
SD of Detected	15035	SD of Detected	2.588
Minimum Non-Detect	0.81	Minimum Non-Detect	-0.211
Maximum Non-Detect	490	Maximum Non-Detect	6.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	138
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.50%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.207	Lilliefors Test Statistic	0.927
5% Lilliefors Critical Value	0.934	5% Lilliefors Critical Value	0.934
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	738.3	Mean	1.673
SD	7466	SD	2.363
95% DL/2 (t) UCL	1772	95% H-Stat (DL/2) UCL	116.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.023
		SD in Log Scale	4.174
		Mean in Original Scale	725.9
		SD in Original Scale	7468
		95% Percentile Bootstrap UCL	1955
		95% BCA Bootstrap UCL	3224
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.189	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	15711		
nu star	13.21		
A-D Test Statistic	4.665	**Nonparametric Statistics**	
5% A-D Critical Value	0.907	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.907	Mean	728
5% K-S Critical Value	0.165	SD	7441
Data not Gamma Distributed at 5% Significance Level		SE of Mean	631.3
		95% KM (t) UCL	1773
Assuming Gamma Distribution		95% KM (z) UCL	1766
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1761
Minimum	1.7	95% KM (bootstrap t) UCL	29410
Maximum	89000	95% KM (BCA) UCL	1940
Mean	2995	95% KM (Percentile Bootstrap) UCL	1974
Median	2815	95% KM (Chebyshev) UCL	3480
SD	7363	97.5% KM (Chebyshev) UCL	4671
k star	0.615	99% KM (Chebyshev) UCL	7010
Theta star	4872		
Nu star	175.8	**Potential UCLs to Use**	
AppChi2	146.1	97.5% KM (Chebyshev) UCL	4671
95% Gamma Approximate UCL	3603		
95% Adjusted Gamma UCL	3610		

Note: DL/2 is not a recommended method.

Result (phenanthrene)

General Statistics

Number of Valid Data	143	Number of Detected Data	45
Number of Distinct Detected Data	36	Number of Non-Detect Data	98
		Percent Non-Detects	68.53%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	31	Minimum Detected	3.434
Maximum Detected	59000	Maximum Detected	10.99
Mean of Detected	2747	Mean of Detected	6.463
SD of Detected	8931	SD of Detected	1.491
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	141
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.60%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.308	Lilliefors Test Statistic	0.96
5% Lilliefors Critical Value	0.945	5% Lilliefors Critical Value	0.945
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	958.6	Mean	4.788
SD	5139	SD	1.645
95% DL/2 (t) UCL	1670	95% H-Stat (DL/2) UCL	483.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.49
		SD in Log Scale	2.515
		Mean in Original Scale	877.9
		SD in Original Scale	5131
		95% Percentile Bootstrap UCL	1729
		95% BCA Bootstrap UCL	2170
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.43	**Data appear Lognormal at 5% Significance Level**	
Theta Star	6394		
nu star	38.67		
A-D Test Statistic	3.704	**Nonparametric Statistics**	
5% A-D Critical Value	0.827	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.827	Mean	894.4
5% K-S Critical Value	0.14	SD	5112
Data not Gamma Distributed at 5% Significance Level		SE of Mean	432.4
		95% KM (t) UCL	1610
Assuming Gamma Distribution		95% KM (z) UCL	1606
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1584
Minimum	31	95% KM (bootstrap t) UCL	3438
Maximum	59000	95% KM (BCA) UCL	1874
Mean	3127	95% KM (Percentile Bootstrap) UCL	1692
Median	2100	95% KM (Chebyshev) UCL	2779
SD	5176	97.5% KM (Chebyshev) UCL	3595
k star	1.032	99% KM (Chebyshev) UCL	5197
Theta star	3030		
Nu star	295.2	**Potential UCLs to Use**	
AppChi2	256.4	95% KM (BCA) UCL	1874
95% Gamma Approximate UCL	3600		
95% Adjusted Gamma UCL	3606		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	143	Number of Detected Data	25
Number of Distinct Detected Data	24	Number of Non-Detect Data	118
		Percent Non-Detects	82.52%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	12000	Maximum Detected	9.393
Mean of Detected	910.5	Mean of Detected	3.97
SD of Detected	2533	SD of Detected	2.738
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	136
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.10%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.408	Lilliefors Test Statistic	0.939
5% Lilliefors Critical Value	0.918	5% Lilliefors Critical Value	0.918
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	165.5	Mean	0.844
SD	1097	SD	2.375
95% DL/2 (t) UCL	317.4	95% H-Stat (DL/2) UCL	49.81
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.455
		SD in Log Scale	4.848
		Mean in Original Scale	159.2
		SD in Original Scale	1098
		95% Percentile Bootstrap UCL	335.3
		95% BCA Bootstrap UCL	444.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.246	**Data appear Lognormal at 5% Significance Level**	
Theta Star	3694		
nu star	12.32		
A-D Test Statistic	1.348	**Nonparametric Statistics**	
5% A-D Critical Value	0.874	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.874	Mean	160.3
5% K-S Critical Value	0.191	SD	1094
Data not Gamma Distributed at 5% Significance Level		SE of Mean	93.34
		95% KM (t) UCL	314.9
Assuming Gamma Distribution		95% KM (z) UCL	313.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	311.9
Minimum	1.1	95% KM (bootstrap t) UCL	992.8
Maximum	12000	95% KM (BCA) UCL	357.4
Mean	938.8	95% KM (Percentile Bootstrap) UCL	330.3
Median	900.7	95% KM (Chebyshev) UCL	567.2
SD	1046	97.5% KM (Chebyshev) UCL	743.3
k star	1.115	99% KM (Chebyshev) UCL	1089
Theta star	841.6		
Nu star	319	**Potential UCLs to Use**	
AppChi2	278.6	97.5% KM (Chebyshev) UCL	743.3
95% Gamma Approximate UCL	1075		
95% Adjusted Gamma UCL	1076		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	143	Number of Detected Data	54
Number of Distinct Detected Data	41	Number of Non-Detect Data	89
		Percent Non-Detects	62.24%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	25	Minimum Detected	3.219
Maximum Detected	13000	Maximum Detected	9.473
Mean of Detected	1358	Mean of Detected	6.238
SD of Detected	2516	SD of Detected	1.373
Minimum Non-Detect	21	Minimum Non-Detect	3.045
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.305	Lilliefors Test Statistic	0.117
5% Lilliefors Critical Value	0.121	5% Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	698.6	Mean	4.942
SD	1998	SD	1.626
95% DL/2 (t) UCL	975.3	95% H-Stat (DL/2) UCL	552.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.059
		SD in Log Scale	2.117
		Mean in Original Scale	529.4
		SD in Original Scale	1668
		95% Percentile Bootstrap UCL	769.9
		95% BCA Bootstrap UCL	833.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.607	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2238		
nu star	65.51		
A-D Test Statistic	2.498	**Nonparametric Statistics**	
5% A-D Critical Value	0.804	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.804	Mean	542.6
5% K-S Critical Value	0.127	SD	1669
Data not Gamma Distributed at 5% Significance Level		SE of Mean	141.8
		95% KM (t) UCL	777.3
Assuming Gamma Distribution		95% KM (z) UCL	775.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	771.6
Minimum	25	95% KM (bootstrap t) UCL	920.3
Maximum	13000	95% KM (BCA) UCL	817.4
Mean	1363	95% KM (Percentile Bootstrap) UCL	788.7
Median	1334	95% KM (Chebyshev) UCL	1160
SD	1538	97.5% KM (Chebyshev) UCL	1428
k star	1.474	99% KM (Chebyshev) UCL	1953
Theta star	924.3		
Nu star	421.7	**Potential UCLs to Use**	
AppChi2	375.1	95% KM (BCA) UCL	817.4
95% Gamma Approximate UCL	1532		
95% Adjusted Gamma UCL	1534		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	143	Number of Detected Data	35
Number of Distinct Detected Data	35	Number of Non-Detect Data	108
		Percent Non-Detects	75.52%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.91	Minimum Detected	-0.0943
Maximum Detected	5200	Maximum Detected	8.556
Mean of Detected	590.3	Mean of Detected	4.21
SD of Detected	1112	SD of Detected	2.659
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	100	Maximum Non-Detect	4.605
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	127
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.81%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.598	Lilliefors Test Statistic	0.929
5% Lilliefors Critical Value	0.934	5% Lilliefors Critical Value	0.934
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	147.8	Mean	0.987
SD	600	SD	2.566
95% DL/2 (t) UCL	230.8	95% H-Stat (DL/2) UCL	88.01
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.223
		SD in Log Scale	4.47
		Mean in Original Scale	144.6
		SD in Original Scale	600.7
		95% Percentile Bootstrap UCL	233.7
		95% BCA Bootstrap UCL	266.1
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.307	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1922		
nu star	21.5		
A-D Test Statistic	0.722	**Nonparametric Statistics**	
5% A-D Critical Value	0.853	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.853	Mean	145.3
5% K-S Critical Value	0.161	SD	598.4
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	50.78
		95% KM (t) UCL	229.4
Assuming Gamma Distribution		95% KM (z) UCL	228.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	228.5
Minimum	0.91	95% KM (bootstrap t) UCL	290.4
Maximum	5200	95% KM (BCA) UCL	245.9
Mean	576.3	95% KM (Percentile Bootstrap) UCL	233.6
Median	587.2	95% KM (Chebyshev) UCL	366.7
SD	553.6	97.5% KM (Chebyshev) UCL	462.4
k star	1.019	99% KM (Chebyshev) UCL	650.5
Theta star	565.7		
Nu star	291.4	**Potential UCLs to Use**	
AppChi2	252.8	95% KM (t) UCL	229.4
95% Gamma Approximate UCL	664.2		
95% Adjusted Gamma UCL	665.1		

Note: DL/2 is not a recommended method.

Result (selenium)

General Statistics

Number of Valid Data	143	Number of Detected Data	19
Number of Distinct Detected Data	18	Number of Non-Detect Data	124
		Percent Non-Detects	86.71%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.785	Minimum Detected	-0.242
Maximum Detected	3.22	Maximum Detected	1.169
Mean of Detected	1.638	Mean of Detected	0.403
SD of Detected	0.753	SD of Detected	0.43
Minimum Non-Detect	0.776	Minimum Non-Detect	-0.254
Maximum Non-Detect	1.04	Maximum Non-Detect	0.0392
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	128
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	15
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	89.51%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.866	Lilliefors Test Statistic	0.947
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.585	Mean	-0.691
SD	0.493	SD	0.459
95% DL/2 (t) UCL	0.654	95% H-Stat (DL/2) UCL	0.559
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.168
		SD in Log Scale	0.724
		Mean in Original Scale	0.444
		SD in Original Scale	0.548
		95% Percentile Bootstrap UCL	0.519
		95% BCA Bootstrap UCL	0.536
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.82	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.34		
nu star	183.2		
A-D Test Statistic	0.46	**Nonparametric Statistics**	
5% A-D Critical Value	0.742	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.742	Mean	0.899
5% K-S Critical Value	0.199	SD	0.394
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0338
		95% KM (t) UCL	0.955
Assuming Gamma Distribution		95% KM (z) UCL	0.955
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.956
Minimum	0.785	95% KM (bootstrap t) UCL	0.966
Maximum	3.22	95% KM (BCA) UCL	1.186
Mean	1.629	95% KM (Percentile Bootstrap) UCL	1.016
Median	1.615	95% KM (Chebyshev) UCL	1.046
SD	0.289	97.5% KM (Chebyshev) UCL	1.11
k star	34.58	99% KM (Chebyshev) UCL	1.236
Theta star	0.0471		
Nu star	9891	**Potential UCLs to Use**	
AppChi2	9661	95% KM (t) UCL	0.955
95% Gamma Approximate UCL	1.668		
95% Adjusted Gamma UCL	1.668		

Note: DL/2 is not a recommended method.

Result (tert-butyl alcohol (tba))

General Statistics

Number of Valid Data	143	Number of Detected Data	12
Number of Distinct Detected Data	11	Number of Non-Detect Data	131
		Percent Non-Detects	91.61%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	16	Minimum Detected	2.773
Maximum Detected	690	Maximum Detected	6.537
Mean of Detected	147.9	Mean of Detected	4.459
SD of Detected	187.1	SD of Detected	1.053
Minimum Non-Detect	8.1	Minimum Non-Detect	2.092
Maximum Non-Detect	10000	Maximum Non-Detect	9.21
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	143
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.671	Lilliefors Test Statistic	0.963
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	230.5	Mean	3.645
SD	548.7	SD	1.869
95% DL/2 (t) UCL	306.4	95% H-Stat (DL/2) UCL	374.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.436
		SD in Log Scale	1.8
		Mean in Original Scale	14.55
		SD in Original Scale	66.05
		95% Percentile Bootstrap UCL	23.94
		95% BCA Bootstrap UCL	30.15
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.855	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	173		
nu star	20.52		
A-D Test Statistic	0.524	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	31.11
5% K-S Critical Value	0.252	SD	73.04
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	7.385
		95% KM (t) UCL	43.34
Assuming Gamma Distribution		95% KM (z) UCL	43.26
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	45.22
Minimum	1E-09	95% KM (bootstrap t) UCL	54.2
Maximum	690	95% KM (BCA) UCL	63.68
Mean	124.1	95% KM (Percentile Bootstrap) UCL	59.18
Median	105.2	95% KM (Chebyshev) UCL	63.3
SD	94.2	97.5% KM (Chebyshev) UCL	77.23
k star	0.266	99% KM (Chebyshev) UCL	104.6
Theta star	466.8		
Nu star	76.01	**Potential UCLs to Use**	
AppChi2	56.93	95% KM (t) UCL	43.34
95% Gamma Approximate UCL	165.6		
95% Adjusted Gamma UCL	166.1		

Note: DL/2 is not a recommended method.

Result (tert-butylbenzene)

General Statistics

Number of Valid Data	143	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	138
		Percent Non-Detects	96.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	5.4	Minimum Detected	1.686
Maximum Detected	690	Maximum Detected	6.537
Mean of Detected	285.1	Mean of Detected	4.879
SD of Detected	261.9	SD of Detected	1.9
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	520	Maximum Non-Detect	6.254
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	142
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.30%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.932	Lilliefors Test Statistic	0.839
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.13	Mean	0.52
SD	72.04	SD	1.97
95% DL/2 (t) UCL	29.11	95% H-Stat (DL/2) UCL	16.97
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.068
		SD in Log Scale	3.2
		Mean in Original Scale	10.06
		SD in Original Scale	68.49
		95% Percentile Bootstrap UCL	19.99
		95% BCA Bootstrap UCL	23.65
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.442	**Data appear Normal at 5% Significance Level**	
Theta Star	645.4		
nu star	4.417		
A-D Test Statistic	0.335	**Nonparametric Statistics**	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.698	Mean	15.22
5% K-S Critical Value	0.366	SD	67.58
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	6.325
		95% KM (t) UCL	25.69
Assuming Gamma Distribution		95% KM (z) UCL	25.62
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	81.77
Minimum	5.4	95% KM (bootstrap t) UCL	25.4
Maximum	690	95% KM (BCA) UCL	320
Mean	285.1	95% KM (Percentile Bootstrap) UCL	308.6
Median	285.1	95% KM (Chebyshev) UCL	42.79
SD	43.95	97.5% KM (Chebyshev) UCL	54.72
k star	18.26	99% KM (Chebyshev) UCL	78.16
Theta star	15.61		
Nu star	5223	**Potential UCLs to Use**	
AppChi2	5056	95% KM (t) UCL	25.69
95% Gamma Approximate UCL	294.5	95% KM (Percentile Bootstrap) UCL	308.6
95% Adjusted Gamma UCL	294.6		

Note: DL/2 is not a recommended method.

Result (toluene)			
General Statistics			
Number of Valid Data	143	Number of Detected Data	45
Number of Distinct Detected Data	40	Number of Non-Detect Data	98
		Percent Non-Detects	68.53%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.73	Minimum Detected	-0.315
Maximum Detected	18000	Maximum Detected	9.798
Mean of Detected	595.6	Mean of Detected	2.511
SD of Detected	2759	SD of Detected	2.38
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	250	Maximum Non-Detect	5.521
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	139
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.20%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.24	Lilliefors Test Statistic	0.873
5% Lilliefors Critical Value	0.945	5% Lilliefors Critical Value	0.945
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	194.1	Mean	1.093
SD	1560	SD	2.237
95% DL/2 (t) UCL	410.1	95% H-Stat (DL/2) UCL	49.93
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.597
		SD in Log Scale	3.416
		Mean in Original Scale	187.5
		SD in Original Scale	1561
		95% Percentile Bootstrap UCL	431.8
		95% BCA Bootstrap UCL	638
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.193	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3084		
nu star	17.38		
A-D Test Statistic	7.164	**Nonparametric Statistics**	
5% A-D Critical Value	0.911	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.911	Mean	188.4
5% K-S Critical Value	0.146	SD	1555
Data not Gamma Distributed at 5% Significance Level		SE of Mean	131.5
		95% KM (t) UCL	406.2
Assuming Gamma Distribution		95% KM (z) UCL	404.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	404.3
Minimum	1E-09	95% KM (bootstrap t) UCL	5306
Maximum	18000	95% KM (BCA) UCL	469.4
Mean	575	95% KM (Percentile Bootstrap) UCL	436.9
Median	516.5	95% KM (Chebyshev) UCL	761.7
SD	1543	97.5% KM (Chebyshev) UCL	1010
k star	0.315	99% KM (Chebyshev) UCL	1497
Theta star	1824		
Nu star	90.18	**Potential UCLs to Use**	
AppChi2	69.28	97.5% KM (Chebyshev) UCL	1010
95% Gamma Approximate UCL	748.4		
95% Adjusted Gamma UCL	750.4		
Note: DL/2 is not a recommended method.			

Result (vanadium)

General Statistics

Number of Valid Observations	143	Number of Distinct Observations	113

Raw Statistics		**Log-transformed Statistics**	
Minimum	5.48	Minimum of Log Data	1.701
Maximum	293	Maximum of Log Data	5.68
Mean	40.45	Mean of log Data	3.609
Median	36.8	SD of log Data	0.388
SD	26.35		
Coefficient of Variation	0.652		
Skewness	6.985		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.27	Lilliefors Test Statistic	0.132
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	44.09	95% H-UCL	42.17
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	45.62
95% Adjusted-CLT UCL	45.45	97.5% Chebyshev (MVUE) UCL	48.14
95% Modified-t UCL	44.31	99% Chebyshev (MVUE) UCL	53.08
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.562	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	7.272		
nu star	1591		
Approximate Chi Square Value (.05)	1499	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	44.07
Adjusted Chi Square Value	1498	95% Jackknife UCL	44.09
		95% Standard Bootstrap UCL	43.96
Anderson-Darling Test Statistic	6.964	95% Bootstrap-t UCL	46.89
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	60.47
Kolmogorov-Smirnov Test Statistic	0.171	95% Percentile Bootstrap UCL	44.28
Kolmogorov-Smirnov 5% Critical Value	0.0785	95% BCA Bootstrap UCL	46.13
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	50.05
		97.5% Chebyshev(Mean, Sd) UCL	54.21
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	62.37
95% Approximate Gamma UCL	42.92		
95% Adjusted Gamma UCL	42.94		
Potential UCL to Use		Use 95% Student's-t UCL	44.09
		or 95% Modified-t UCL	44.31

Result (xylenes, total)

General Statistics

Number of Valid Data	143	Number of Detected Data	39
Number of Distinct Detected Data	39	Number of Non-Detect Data	104
		Percent Non-Detects	72.73%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.7	Minimum Detected	0.531
Maximum Detected	129000	Maximum Detected	11.77
Mean of Detected	3945	Mean of Detected	4.195
SD of Detected	20682	SD of Detected	2.618
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	490	Maximum Non-Detect	6.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	135
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.41%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.201	Lilliefors Test Statistic	0.939
5% Lilliefors Critical Value	0.939	5% Lilliefors Critical Value	0.939
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1088	Mean	1.792
SD	10842	SD	2.467
95% DL/2 (t) UCL	2589	95% H-Stat (DL/2) UCL	166.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.493
		SD in Log Scale	4.216
		Mean in Original Scale	1076
		SD in Original Scale	10843
		95% Percentile Bootstrap UCL	2818
		95% BCA Bootstrap UCL	4594
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.186	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	21241		
nu star	14.49		
A-D Test Statistic	5.123	**Nonparametric Statistics**	
5% A-D Critical Value	0.912	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.912	Mean	1078
5% K-S Critical Value	0.157	SD	10805
Data not Gamma Distributed at 5% Significance Level		SE of Mean	915.4
		95% KM (t) UCL	2594
Assuming Gamma Distribution		95% KM (z) UCL	2584
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2579
Minimum	1E-09	95% KM (bootstrap t) UCL	41888
Maximum	129000	95% KM (BCA) UCL	2969
Mean	3884	95% KM (Percentile Bootstrap) UCL	2874
Median	3994	95% KM (Chebyshev) UCL	5068
SD	10769	97.5% KM (Chebyshev) UCL	6795
k star	0.294	99% KM (Chebyshev) UCL	10186
Theta star	13221		
Nu star	84.01	**Potential UCLs to Use**	
AppChi2	63.88	97.5% KM (Chebyshev) UCL	6795
95% Gamma Approximate UCL	5107		
95% Adjusted Gamma UCL	5121		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	143	Number of Distinct Observations	117

Raw Statistics		**Log-transformed Statistics**	
Minimum	25.4	Minimum of Log Data	3.235
Maximum	1740	Maximum of Log Data	7.462
Mean	153.1	Mean of log Data	4.736
Median	101	SD of log Data	0.667
SD	187.3		
Coefficient of Variation	1.224		
Skewness	5.333		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.28	Lilliefors Test Statistic	0.117
Lilliefors Critical Value	0.0741	Lilliefors Critical Value	0.0741
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	179	95% H-UCL	158.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	180
95% Adjusted-CLT UCL	186.3	97.5% Chebyshev (MVUE) UCL	196.4
95% Modified-t UCL	180.2	99% Chebyshev (MVUE) UCL	228.7
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.808	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	84.64		
nu star	517.2		
Approximate Chi Square Value (.05)	465.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0483	95% CLT UCL	178.8
Adjusted Chi Square Value	465	95% Jackknife UCL	179
		95% Standard Bootstrap UCL	178.8
Anderson-Darling Test Statistic	8.027	95% Bootstrap-t UCL	191.7
Anderson-Darling 5% Critical Value	0.767	95% Hall's Bootstrap UCL	205.9
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL	180.2
Kolmogorov-Smirnov 5% Critical Value	0.0795	95% BCA Bootstrap UCL	189
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	221.3
		97.5% Chebyshev(Mean, Sd) UCL	250.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	308.9
95% Approximate Gamma UCL	170.1		
95% Adjusted Gamma UCL	170.3		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	221.3

	General UCL Statistics for Data Sets with Non-Detects		
User Selected Options			
From File	C:\Documents and Settings\sselden\Desktop\cenco\Area 3 0-10 proucl input.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Result (1,2,4-trimethylbenzene)			
General Statistics			
Number of Valid Data	333	Number of Detected Data	93
Number of Distinct Detected Data	88	Number of Non-Detect Data	240
		Percent Non-Detects	72.07%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.125	Minimum Detected	0.754
Maximum Detected	298750	Maximum Detected	12.61
Mean of Detected	12249	Mean of Detected	5.968
SD of Detected	37516	SD of Detected	3.307
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	5150	Maximum Non-Detect	8.547
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	307
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	26
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.19%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.372	Lilliefors Test Statistic	0.0885
5% Lilliefors Critical Value	0.0919	5% Lilliefors Critical Value	0.0919
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3443	Mean	2.489
SD	20498	SD	3.093
95% DL/2 (t) UCL	5296	95% H-Stat (DL/2) UCL	1321
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.148
		SD in Log Scale	5.6
		Mean in Original Scale	3421
		SD in Original Scale	20501
		95% Percentile Bootstrap UCL	5484
		95% BCA Bootstrap UCL	5969
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.212	**Data appear Lognormal at 5% Significance Level**	
Theta Star	57768		
nu star	39.44		
A-D Test Statistic	3.385	**Nonparametric Statistics**	
5% A-D Critical Value	0.906	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.906	Mean	3424
5% K-S Critical Value	0.103	SD	20470
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1128
		95% KM (t) UCL	5284
Assuming Gamma Distribution		95% KM (z) UCL	5279
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5277
Minimum	2.125	95% KM (bootstrap t) UCL	7181
Maximum	298750	95% KM (BCA) UCL	5557
Mean	12279	95% KM (Percentile Bootstrap) UCL	5417
Median	12059	95% KM (Chebyshev) UCL	8340
SD	19752	97.5% KM (Chebyshev) UCL	10467
k star	0.633	99% KM (Chebyshev) UCL	14645
Theta star	19411		
Nu star	421.3	**Potential UCLs to Use**	
AppChi2	374.7	97.5% KM (Chebyshev) UCL	10467
95% Gamma Approximate UCL	13805		
95% Adjusted Gamma UCL	13812		
Note: DL/2 is not a recommended method.			

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	333	Number of Detected Data	64
Number of Distinct Detected Data	62	Number of Non-Detect Data	269
		Percent Non-Detects	80.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.375	Minimum Detected	0.318
Maximum Detected	104250	Maximum Detected	11.55
Mean of Detected	5247	Mean of Detected	5.869
SD of Detected	14168	SD of Detected	3.077
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	5150	Maximum Non-Detect	8.547
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	317
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.20%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.356	Lilliefors Test Statistic	0.109
5% Lilliefors Critical Value	0.111	5% Lilliefors Critical Value	0.111
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1039	Mean	2.213
SD	6507	SD	2.729
95% DL/2 (t) UCL	1627	95% H-Stat (DL/2) UCL	370.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.332
		SD in Log Scale	5.313
		Mean in Original Scale	1009
		SD in Original Scale	6510
		95% Percentile Bootstrap UCL	1663
		95% BCA Bootstrap UCL	2026
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.26	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	20202		
nu star	33.24		
A-D Test Statistic	0.977	**Nonparametric Statistics**	
5% A-D Critical Value	0.882	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.882	Mean	1011
5% K-S Critical Value	0.122	SD	6500
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	359
		95% KM (t) UCL	1603
Assuming Gamma Distribution		95% KM (z) UCL	1601
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1599
Minimum	1.375	95% KM (bootstrap t) UCL	2238
Maximum	104250	95% KM (BCA) UCL	1700
Mean	5361	95% KM (Percentile Bootstrap) UCL	1663
Median	4494	95% KM (Chebyshev) UCL	2576
SD	6452	97.5% KM (Chebyshev) UCL	3253
k star	1.014	99% KM (Chebyshev) UCL	4583
Theta star	5286		
Nu star	675.3	**Potential UCLs to Use**	
AppChi2	616	95% KM (t) UCL	1603
95% Gamma Approximate UCL	5876		
95% Adjusted Gamma UCL	5879		

Note: DL/2 is not a recommended method.

Result (1-methylnaphthalene)

General Statistics

Number of Valid Data	186	Number of Detected Data	50
Number of Distinct Detected Data	45	Number of Non-Detect Data	136
		Percent Non-Detects	73.12%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	85	Minimum Detected	4.443
Maximum Detected	240000	Maximum Detected	12.39
Mean of Detected	20583	Mean of Detected	7.466
SD of Detected	54282	SD of Detected	2.204
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	161
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	25
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	86.56%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.429	Lilliefors Test Statistic	0.918
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5585	Mean	4.756
SD	29387	SD	2.183
95% DL/2 (t) UCL	9147	95% H-Stat (DL/2) UCL	1194
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.144
		SD in Log Scale	4.107
		Mean in Original Scale	5540
		SD in Original Scale	29395
		95% Percentile Bootstrap UCL	9211
		95% BCA Bootstrap UCL	10863
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.279	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	73831		
nu star	27.88		
A-D Test Statistic	4.365	**Nonparametric Statistics**	
5% A-D Critical Value	0.87	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.87	Mean	5597
5% K-S Critical Value	0.137	SD	29306
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2171
		95% KM (t) UCL	9186
Assuming Gamma Distribution		95% KM (z) UCL	9168
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	9152
Minimum	85	95% KM (bootstrap t) UCL	12090
Maximum	240000	95% KM (BCA) UCL	9356
Mean	20853	95% KM (Percentile Bootstrap) UCL	9282
Median	6635	95% KM (Chebyshev) UCL	15059
SD	34960	97.5% KM (Chebyshev) UCL	19153
k star	0.502	99% KM (Chebyshev) UCL	27195
Theta star	41503		
Nu star	186.9	**Potential UCLs to Use**	
AppChi2	156.3	97.5% KM (Chebyshev) UCL	19153
95% Gamma Approximate UCL	24939		
95% Adjusted Gamma UCL	24974		

Note: DL/2 is not a recommended method.

Result (2-butanone)

General Statistics

Number of Valid Data	334	Number of Detected Data	60
Number of Distinct Detected Data	38	Number of Non-Detect Data	274
		Percent Non-Detects	82.04%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	18	Minimum Detected	2.89
Maximum Detected	150	Maximum Detected	5.011
Mean of Detected	42.67	Mean of Detected	3.641
SD of Detected	23.52	SD of Detected	0.456
Minimum Non-Detect	8.1	Minimum Non-Detect	2.092
Maximum Non-Detect	247500	Maximum Non-Detect	12.42
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.162	Lilliefors Test Statistic	0.108
5% Lilliefors Critical Value	0.114	5% Lilliefors Critical Value	0.114
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3161	Mean	4.79
SD	12689	SD	2.273
95% DL/2 (t) UCL	4306	95% H-Stat (DL/2) UCL	4138
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.041
		SD in Log Scale	0.582
		Mean in Original Scale	25.01
		SD in Original Scale	17.5
		95% Percentile Bootstrap UCL	26.63
		95% BCA Bootstrap UCL	26.77
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.373	**Data appear Lognormal at 5% Significance Level**	
Theta Star	9.758		
nu star	524.7		
A-D Test Statistic	1.37	**Nonparametric Statistics**	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	29.37
5% K-S Critical Value	0.115	SD	18.68
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.595
		95% KM (t) UCL	32
Assuming Gamma Distribution		95% KM (z) UCL	31.99
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	31.57
Minimum	18	95% KM (bootstrap t) UCL	31.71
Maximum	150	95% KM (BCA) UCL	33.51
Mean	46.41	95% KM (Percentile Bootstrap) UCL	33.03
Median	48.13	95% KM (Chebyshev) UCL	36.32
SD	12.19	97.5% KM (Chebyshev) UCL	39.33
k star	15.03	99% KM (Chebyshev) UCL	45.24
Theta star	3.088		
Nu star	10041	**Potential UCLs to Use**	
AppChi2	9809	95% KM (t) UCL	32
95% Gamma Approximate UCL	47.51	95% KM (% Bootstrap) UCL	33.03
95% Adjusted Gamma UCL	47.51		

Note: DL/2 is not a recommended method.

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	186	Number of Detected Data	53
Number of Distinct Detected Data	47	Number of Non-Detect Data	133
		Percent Non-Detects	71.51%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	29	Minimum Detected	3.367
Maximum Detected	360000	Maximum Detected	12.79
Mean of Detected	26627	Mean of Detected	7.408
SD of Detected	75981	SD of Detected	2.368
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	1200	Maximum Non-Detect	7.09
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	161
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	25
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	86.56%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.391	Lilliefors Test Statistic	0.141
5% Lilliefors Critical Value	0.122	5% Lilliefors Critical Value	0.122
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7638	Mean	4.81
SD	42038	SD	2.241
95% DL/2 (t) UCL	12734	95% H-Stat (DL/2) UCL	1407
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.965
		SD in Log Scale	4.352
		Mean in Original Scale	7593
		SD in Original Scale	42046
		95% Percentile Bootstrap UCL	13079
		95% BCA Bootstrap UCL	14454
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.253	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	105353		
nu star	26.79		
A-D Test Statistic	4.809	**Nonparametric Statistics**	
5% A-D Critical Value	0.883	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.883	Mean	7612
5% K-S Critical Value	0.134	SD	41929
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3104
		95% KM (t) UCL	12743
Assuming Gamma Distribution		95% KM (z) UCL	12717
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	12700
Minimum	29	95% KM (bootstrap t) UCL	18354
Maximum	360000	95% KM (BCA) UCL	13564
Mean	26589	95% KM (Percentile Bootstrap) UCL	12780
Median	21936	95% KM (Chebyshev) UCL	21141
SD	40741	97.5% KM (Chebyshev) UCL	26995
k star	0.729	99% KM (Chebyshev) UCL	38494
Theta star	36491		
Nu star	271.1	**Potential UCLs to Use**	
AppChi2	233.9	97.5% KM (Chebyshev) UCL	26995
95% Gamma Approximate UCL	30809		
95% Adjusted Gamma UCL	30844		

Note: DL/2 is not a recommended method.

Result (acenaphthene)

General Statistics

Number of Valid Data	333	Number of Detected Data	68
Number of Distinct Detected Data	59	Number of Non-Detect Data	265
		Percent Non-Detects	79.58%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	19000	Maximum Detected	9.852
Mean of Detected	831.7	Mean of Detected	4.837
SD of Detected	2866	SD of Detected	1.851
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	333
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.407	Lilliefors Test Statistic	0.081
5% Lilliefors Critical Value	0.107	5% Lilliefors Critical Value	0.107
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	283.5	Mean	3.666
SD	1530	SD	1.64
95% DL/2 (t) UCL	421.8	95% H-Stat (DL/2) UCL	156.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.089
		SD in Log Scale	2.165
		Mean in Original Scale	178.5
		SD in Original Scale	1330
		95% Percentile Bootstrap UCL	301.7
		95% BCA Bootstrap UCL	363.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.35	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2379		
nu star	47.54		
A-D Test Statistic	4.792	**Nonparametric Statistics**	
5% A-D Critical Value	0.852	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.852	Mean	180.5
5% K-S Critical Value	0.117	SD	1330
Data not Gamma Distributed at 5% Significance Level		SE of Mean	73.57
		95% KM (t) UCL	301.9
Assuming Gamma Distribution		95% KM (z) UCL	301.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	301.2
Minimum	1E-09	95% KM (bootstrap t) UCL	619.3
Maximum	19000	95% KM (BCA) UCL	330.9
Mean	2470	95% KM (Percentile Bootstrap) UCL	311.4
Median	798.3	95% KM (Chebyshev) UCL	501.2
SD	3430	97.5% KM (Chebyshev) UCL	640
k star	0.127	99% KM (Chebyshev) UCL	912.6
Theta star	19384		
Nu star	84.86	**Potential UCLs to Use**	
AppChi2	64.63	95% KM (Chebyshev) UCL	501.2
95% Gamma Approximate UCL	3243		
95% Adjusted Gamma UCL	3247		

Note: DL/2 is not a recommended method.

Result (acenaphthylene)

General Statistics

Number of Valid Data	333	Number of Detected Data	36
Number of Distinct Detected Data	34	Number of Non-Detect Data	297
		Percent Non-Detects	89.19%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	6200	Maximum Detected	8.732
Mean of Detected	412.3	Mean of Detected	4.219
SD of Detected	1127	SD of Detected	1.846
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	333
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.402	Lilliefors Test Statistic	0.96
5% Lilliefors Critical Value	0.935	5% Lilliefors Critical Value	0.935
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	182.7	Mean	3.479
SD	922	SD	1.524
95% DL/2 (t) UCL	266.1	95% H-Stat (DL/2) UCL	118.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.141
		SD in Log Scale	1.513
		Mean in Original Scale	56.14
		SD in Original Scale	386.8
		95% Percentile Bootstrap UCL	97
		95% BCA Bootstrap UCL	113
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.357	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1153		
nu star	25.74		
A-D Test Statistic	2.528	**Nonparametric Statistics**	
5% A-D Critical Value	0.841	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.841	Mean	55.58
5% K-S Critical Value	0.158	SD	388.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	21.75
		95% KM (t) UCL	91.46
Assuming Gamma Distribution		95% KM (z) UCL	91.36
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	91.02
Minimum	1E-09	95% KM (bootstrap t) UCL	165
Maximum	6200	95% KM (BCA) UCL	91.84
Mean	299.8	95% KM (Percentile Bootstrap) UCL	96.52
Median	323.6	95% KM (Chebyshev) UCL	150.4
SD	399	97.5% KM (Chebyshev) UCL	191.4
k star	0.228	99% KM (Chebyshev) UCL	272
Theta star	1317		
Nu star	151.6	**Potential UCLs to Use**	
AppChi2	124.2	95% KM (Chebyshev) UCL	150.4
95% Gamma Approximate UCL	366.1		
95% Adjusted Gamma UCL	366.4		

Note: DL/2 is not a recommended method.

Result (acetone)

General Statistics

Number of Valid Data	334	Number of Detected Data	73
Number of Distinct Detected Data	38	Number of Non-Detect Data	261
		Percent Non-Detects	78.14%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	41	Minimum Detected	3.714
Maximum Detected	540	Maximum Detected	6.292
Mean of Detected	129.6	Mean of Detected	4.742
SD of Detected	74.07	SD of Detected	0.484
Minimum Non-Detect	27	Minimum Non-Detect	3.296
Maximum Non-Detect	170000	Maximum Non-Detect	12.04
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.128	Lilliefors Test Statistic	0.0772
5% Lilliefors Critical Value	0.104	5% Lilliefors Critical Value	0.104
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2368	Mean	5.408
SD	8174	SD	2.085
95% DL/2 (t) UCL	3106	95% H-Stat (DL/2) UCL	4688
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.913
		SD in Log Scale	0.666
		Mean in Original Scale	63.23
		SD in Original Scale	52.8
		95% Percentile Bootstrap UCL	68.19
		95% BCA Bootstrap UCL	68.54
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.08	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	31.77		
nu star	595.6		
A-D Test Statistic	0.633	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	75.72
5% K-S Critical Value	0.105	SD	59.96
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4.343
		95% KM (t) UCL	82.88
Assuming Gamma Distribution		95% KM (z) UCL	82.86
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	81.73
Minimum	41	95% KM (bootstrap t) UCL	82.94
Maximum	540	95% KM (BCA) UCL	87.81
Mean	135.4	95% KM (Percentile Bootstrap) UCL	85.44
Median	137.9	95% KM (Chebyshev) UCL	94.65
SD	35.15	97.5% KM (Chebyshev) UCL	102.8
k star	17.79	99% KM (Chebyshev) UCL	118.9
Theta star	7.614		
Nu star	11881	**Potential UCLs to Use**	
AppChi2	11629	95% KM (t) UCL	82.88
95% Gamma Approximate UCL	138.4		
95% Adjusted Gamma UCL	138.4		

Note: DL/2 is not a recommended method.

Result (anthracene)

General Statistics

Number of Valid Data	334	Number of Detected Data	50
Number of Distinct Detected Data	47	Number of Non-Detect Data	284
		Percent Non-Detects	85.03%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	7300	Maximum Detected	8.896
Mean of Detected	396.7	Mean of Detected	4.655
SD of Detected	1087	SD of Detected	1.65
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.358	Lilliefors Test Statistic	0.984
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	194.3	Mean	3.562
SD	942.5	SD	1.562
95% DL/2 (t) UCL	279.4	95% H-Stat (DL/2) UCL	127.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.588
		SD in Log Scale	2.068
		Mean in Original Scale	66.1
		SD in Original Scale	439.5
		95% Percentile Bootstrap UCL	111.6
		95% BCA Bootstrap UCL	136.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.466	**Data appear Lognormal at 5% Significance Level**	
Theta Star	852.1		
nu star	46.55		
A-D Test Statistic	1.891	**Nonparametric Statistics**	
5% A-D Critical Value	0.819	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.819	Mean	68.11
5% K-S Critical Value	0.133	SD	441.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	24.57
		95% KM (t) UCL	108.6
Assuming Gamma Distribution		95% KM (z) UCL	108.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	108.3
Minimum	2.5	95% KM (bootstrap t) UCL	177.7
Maximum	7300	95% KM (BCA) UCL	114.7
Mean	1151	95% KM (Percentile Bootstrap) UCL	113.4
Median	777.1	95% KM (Chebyshev) UCL	175.2
SD	1117	97.5% KM (Chebyshev) UCL	221.6
k star	0.877	99% KM (Chebyshev) UCL	312.6
Theta star	1312		
Nu star	586	**Potential UCLs to Use**	
AppChi2	530.8	95% KM (Chebyshev) UCL	175.2
95% Gamma Approximate UCL	1271		
95% Adjusted Gamma UCL	1271		

Note: DL/2 is not a recommended method.

Result (antimony)

General Statistics

Number of Valid Data	223	Number of Detected Data	61
Number of Distinct Detected Data	60	Number of Non-Detect Data	162
		Percent Non-Detects	72.65%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.86	Minimum Detected	-0.151
Maximum Detected	14.2	Maximum Detected	2.653
Mean of Detected	3.398	Mean of Detected	0.996
SD of Detected	2.494	SD of Detected	0.678
Minimum Non-Detect	0.774	Minimum Non-Detect	-0.256
Maximum Non-Detect	5.53	Maximum Non-Detect	1.71
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	213
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.52%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.168	Lilliefors Test Statistic	0.0543
5% Lilliefors Critical Value	0.113	5% Lilliefors Critical Value	0.113
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.474	Mean	-0.0949
SD	1.825	SD	0.915
95% DL/2 (t) UCL	1.676	95% H-Stat (DL/2) UCL	1.261
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.406
		SD in Log Scale	0.997
		Mean in Original Scale	1.242
		SD in Original Scale	1.863
		95% Percentile Bootstrap UCL	1.462
		95% BCA Bootstrap UCL	1.461
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.247	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1.513		
nu star	274.1		
A-D Test Statistic	0.566	**Nonparametric Statistics**	
5% A-D Critical Value	0.761	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.761	Mean	1.597
5% K-S Critical Value	0.115	SD	1.721
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.118
		95% KM (t) UCL	1.791
Assuming Gamma Distribution		95% KM (z) UCL	1.79
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.782
Minimum	0.86	95% KM (bootstrap t) UCL	1.825
Maximum	14.2	95% KM (BCA) UCL	1.826
Mean	3.352	95% KM (Percentile Bootstrap) UCL	1.81
Median	3.344	95% KM (Chebyshev) UCL	2.109
SD	1.311	97.5% KM (Chebyshev) UCL	2.331
k star	7.887	99% KM (Chebyshev) UCL	2.767
Theta star	0.425		
Nu star	3518	**Potential UCLs to Use**	
AppChi2	3381	95% KM (t) UCL	1.791
95% Gamma Approximate UCL	3.488		
95% Adjusted Gamma UCL	3.489		

Note: DL/2 is not a recommended method.

Result (arsenic)

General Statistics

Number of Valid Data	233	Number of Detected Data	195
Number of Distinct Detected Data	183	Number of Non-Detect Data	38
		Percent Non-Detects	16.31%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.451	Minimum Detected	-0.796
Maximum Detected	40.9	Maximum Detected	3.711
Mean of Detected	5.696	Mean of Detected	1.548
SD of Detected	3.928	SD of Detected	0.667
Minimum Non-Detect	0.581	Minimum Non-Detect	-0.543
Maximum Non-Detect	4.97	Maximum Non-Detect	1.603
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	120
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	113
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	51.50%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.136	Lilliefors Test Statistic	0.117
5% Lilliefors Critical Value	0.0634	5% Lilliefors Critical Value	0.0634
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.943	Mean	1.288
SD	3.984	SD	0.873
95% DL/2 (t) UCL	5.374	95% H-Stat (DL/2) UCL	6.065
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	3.965	Mean in Log Scale	1.369
SD	5.116	SD in Log Scale	0.739
95% MLE (t) UCL	4.518	Mean in Original Scale	5.029
95% MLE (Tiku) UCL	4.668	SD in Original Scale	3.9
		95% Percentile Bootstrap UCL	5.463
		95% BCA Bootstrap UCL	5.535
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.724	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2.091		
nu star	1062		
A-D Test Statistic	2.392	**Nonparametric Statistics**	
5% A-D Critical Value	0.762	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.762	Mean	4.948
5% K-S Critical Value	0.0655	SD	3.976
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.262
		95% KM (t) UCL	5.381
Assuming Gamma Distribution		95% KM (z) UCL	5.379
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.381
Minimum	1E-09	95% KM (bootstrap t) UCL	5.465
Maximum	40.9	95% KM (BCA) UCL	5.379
Mean	5.1	95% KM (Percentile Bootstrap) UCL	5.387
Median	4.65	95% KM (Chebyshev) UCL	6.09
SD	3.864	97.5% KM (Chebyshev) UCL	6.584
k star	1.127	99% KM (Chebyshev) UCL	7.554
Theta star	4.523		
Nu star	525.4	**Potential UCLs to Use**	
AppChi2	473.2	95% KM (BCA) UCL	5.379
95% Gamma Approximate UCL	5.662		
95% Adjusted Gamma UCL	5.665		

Note: DL/2 is not a recommended method.

Result (barium)

General Statistics

Number of Valid Observations	233	Number of Distinct Observations	149

Raw Statistics		**Log-transformed Statistics**	
Minimum	47	Minimum of Log Data	3.85
Maximum	1800	Maximum of Log Data	7.496
Mean	187.2	Mean of log Data	5.125
Median	163	SD of log Data	0.37
SD	166.1		
Coefficient of Variation	0.887		
Skewness	8.282		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.318	Lilliefors Test Statistic	0.142
Lilliefors Critical Value	0.058	Lilliefors Critical Value	0.058
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	205.2	95% H-UCL	187.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	199.6
95% Adjusted-CLT UCL	211.4	97.5% Chebyshev (MVUE) UCL	208.1
95% Modified-t UCL	206.1	99% Chebyshev (MVUE) UCL	224.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.767	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	39.27		
nu star	2221		
Approximate Chi Square Value (.05)	2113	**Nonparametric Statistics**	
Adjusted Level of Significance	0.049	95% CLT UCL	205.1
Adjusted Chi Square Value	2112	95% Jackknife UCL	205.2
		95% Standard Bootstrap UCL	205.4
Anderson-Darling Test Statistic	19.15	95% Bootstrap-t UCL	227.1
Anderson-Darling 5% Critical Value	0.756	95% Hall's Bootstrap UCL	277.9
Kolmogorov-Smirnov Test Statistic	0.207	95% Percentile Bootstrap UCL	205.8
Kolmogorov-Smirnov 5% Critical Value	0.06	95% BCA Bootstrap UCL	213.8
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	234.6
		97.5% Chebyshev(Mean, Sd) UCL	255.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	295.5
95% Approximate Gamma UCL	196.8		
95% Adjusted Gamma UCL	196.9		
Potential UCL to Use		Use 95% Student's-t UCL	205.2
		or 95% Modified-t UCL	206.1

Result (benzene)

General Statistics

Number of Valid Data	334	Number of Detected Data	115
Number of Distinct Detected Data	99	Number of Non-Detect Data	219
		Percent Non-Detects	65.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.71	Minimum Detected	-0.342
Maximum Detected	24000	Maximum Detected	10.09
Mean of Detected	523.4	Mean of Detected	3.644
SD of Detected	2330	SD of Detected	2.469
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	333
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.411	Lilliefors Test Statistic	0.106
5% Lilliefors Critical Value	0.0826	5% Lilliefors Critical Value	0.0826
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	287.3	Mean	2.226
SD	1476	SD	2.637
95% DL/2 (t) UCL	420.5	95% H-Stat (DL/2) UCL	401
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.0782
		SD in Log Scale	3.42
		Mean in Original Scale	180.8
		SD in Original Scale	1386
		95% Percentile Bootstrap UCL	318.5
		95% BCA Bootstrap UCL	413.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.267	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1959		
nu star	61.45		
A-D Test Statistic	5.457	**Nonparametric Statistics**	
5% A-D Critical Value	0.882	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.882	Mean	186.1
5% K-S Critical Value	0.0935	SD	1385
Data not Gamma Distributed at 5% Significance Level		SE of Mean	76.24
		95% KM (t) UCL	311.8
Assuming Gamma Distribution		95% KM (z) UCL	311.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	311.5
Minimum	1E-09	95% KM (bootstrap t) UCL	556.7
Maximum	24000	95% KM (BCA) UCL	351.8
Mean	511.9	95% KM (Percentile Bootstrap) UCL	326.3
Median	46.61	95% KM (Chebyshev) UCL	518.4
SD	1568	97.5% KM (Chebyshev) UCL	662.2
k star	0.0906	99% KM (Chebyshev) UCL	944.7
Theta star	5652		
Nu star	60.5	**Potential UCLs to Use**	
AppChi2	43.62	97.5% KM (Chebyshev) UCL	662.2
95% Gamma Approximate UCL	710.1		
95% Adjusted Gamma UCL	711.1		

Note: DL/2 is not a recommended method.

Result (benzo(a)anthracene)

General Statistics

Number of Valid Data	334	Number of Detected Data	66
Number of Distinct Detected Data	60	Number of Non-Detect Data	268
		Percent Non-Detects	80.24%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	7400	Maximum Detected	8.909
Mean of Detected	442.5	Mean of Detected	4.422
SD of Detected	1199	SD of Detected	1.843
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.357	Lilliefors Test Statistic	0.0483
5% Lilliefors Critical Value	0.109	5% Lilliefors Critical Value	0.109
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	214.9	Mean	3.536
SD	999.3	SD	1.602
95% DL/2 (t) UCL	305.1	95% H-Stat (DL/2) UCL	139.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.095
		SD in Log Scale	1.915
		Mean in Original Scale	95.9
		SD in Original Scale	557.2
		95% Percentile Bootstrap UCL	150.1
		95% BCA Bootstrap UCL	175.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.387	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1144		
nu star	51.07		
A-D Test Statistic	3.022	**Nonparametric Statistics**	
5% A-D Critical Value	0.842	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.842	Mean	97.23
5% K-S Critical Value	0.118	SD	559.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	31.03
		95% KM (t) UCL	148.4
Assuming Gamma Distribution		95% KM (z) UCL	148.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	148.1
Minimum	2.5	95% KM (bootstrap t) UCL	214.3
Maximum	7400	95% KM (BCA) UCL	156.4
Mean	994.4	95% KM (Percentile Bootstrap) UCL	151.5
Median	564.6	95% KM (Chebyshev) UCL	232.5
SD	1111	97.5% KM (Chebyshev) UCL	291
k star	0.746	99% KM (Chebyshev) UCL	406
Theta star	1333		
Nu star	498.3	**Potential UCLs to Use**	
AppChi2	447.6	95% KM (Chebyshev) UCL	232.5
95% Gamma Approximate UCL	1107		
95% Adjusted Gamma UCL	1108		

Note: DL/2 is not a recommended method.

Result (benzo(a)pyrene)

General Statistics

Number of Valid Data	334	Number of Detected Data	61
Number of Distinct Detected Data	55	Number of Non-Detect Data	273
		Percent Non-Detects	81.74%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	5100	Maximum Detected	8.537
Mean of Detected	349.2	Mean of Detected	4.344
SD of Detected	893.9	SD of Detected	1.696
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.35	Lilliefors Test Statistic	0.0982
5% Lilliefors Critical Value	0.113	5% Lilliefors Critical Value	0.113
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	196.6	Mean	3.549
SD	924.9	SD	1.566
95% DL/2 (t) UCL	280.1	95% H-Stat (DL/2) UCL	137.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.156
		SD in Log Scale	1.747
		Mean in Original Scale	72.82
		SD in Original Scale	401.6
		95% Percentile Bootstrap UCL	112.8
		95% BCA Bootstrap UCL	129.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.42	**Data appear Lognormal at 5% Significance Level**	
Theta Star	831.2		
nu star	51.25		
A-D Test Statistic	3.153	**Nonparametric Statistics**	
5% A-D Critical Value	0.833	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.833	Mean	74.85
5% K-S Critical Value	0.122	SD	403.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	22.42
		95% KM (t) UCL	111.8
Assuming Gamma Distribution		95% KM (z) UCL	111.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	111.6
Minimum	3.75	95% KM (bootstrap t) UCL	162.8
Maximum	5100	95% KM (BCA) UCL	117.9
Mean	756.2	95% KM (Percentile Bootstrap) UCL	112.8
Median	507.1	95% KM (Chebyshev) UCL	172.6
SD	766.3	97.5% KM (Chebyshev) UCL	214.9
k star	0.9	99% KM (Chebyshev) UCL	297.9
Theta star	840.4		
Nu star	601.1	**Potential UCLs to Use**	
AppChi2	545.2	95% KM (Chebyshev) UCL	172.6
95% Gamma Approximate UCL	833.7		
95% Adjusted Gamma UCL	834		

Note: DL/2 is not a recommended method.

Result (benzo(b)fluoranthene)

General Statistics

Number of Valid Data	334	Number of Detected Data	51
Number of Distinct Detected Data	45	Number of Non-Detect Data	283
		Percent Non-Detects	84.73%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	5900	Maximum Detected	8.683
Mean of Detected	324.1	Mean of Detected	3.968
SD of Detected	937	SD of Detected	1.903
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.366	Lilliefors Test Statistic	0.107
5% Lilliefors Critical Value	0.124	5% Lilliefors Critical Value	0.124
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	182.6	Mean	3.441
SD	917.7	SD	1.557
95% DL/2 (t) UCL	265.4	95% H-Stat (DL/2) UCL	129
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.018
		SD in Log Scale	1.626
		Mean in Original Scale	58.46
		SD in Original Scale	380.4
		95% Percentile Bootstrap UCL	97.7
		95% BCA Bootstrap UCL	118.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.359	**Data appear Lognormal at 5% Significance Level**	
Theta Star	901.8		
nu star	36.65		
A-D Test Statistic	2.757	**Nonparametric Statistics**	
5% A-D Critical Value	0.846	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.846	Mean	58.48
5% K-S Critical Value	0.134	SD	382
Data not Gamma Distributed at 5% Significance Level		SE of Mean	21.26
		95% KM (t) UCL	93.56
Assuming Gamma Distribution		95% KM (z) UCL	93.46
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	93.27
Minimum	2.5	95% KM (bootstrap t) UCL	162.3
Maximum	5900	95% KM (BCA) UCL	102.6
Mean	292	95% KM (Percentile Bootstrap) UCL	97.43
Median	298.2	95% KM (Chebyshev) UCL	151.2
SD	366.7	97.5% KM (Chebyshev) UCL	191.3
k star	1.821	99% KM (Chebyshev) UCL	270
Theta star	160.3		
Nu star	1217	**Potential UCLs to Use**	
AppChi2	1137	95% KM (Chebyshev) UCL	151.2
95% Gamma Approximate UCL	312.5		
95% Adjusted Gamma UCL	312.6		

Note: DL/2 is not a recommended method.

Result (benzo(ghi)perylene)

General Statistics

Number of Valid Data	333	Number of Detected Data	70
Number of Distinct Detected Data	59	Number of Non-Detect Data	263
		Percent Non-Detects	78.98%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	4000	Maximum Detected	8.294
Mean of Detected	246.3	Mean of Detected	3.997
SD of Detected	619	SD of Detected	1.765
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	333
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.347	Lilliefors Test Statistic	0.0784
5% Lilliefors Critical Value	0.106	5% Lilliefors Critical Value	0.106
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	182.5	Mean	3.502
SD	887.8	SD	1.567
95% DL/2 (t) UCL	262.7	95% H-Stat (DL/2) UCL	139.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.364
		SD in Log Scale	1.588
		Mean in Original Scale	61.86
		SD in Original Scale	298.1
		95% Percentile Bootstrap UCL	92.47
		95% BCA Bootstrap UCL	101.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.422	**Data appear Lognormal at 5% Significance Level**	
Theta Star	584		
nu star	59.05		
A-D Test Statistic	2.705	**Nonparametric Statistics**	
5% A-D Critical Value	0.834	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.834	Mean	61.62
5% K-S Critical Value	0.114	SD	300
Data not Gamma Distributed at 5% Significance Level		SE of Mean	16.71
		95% KM (t) UCL	89.17
Assuming Gamma Distribution		95% KM (z) UCL	89.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	89.02
Minimum	3.125	95% KM (bootstrap t) UCL	117.9
Maximum	4000	95% KM (BCA) UCL	92.43
Mean	369	95% KM (Percentile Bootstrap) UCL	93.36
Median	285.8	95% KM (Chebyshev) UCL	134.4
SD	363	97.5% KM (Chebyshev) UCL	166
k star	1.179	99% KM (Chebyshev) UCL	227.9
Theta star	313		
Nu star	785.3	**Potential UCLs to Use**	
AppChi2	721.2	95% KM (Chebyshev) UCL	134.4
95% Gamma Approximate UCL	401.8		
95% Adjusted Gamma UCL	401.9		

Note: DL/2 is not a recommended method.

Result (benzo(k)fluoranthene)

General Statistics

Number of Valid Data	334	Number of Detected Data	40
Number of Distinct Detected Data	34	Number of Non-Detect Data	294
		Percent Non-Detects	88.02%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	5400	Maximum Detected	8.594
Mean of Detected	337.9	Mean of Detected	3.877
SD of Detected	1044	SD of Detected	1.853
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.337	Lilliefors Test Statistic	0.94
5% Lilliefors Critical Value	0.94	5% Lilliefors Critical Value	0.94
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	177.9	Mean	3.434
SD	915.9	SD	1.527
95% DL/2 (t) UCL	260.5	95% H-Stat (DL/2) UCL	122.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.998
		SD in Log Scale	1.47
		Mean in Original Scale	49.81
		SD in Original Scale	373
		95% Percentile Bootstrap UCL	89.08
		95% BCA Bootstrap UCL	106.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.337	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1003		
nu star	26.95		
A-D Test Statistic	3.262	**Nonparametric Statistics**	
5% A-D Critical Value	0.847	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.847	Mean	49.48
5% K-S Critical Value	0.151	SD	374.4
Data not Gamma Distributed at 5% Significance Level		SE of Mean	20.88
		95% KM (t) UCL	83.92
Assuming Gamma Distribution		95% KM (z) UCL	83.83
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	83.55
Minimum	1E-09	95% KM (bootstrap t) UCL	231.5
Maximum	5400	95% KM (BCA) UCL	90.03
Mean	250	95% KM (Percentile Bootstrap) UCL	85.31
Median	273	95% KM (Chebyshev) UCL	140.5
SD	380.8	97.5% KM (Chebyshev) UCL	179.9
k star	0.211	99% KM (Chebyshev) UCL	257.3
Theta star	1183		
Nu star	141.2	**Potential UCLs to Use**	
AppChi2	114.7	95% KM (Chebyshev) UCL	140.5
95% Gamma Approximate UCL	307.7		
95% Adjusted Gamma UCL	308		

Note: DL/2 is not a recommended method.

Result (beryllium)

General Statistics

Number of Valid Data	233	Number of Detected Data	224
Number of Distinct Detected Data	201	Number of Non-Detect Data	9
		Percent Non-Detects	3.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.269	Minimum Detected	-1.313
Maximum Detected	4.6	Maximum Detected	1.526
Mean of Detected	0.834	Mean of Detected	-0.31
SD of Detected	0.487	SD of Detected	0.493
Minimum Non-Detect	0.261	Minimum Non-Detect	-1.343
Maximum Non-Detect	0.625	Maximum Non-Detect	-0.47
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	108
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	125
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	46.35%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.145	Lilliefors Test Statistic	0.087
5% Lilliefors Critical Value	0.0592	5% Lilliefors Critical Value	0.0592
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.808	Mean	-0.37
SD	0.495	SD	0.573
95% DL/2 (t) UCL	0.862	95% H-Stat (DL/2) UCL	0.845
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.635	Mean in Log Scale	-0.351
SD	0.688	SD in Log Scale	0.529
95% MLE (t) UCL	0.71	Mean in Original Scale	0.812
95% MLE (Tiku) UCL	0.724	SD in Original Scale	0.49
		95% Percentile Bootstrap UCL	0.868
		95% BCA Bootstrap UCL	0.874
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.999	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.209		
nu star	1791		
A-D Test Statistic	3.29	**Nonparametric Statistics**	
5% A-D Critical Value	0.757	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.757	Mean	0.813
5% K-S Critical Value	0.0611	SD	0.488
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.032
		95% KM (t) UCL	0.866
Assuming Gamma Distribution		95% KM (z) UCL	0.866
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.866
Minimum	1E-09	95% KM (bootstrap t) UCL	0.873
Maximum	4.6	95% KM (BCA) UCL	0.87
Mean	0.805	95% KM (Percentile Bootstrap) UCL	0.868
Median	0.65	95% KM (Chebyshev) UCL	0.953
SD	0.501	97.5% KM (Chebyshev) UCL	1.013
k star	0.813	99% KM (Chebyshev) UCL	1.132
Theta star	0.99		
Nu star	378.8	**Potential UCLs to Use**	
AppChi2	334.7	95% KM (BCA) UCL	0.87
95% Gamma Approximate UCL	0.911		
95% Adjusted Gamma UCL	0.911		

Note: DL/2 is not a recommended method.

Result (bromodichloromethane)

General Statistics

Number of Valid Data	334	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	329
		Percent Non-Detects	98.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.2	Minimum Detected	0.788
Maximum Detected	140	Maximum Detected	4.942
Mean of Detected	65.64	Mean of Detected	3.545
SD of Detected	53.97	SD of Detected	1.664
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.952	Lilliefors Test Statistic	0.838
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	158.2	Mean	1.551
SD	634.4	SD	2.45
95% DL/2 (t) UCL	215.5	95% H-Stat (DL/2) UCL	156.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.665
		SD in Log Scale	3.155
		Mean in Original Scale	1.037
		SD in Original Scale	9.936
		95% Percentile Bootstrap UCL	2.017
		95% BCA Bootstrap UCL	2.399
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.499	**Data appear Normal at 5% Significance Level**	
Theta Star	131.7		
nu star	4.985		
A-D Test Statistic	0.382	**Nonparametric Statistics**	
5% A-D Critical Value	0.694	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.694	Mean	3.365
5% K-S Critical Value	0.365	SD	10.69
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.721
		95% KM (t) UCL	4.554
Assuming Gamma Distribution		95% KM (z) UCL	4.551
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	17.93
Minimum	1E-09	95% KM (bootstrap t) UCL	4.341
Maximum	140	95% KM (BCA) UCL	82
Mean	0.983	95% KM (Percentile Bootstrap) UCL	79.67
Median	1E-09	95% KM (Chebyshev) UCL	6.507
SD	9.936	97.5% KM (Chebyshev) UCL	7.866
k star	0.0451	99% KM (Chebyshev) UCL	10.54
Theta star	21.77		
Nu star	30.16	**Potential UCLs to Use**	
AppChi2	18.61	95% KM (t) UCL	4.554
95% Gamma Approximate UCL	1.592	95% KM (Percentile Bootstrap) UCL	79.67
95% Adjusted Gamma UCL	1.595		

Note: DL/2 is not a recommended method.

Result (cadmium)

General Statistics

Number of Valid Data	233	Number of Detected Data	97
Number of Distinct Detected Data	89	Number of Non-Detect Data	136
		Percent Non-Detects	58.37%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0188	Minimum Detected	-3.977
Maximum Detected	3.93	Maximum Detected	1.369
Mean of Detected	0.564	Mean of Detected	-0.917
SD of Detected	0.676	SD of Detected	0.762
Minimum Non-Detect	0.123	Minimum Non-Detect	-2.1
Maximum Non-Detect	0.693	Maximum Non-Detect	-0.367
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	216
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.271	Lilliefors Test Statistic	0.125
5% Lilliefors Critical Value	0.09	5% Lilliefors Critical Value	0.09
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.393	Mean	-1.16
SD	0.459	SD	0.574
95% DL/2 (t) UCL	0.443	95% H-Stat (DL/2) UCL	0.374
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.17
		SD in Log Scale	0.604
		Mean in Original Scale	0.396
		SD in Original Scale	0.463
		95% Percentile Bootstrap UCL	0.449
		95% BCA Bootstrap UCL	0.461
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.558	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.362		
nu star	302.2		
A-D Test Statistic	5.942	**Nonparametric Statistics**	
5% A-D Critical Value	0.769	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.769	Mean	0.397
5% K-S Critical Value	0.0925	SD	0.466
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0321
		95% KM (t) UCL	0.45
Assuming Gamma Distribution		95% KM (z) UCL	0.449
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.45
Minimum	0.0188	95% KM (bootstrap t) UCL	0.464
Maximum	3.93	95% KM (BCA) UCL	0.455
Mean	0.564	95% KM (Percentile Bootstrap) UCL	0.453
Median	0.514	95% KM (Chebyshev) UCL	0.536
SD	0.439	97.5% KM (Chebyshev) UCL	0.597
k star	3.441	99% KM (Chebyshev) UCL	0.716
Theta star	0.164		
Nu star	1604	**Potential UCLs to Use**	
AppChi2	1512	95% KM (t) UCL	0.45
95% Gamma Approximate UCL	0.599	95% KM (% Bootstrap) UCL	0.453
95% Adjusted Gamma UCL	0.599		

Note: DL/2 is not a recommended method.

Result (carbon disulfide)

General Statistics

Number of Valid Data	334	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	326
		Percent Non-Detects	97.60%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	43	Maximum Detected	3.761
Mean of Detected	15.88	Mean of Detected	2.12
SD of Detected	16.67	SD of Detected	1.336
Minimum Non-Detect	4	Minimum Non-Detect	1.386
Maximum Non-Detect	33000	Maximum Non-Detect	10.4
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.808	Lilliefors Test Statistic	0.901
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	300.5	Mean	2.821
SD	1224	SD	2.204
95% DL/2 (t) UCL	411	95% H-Stat (DL/2) UCL	294
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.689
		SD in Log Scale	0.725
		Mean in Original Scale	2.716
		SD in Original Scale	3.624
		95% Percentile Bootstrap UCL	3.061
		95% BCA Bootstrap UCL	3.159
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.649	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	24.45		
nu star	10.39		
A-D Test Statistic	0.372	**Nonparametric Statistics**	
5% A-D Critical Value	0.739	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.739	Mean	2.499
5% K-S Critical Value	0.302	SD	3.916
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.463
		95% KM (t) UCL	3.264
Assuming Gamma Distribution		95% KM (z) UCL	3.261
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.462
Minimum	1.5	95% KM (bootstrap t) UCL	4.031
Maximum	43	95% KM (BCA) UCL	10.16
Mean	15.76	95% KM (Percentile Bootstrap) UCL	10.06
Median	15.86	95% KM (Chebyshev) UCL	4.519
SD	2.638	97.5% KM (Chebyshev) UCL	5.393
k star	28.07	99% KM (Chebyshev) UCL	7.11
Theta star	0.561		
Nu star	18753	**Potential UCLs to Use**	
AppChi2	18436	95% KM (t) UCL	3.264
95% Gamma Approximate UCL	16.03		
95% Adjusted Gamma UCL	16.03		

Note: DL/2 is not a recommended method.

Result (chloroform)

General Statistics

Number of Valid Data	334	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	324
		Percent Non-Detects	97.01%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	260	Maximum Detected	5.561
Mean of Detected	65.29	Mean of Detected	2.515
SD of Detected	101	SD of Detected	2.125
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.68	Lilliefors Test Statistic	0.845
5% Lilliefors Critical Value	0.842	5% Lilliefors Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	159.1	Mean	1.572
SD	634.4	SD	2.447
95% DL/2 (t) UCL	216.4	95% H-Stat (DL/2) UCL	163.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-7.831
		SD in Log Scale	3.749
		Mean in Original Scale	1.993
		SD in Original Scale	19.99
		95% Percentile Bootstrap UCL	3.933
		95% BCA Bootstrap UCL	5.115
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.344	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	189.8		
nu star	6.88		
A-D Test Statistic	0.818	**Nonparametric Statistics**	
5% A-D Critical Value	0.796	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.796	Mean	3.692
5% K-S Critical Value	0.284	SD	21.5
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	1.346
		95% KM (t) UCL	5.912
Assuming Gamma Distribution		95% KM (z) UCL	5.906
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.715
Minimum	1.4	95% KM (bootstrap t) UCL	11.45
Maximum	291.7	95% KM (BCA) UCL	7.022
Mean	86.05	95% KM (Percentile Bootstrap) UCL	6.37
Median	69.64	95% KM (Chebyshev) UCL	9.56
SD	57.63	97.5% KM (Chebyshev) UCL	12.1
k star	2.486	99% KM (Chebyshev) UCL	17.09
Theta star	34.62		
Nu star	1660	**Potential UCLs to Use**	
AppChi2	1567	95% KM (t) UCL	5.912
95% Gamma Approximate UCL	91.19		
95% Adjusted Gamma UCL	91.21		

Note: DL/2 is not a recommended method.

Result (chromium)

General Statistics

Number of Valid Data	233	Number of Detected Data	232
Number of Distinct Detected Data	192	Number of Non-Detect Data	1
		Percent Non-Detects	0.43%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.47	Minimum Detected	1.497
Maximum Detected	2690	Maximum Detected	7.897
Mean of Detected	65.1	Mean of Detected	3.641
SD of Detected	194.6	SD of Detected	0.738
Minimum Non-Detect	22.5	Minimum Non-Detect	3.114
Maximum Non-Detect	22.5	Maximum Non-Detect	3.114

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.383	Lilliefors Test Statistic	0.174
5% Lilliefors Critical Value	0.0582	5% Lilliefors Critical Value	0.0582
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	64.87	Mean	3.636
SD	194.2	SD	0.741
95% DL/2 (t) UCL	85.88	95% H-Stat (DL/2) UCL	54.82
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	43.57	Mean in Log Scale	3.637
SD	211	SD in Log Scale	0.74
95% MLE (t) UCL	66.4	Mean in Original Scale	64.88
95% MLE (Tiku) UCL	64.95	SD in Original Scale	194.2
		95% Percentile Bootstrap UCL	88.56
		95% BCA Bootstrap UCL	97.62

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.06	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	61.42		
nu star	491.8		
A-D Test Statistic	4.31E+28	**Nonparametric Statistics**	
5% A-D Critical Value	0.782	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.782	Mean	64.9
5% K-S Critical Value	0.0616	SD	193.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	12.72
		95% KM (t) UCL	85.9
Assuming Gamma Distribution		95% KM (z) UCL	85.82
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	85.9
Minimum	1E-09	95% KM (bootstrap t) UCL	124.4
Maximum	2690	95% KM (BCA) UCL	91.26
Mean	64.82	95% KM (Percentile Bootstrap) UCL	87.31
Median	34	95% KM (Chebyshev) UCL	120.3
SD	194.2	97.5% KM (Chebyshev) UCL	144.3
k star	0.909	99% KM (Chebyshev) UCL	191.5
Theta star	71.28		
Nu star	423.8	**Potential UCLs to Use**	
AppChi2	377.1	95% KM (BCA) UCL	91.26
95% Gamma Approximate UCL	72.86		
95% Adjusted Gamma UCL	72.91		

Note: DL/2 is not a recommended method.

Result (chromium, hexavalent)

General Statistics

Number of Valid Observations	22	Number of Distinct Observations	22

Raw Statistics		**Log-transformed Statistics**	
Minimum	107.5	Minimum of Log Data	4.677
Maximum	2800	Maximum of Log Data	7.937
Mean	506.5	Mean of log Data	5.734
Median	225	SD of log Data	0.913
SD	659.2		
Coefficient of Variation	1.301		
Skewness	2.558		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.624	Shapiro Wilk Test Statistic	0.886
Shapiro Wilk Critical Value	0.911	Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	748.4	95% H-UCL	761.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	887.8
95% Adjusted-CLT UCL	819.6	97.5% Chebyshev (MVUE) UCL	1074
95% Modified-t UCL	761.2	99% Chebyshev (MVUE) UCL	1440
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.024	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	494.5		
nu star	45.07		
Approximate Chi Square Value (.05)	30.67	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0386	95% CLT UCL	737.7
Adjusted Chi Square Value	29.79	95% Jackknife UCL	748.4
		95% Standard Bootstrap UCL	729.6
Anderson-Darling Test Statistic	1.641	95% Bootstrap-t UCL	991.1
Anderson-Darling 5% Critical Value	0.767	95% Hall's Bootstrap UCL	891.3
Kolmogorov-Smirnov Test Statistic	0.224	95% Percentile Bootstrap UCL	766.1
Kolmogorov-Smirnov 5% Critical Value	0.19	95% BCA Bootstrap UCL	836.7
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1119
		97.5% Chebyshev(Mean, Sd) UCL	1384
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1905
95% Approximate Gamma UCL	744.3		
95% Adjusted Gamma UCL	766.5		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	1119

Result (chrysene)

General Statistics

Number of Valid Data	334	Number of Detected Data	119
Number of Distinct Detected Data	101	Number of Non-Detect Data	215
		Percent Non-Detects	64.37%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	7500	Maximum Detected	8.923
Mean of Detected	492.5	Mean of Detected	4.864
SD of Detected	1184	SD of Detected	1.705
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.341	Lilliefors Test Statistic	0.0892
5% Lilliefors Critical Value	0.0812	5% Lilliefors Critical Value	0.0812
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	295.4	Mean	3.85
SD	1105	SD	1.771
95% DL/2 (t) UCL	395.1	95% H-Stat (DL/2) UCL	237.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.034
		SD in Log Scale	2.006
		Mean in Original Scale	185.2
		SD in Original Scale	741
		95% Percentile Bootstrap UCL	254.8
		95% BCA Bootstrap UCL	278.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.472	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1043		
nu star	112.4		
A-D Test Statistic	3.787	**Nonparametric Statistics**	
5% A-D Critical Value	0.824	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.824	Mean	188
5% K-S Critical Value	0.0897	SD	743.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	41.13
		95% KM (t) UCL	255.8
Assuming Gamma Distribution		95% KM (z) UCL	255.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	255.7
Minimum	3.75	95% KM (bootstrap t) UCL	282
Maximum	7500	95% KM (BCA) UCL	273.2
Mean	474.2	95% KM (Percentile Bootstrap) UCL	255.7
Median	430.2	95% KM (Chebyshev) UCL	367.3
SD	710.3	97.5% KM (Chebyshev) UCL	444.8
k star	1.126	99% KM (Chebyshev) UCL	597.2
Theta star	421.3		
Nu star	751.9	**Potential UCLs to Use**	
AppChi2	689.3	95% KM (Chebyshev) UCL	367.3
95% Gamma Approximate UCL	517.3		
95% Adjusted Gamma UCL	517.5		

Note: DL/2 is not a recommended method.

Result (cobalt)

General Statistics

Number of Valid Observations	233	Number of Distinct Observations	158

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.07	Minimum of Log Data	0.0677
Maximum	71.5	Maximum of Log Data	4.27
Mean	13.33	Mean of log Data	2.516
Median	12.5	SD of log Data	0.388
SD	6.173		
Coefficient of Variation	0.463		
Skewness	4.93		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.125	Lilliefors Test Statistic	0.0779
Lilliefors Critical Value	0.058	Lilliefors Critical Value	0.058
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	14	95% H-UCL	13.95
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	14.87
95% Adjusted-CLT UCL	14.14	97.5% Chebyshev (MVUE) UCL	15.53
95% Modified-t UCL	14.02	99% Chebyshev (MVUE) UCL	16.83
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.811	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.958		
nu star	3174		
Approximate Chi Square Value (.05)	3044	**Nonparametric Statistics**	
Adjusted Level of Significance	0.049	95% CLT UCL	14
Adjusted Chi Square Value	3043	95% Jackknife UCL	14
		95% Standard Bootstrap UCL	13.99
Anderson-Darling Test Statistic	2.23	95% Bootstrap-t UCL	14.21
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	14.45
Kolmogorov-Smirnov Test Statistic	0.0754	95% Percentile Bootstrap UCL	13.99
Kolmogorov-Smirnov 5% Critical Value	0.0599	95% BCA Bootstrap UCL	14.24
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.1
		97.5% Chebyshev(Mean, Sd) UCL	15.86
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	17.36
95% Approximate Gamma UCL	13.9		
95% Adjusted Gamma UCL	13.91		
Potential UCL to Use		Use 95% Student's-t UCL	14
		or 95% Modified-t UCL	14.02

Result (copper)

General Statistics

Number of Valid Data	233	Number of Detected Data	221
Number of Distinct Detected Data	191	Number of Non-Detect Data	12
		Percent Non-Detects	5.15%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	10.5	Minimum Detected	2.351
Maximum Detected	1370	Maximum Detected	7.223
Mean of Detected	61.88	Mean of Detected	3.608
SD of Detected	128.3	SD of Detected	0.79
Minimum Non-Detect	1.25	Minimum Non-Detect	0.223
Maximum Non-Detect	28.7	Maximum Non-Detect	3.357
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	107
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	126
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	45.92%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.346	Lilliefors Test Statistic	0.146
5% Lilliefors Critical Value	0.0596	5% Lilliefors Critical Value	0.0596
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	59.19	Mean	3.531
SD	125.5	SD	0.858
95% DL/2 (t) UCL	72.76	95% H-Stat (DL/2) UCL	54.96
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.55
		SD in Log Scale	0.814
		Mean in Original Scale	59.34
		SD in Original Scale	125.4
		95% Percentile Bootstrap UCL	73.8
		95% BCA Bootstrap UCL	77.61
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.093	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	56.63		
nu star	482.9		
A-D Test Statistic	22.19	**Nonparametric Statistics**	
5% A-D Critical Value	0.781	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.781	Mean	59.5
5% K-S Critical Value	0.0629	SD	125.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	8.214
		95% KM (t) UCL	73.07
Assuming Gamma Distribution		95% KM (z) UCL	73.01
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	73.06
Minimum	1E-09	95% KM (bootstrap t) UCL	81.69
Maximum	1370	95% KM (BCA) UCL	74.12
Mean	58.78	95% KM (Percentile Bootstrap) UCL	73.83
Median	29.9	95% KM (Chebyshev) UCL	95.31
SD	125.7	97.5% KM (Chebyshev) UCL	110.8
k star	0.426	99% KM (Chebyshev) UCL	141.2
Theta star	138.1		
Nu star	198.3	**Potential UCLs to Use**	
AppChi2	166.7	95% KM (BCA) UCL	74.12
95% Gamma Approximate UCL	69.92		
95% Adjusted Gamma UCL	69.99		

Note: DL/2 is not a recommended method.

Result (dibenzo(a,h)anthracene)

General Statistics

Number of Valid Data	333	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	321
		Percent Non-Detects	96.40%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	3500	Maximum Detected	8.161
Mean of Detected	422.9	Mean of Detected	4.174
SD of Detected	983.4	SD of Detected	2.123
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	333
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.464	Lilliefors Test Statistic	0.94
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	157.1	Mean	3.373
SD	863.9	SD	1.488
95% DL/2 (t) UCL	235.2	95% H-Stat (DL/2) UCL	107.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.498
		SD in Log Scale	1.441
		Mean in Original Scale	23.57
		SD in Original Scale	195.3
		95% Percentile Bootstrap UCL	44.43
		95% BCA Bootstrap UCL	56.92
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.324	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1306		
nu star	7.773		
A-D Test Statistic	0.746	**Nonparametric Statistics**	
5% A-D Critical Value	0.813	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.813	Mean	22.19
5% K-S Critical Value	0.263	SD	196
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	11.38
		95% KM (t) UCL	40.96
Assuming Gamma Distribution		95% KM (z) UCL	40.91
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	40.38
Minimum	1E-09	95% KM (bootstrap t) UCL	97.88
Maximum	3500	95% KM (BCA) UCL	50.6
Mean	264.7	95% KM (Percentile Bootstrap) UCL	43.04
Median	302.6	95% KM (Chebyshev) UCL	71.8
SD	264.9	97.5% KM (Chebyshev) UCL	93.27
k star	0.117	99% KM (Chebyshev) UCL	135.4
Theta star	2270		
Nu star	77.64	**Potential UCLs to Use**	
AppChi2	58.35	95% KM (t) UCL	40.96
95% Gamma Approximate UCL	352.2		
95% Adjusted Gamma UCL	352.6		

Note: DL/2 is not a recommended method.

Result (ethylbenzene)

General Statistics

Number of Valid Data	333	Number of Detected Data	98
Number of Distinct Detected Data	94	Number of Non-Detect Data	235
		Percent Non-Detects	70.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.94	Minimum Detected	-0.0619
Maximum Detected	50000	Maximum Detected	10.82
Mean of Detected	3054	Mean of Detected	5.039
SD of Detected	8319	SD of Detected	2.939
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	5150	Maximum Non-Detect	8.547
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	319
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	14
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.357	Lilliefors Test Statistic	0.0736
5% Lilliefors Critical Value	0.0895	5% Lilliefors Critical Value	0.0895
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	920.7	Mean	2.076
SD	4706	SD	2.913
95% DL/2 (t) UCL	1346	95% H-Stat (DL/2) UCL	517.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.888
		SD in Log Scale	4.816
		Mean in Original Scale	899
		SD in Original Scale	4707
		95% Percentile Bootstrap UCL	1349
		95% BCA Bootstrap UCL	1398

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.239	**Data appear Lognormal at 5% Significance Level**	
Theta Star	12776		
nu star	46.85		
A-D Test Statistic	3.559	**Nonparametric Statistics**	
5% A-D Critical Value	0.895	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.895	Mean	900.8
5% K-S Critical Value	0.0993	SD	4700
Data not Gamma Distributed at 5% Significance Level		SE of Mean	258.9
		95% KM (t) UCL	1328
Assuming Gamma Distribution		95% KM (z) UCL	1327
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1326
Minimum	0.94	95% KM (bootstrap t) UCL	1573
Maximum	50000	95% KM (BCA) UCL	1366
Mean	3134	95% KM (Percentile Bootstrap) UCL	1342
Median	2809	95% KM (Chebyshev) UCL	2029
SD	4532	97.5% KM (Chebyshev) UCL	2518
k star	0.677	99% KM (Chebyshev) UCL	3477
Theta star	4632		
Nu star	450.7	**Potential UCLs to Use**	
AppChi2	402.4	97.5% KM (Chebyshev) UCL	2518
95% Gamma Approximate UCL	3510		
95% Adjusted Gamma UCL	3511		

Note: DL/2 is not a recommended method.

Result (fluoranthene)

General Statistics

Number of Valid Data	334	Number of Detected Data	73
Number of Distinct Detected Data	60	Number of Non-Detect Data	261
		Percent Non-Detects	78.14%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	15000	Maximum Detected	9.616
Mean of Detected	543.1	Mean of Detected	4.409
SD of Detected	1906	SD of Detected	1.921
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.388	Lilliefors Test Statistic	0.0583
5% Lilliefors Critical Value	0.104	5% Lilliefors Critical Value	0.104
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	246	Mean	3.579
SD	1231	SD	1.634
95% DL/2 (t) UCL	357.1	95% H-Stat (DL/2) UCL	153
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.328
		SD in Log Scale	1.877
		Mean in Original Scale	128.5
		SD in Original Scale	913.3
		95% Percentile Bootstrap UCL	219.8
		95% BCA Bootstrap UCL	263.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.35	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1552		
nu star	51.08		
A-D Test Statistic	3.71	**Nonparametric Statistics**	
5% A-D Critical Value	0.852	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.852	Mean	129.1
5% K-S Critical Value	0.113	SD	914.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	50.52
		95% KM (t) UCL	212.4
Assuming Gamma Distribution		95% KM (z) UCL	212.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	212
Minimum	3.125	95% KM (bootstrap t) UCL	447.1
Maximum	15000	95% KM (BCA) UCL	226.2
Mean	1144	95% KM (Percentile Bootstrap) UCL	222.7
Median	499.9	95% KM (Chebyshev) UCL	349.3
SD	1544	97.5% KM (Chebyshev) UCL	444.6
k star	0.589	99% KM (Chebyshev) UCL	631.7
Theta star	1943		
Nu star	393.4	**Potential UCLs to Use**	
AppChi2	348.4	95% KM (Chebyshev) UCL	349.3
95% Gamma Approximate UCL	1292		
95% Adjusted Gamma UCL	1293		

Note: DL/2 is not a recommended method.

Result (fluorene)

General Statistics

Number of Valid Data	332	Number of Detected Data	87
Number of Distinct Detected Data	77	Number of Non-Detect Data	245
		Percent Non-Detects	73.80%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.75	Minimum Detected	1.012
Maximum Detected	39000	Maximum Detected	10.57
Mean of Detected	1769	Mean of Detected	5.398
SD of Detected	5498	SD of Detected	2.202
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	329
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.10%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.374	Lilliefors Test Statistic	0.083
5% Lilliefors Critical Value	0.095	5% Lilliefors Critical Value	0.095
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	526.6	Mean	3.845
SD	2916	SD	1.852
95% DL/2 (t) UCL	790.6	95% H-Stat (DL/2) UCL	242.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.802
		SD in Log Scale	2.383
		Mean in Original Scale	476.6
		SD in Original Scale	2907
		95% Percentile Bootstrap UCL	755.8
		95% BCA Bootstrap UCL	889.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.323	**Data appear Lognormal at 5% Significance Level**	
Theta Star	5474		
nu star	56.24		
A-D Test Statistic	3.561	**Nonparametric Statistics**	
5% A-D Critical Value	0.861	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.861	Mean	473.4
5% K-S Critical Value	0.104	SD	2903
Data not Gamma Distributed at 5% Significance Level		SE of Mean	160.3
		95% KM (t) UCL	737.8
Assuming Gamma Distribution		95% KM (z) UCL	737.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	736.7
Minimum	1E-09	95% KM (bootstrap t) UCL	944.6
Maximum	39000	95% KM (BCA) UCL	758.3
Mean	2523	95% KM (Percentile Bootstrap) UCL	748.4
Median	493.6	95% KM (Chebyshev) UCL	1172
SD	4325	97.5% KM (Chebyshev) UCL	1474
k star	0.0894	99% KM (Chebyshev) UCL	2068
Theta star	28210		
Nu star	59.38	**Potential UCLs to Use**	
AppChi2	42.66	97.5% KM (Chebyshev) UCL	1474
95% Gamma Approximate UCL	3511		
95% Adjusted Gamma UCL	3516		

Note: DL/2 is not a recommended method.

Result (indeno(1,2,3-cd)pyrene)

General Statistics

Number of Valid Data	332	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	310
		Percent Non-Detects	93.37%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	4000	Maximum Detected	8.294
Mean of Detected	450	Mean of Detected	4.425
SD of Detected	1036	SD of Detected	1.899
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	332
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.451	Lilliefors Test Statistic	0.962
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	169.3	Mean	3.41
SD	886.9	SD	1.513
95% DL/2 (t) UCL	249.6	95% H-Stat (DL/2) UCL	115.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.19
		SD in Log Scale	1.784
		Mean in Original Scale	36.27
		SD in Original Scale	283.6
		95% Percentile Bootstrap UCL	63.61
		95% BCA Bootstrap UCL	79.62
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.369	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1220		
nu star	16.23		
A-D Test Statistic	1.333	**Nonparametric Statistics**	
5% A-D Critical Value	0.828	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.828	Mean	37.62
5% K-S Critical Value	0.199	SD	284.5
Data not Gamma Distributed at 5% Significance Level		SE of Mean	16.14
		95% KM (t) UCL	64.24
Assuming Gamma Distribution		95% KM (z) UCL	64.17
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	63.8
Minimum	1E-09	95% KM (bootstrap t) UCL	167.7
Maximum	4000	95% KM (BCA) UCL	72.77
Mean	269.8	95% KM (Percentile Bootstrap) UCL	67.39
Median	288.5	95% KM (Chebyshev) UCL	108
SD	322.2	97.5% KM (Chebyshev) UCL	138.4
k star	0.13	99% KM (Chebyshev) UCL	198.2
Theta star	2070		
Nu star	86.57	**Potential UCLs to Use**	
AppChi2	66.12	95% KM (Chebyshev) UCL	108
95% Gamma Approximate UCL	353.3		
95% Adjusted Gamma UCL	353.7		

Note: DL/2 is not a recommended method.

Result (isopropylbenzene)

General Statistics

Number of Valid Data	334	Number of Detected Data	93
Number of Distinct Detected Data	87	Number of Non-Detect Data	241
		Percent Non-Detects	72.16%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.91	Minimum Detected	-0.0943
Maximum Detected	29375	Maximum Detected	10.29
Mean of Detected	1211	Mean of Detected	4.802
SD of Detected	3440	SD of Detected	2.661
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	332
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.40%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.363	Lilliefors Test Statistic	0.101
5% Lilliefors Critical Value	0.0919	5% Lilliefors Critical Value	0.0919
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	397	Mean	1.943
SD	1931	SD	2.794
95% DL/2 (t) UCL	571.2	95% H-Stat (DL/2) UCL	323.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.537
		SD in Log Scale	4.241
		Mean in Original Scale	337.7
		SD in Original Scale	1888
		95% Percentile Bootstrap UCL	520.1
		95% BCA Bootstrap UCL	618.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.298	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	4068		
nu star	55.36		
A-D Test Statistic	1.69	**Nonparametric Statistics**	
5% A-D Critical Value	0.868	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.868	Mean	341.5
5% K-S Critical Value	0.101	SD	1886
Data not Gamma Distributed at 5% Significance Level		SE of Mean	103.9
		95% KM (t) UCL	512.9
Assuming Gamma Distribution		95% KM (z) UCL	512.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	511.9
Minimum	0.91	95% KM (bootstrap t) UCL	737.1
Maximum	29375	95% KM (BCA) UCL	547.9
Mean	1212	95% KM (Percentile Bootstrap) UCL	535.5
Median	1210	95% KM (Chebyshev) UCL	794.3
SD	1808	97.5% KM (Chebyshev) UCL	990.3
k star	0.906	99% KM (Chebyshev) UCL	1375
Theta star	1337		
Nu star	605.3	**Potential UCLs to Use**	
AppChi2	549.3	97.5% KM (Chebyshev) UCL	990.3
95% Gamma Approximate UCL	1335		
95% Adjusted Gamma UCL	1336		

Note: DL/2 is not a recommended method.

Result (lead)

General Statistics

Number of Valid Data	233	Number of Detected Data	229
Number of Distinct Detected Data	212	Number of Non-Detect Data	4
		Percent Non-Detects	1.72%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.1	Minimum Detected	1.131
Maximum Detected	47300	Maximum Detected	10.76
Mean of Detected	459.8	Mean of Detected	3.825
SD of Detected	3568	SD of Detected	1.526
Minimum Non-Detect	6.26	Minimum Non-Detect	1.834
Maximum Non-Detect	12.9	Maximum Non-Detect	2.557
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	70
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	163
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	30.04%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.449	Lilliefors Test Statistic	0.0987
5% Lilliefors Critical Value	0.0585	5% Lilliefors Critical Value	0.0585
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	452	Mean	3.784
SD	3537	SD	1.544
95% DL/2 (t) UCL	834.7	95% H-Stat (DL/2) UCL	189.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.779
		SD in Log Scale	1.556
		Mean in Original Scale	452
		SD in Original Scale	3537
		95% Percentile Bootstrap UCL	875.9
		95% BCA Bootstrap UCL	1039
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.298	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1542		
nu star	136.6		
A-D Test Statistic	32.52	**Nonparametric Statistics**	
5% A-D Critical Value	0.87	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.87	Mean	452
5% K-S Critical Value	0.0655	SD	3530
Data not Gamma Distributed at 5% Significance Level		SE of Mean	231.7
		95% KM (t) UCL	834.7
Assuming Gamma Distribution		95% KM (z) UCL	833.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	834.7
Minimum	1E-09	95% KM (bootstrap t) UCL	3348
Maximum	47300	95% KM (BCA) UCL	884.4
Mean	451.9	95% KM (Percentile Bootstrap) UCL	896.7
Median	38.4	95% KM (Chebyshev) UCL	1462
SD	3537	97.5% KM (Chebyshev) UCL	1899
k star	0.26	99% KM (Chebyshev) UCL	2758
Theta star	1739		
Nu star	121.1	**Potential UCLs to Use**	
AppChi2	96.7	97.5% KM (Chebyshev) UCL	1899
95% Gamma Approximate UCL	566		
95% Adjusted Gamma UCL	566.8		

Note: DL/2 is not a recommended method.

Result (mercury)

General Statistics

Number of Valid Data	233	Number of Detected Data	160
Number of Distinct Detected Data	97	Number of Non-Detect Data	73
		Percent Non-Detects	31.33%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.025	Minimum Detected	-3.689
Maximum Detected	53.5	Maximum Detected	3.98
Mean of Detected	1.12	Mean of Detected	-1.723
SD of Detected	5.205	SD of Detected	1.485
Minimum Non-Detect	0.0862	Minimum Non-Detect	-2.451
Maximum Non-Detect	0.175	Maximum Non-Detect	-1.743
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	163
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	70
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.96%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.417	Lilliefors Test Statistic	0.0927
5% Lilliefors Critical Value	0.07	5% Lilliefors Critical Value	0.07
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.787	Mean	-2.093
SD	4.337	SD	1.355
95% DL/2 (t) UCL	1.256	95% H-Stat (DL/2) UCL	0.311
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.124
		SD in Log Scale	1.392
		Mean in Original Scale	0.787
		SD in Original Scale	4.337
		95% Percentile Bootstrap UCL	1.297
		95% BCA Bootstrap UCL	1.564
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.361	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3.1		
nu star	115.6		
A-D Test Statistic	19.09	**Nonparametric Statistics**	
5% A-D Critical Value	0.853	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.853	Mean	0.786
5% K-S Critical Value	0.0796	SD	4.328
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.284
		95% KM (t) UCL	1.255
Assuming Gamma Distribution		95% KM (z) UCL	1.253
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.255
Minimum	0.025	95% KM (bootstrap t) UCL	1.909
Maximum	53.5	95% KM (BCA) UCL	1.271
Mean	1.042	95% KM (Percentile Bootstrap) UCL	1.288
Median	0.362	95% KM (Chebyshev) UCL	2.025
SD	4.314	97.5% KM (Chebyshev) UCL	2.562
k star	0.493	99% KM (Chebyshev) UCL	3.616
Theta star	2.114		
Nu star	229.7	**Potential UCLs to Use**	
AppChi2	195.6	95% KM (Chebyshev) UCL	2.025
95% Gamma Approximate UCL	1.224		
95% Adjusted Gamma UCL	1.225		

Note: DL/2 is not a recommended method.

Result (methyl-t-butyl ether (mtbe))

General Statistics

Number of Valid Data	334	Number of Detected Data	18
Number of Distinct Detected Data	17	Number of Non-Detect Data	316
		Percent Non-Detects	94.61%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	230	Maximum Detected	5.438
Mean of Detected	18.46	Mean of Detected	1.636
SD of Detected	53.31	SD of Detected	1.221
Minimum Non-Detect	0.81	Minimum Non-Detect	-0.211
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.335	Lilliefors Test Statistic	0.796
5% Lilliefors Critical Value	0.897	5% Lilliefors Critical Value	0.897
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	174.2	Mean	1.951
SD	657.8	SD	2.311
95% DL/2 (t) UCL	233.5	95% H-Stat (DL/2) UCL	164.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.125
		SD in Log Scale	1.706
		Mean in Original Scale	1.253
		SD in Original Scale	12.74
		95% Percentile Bootstrap UCL	2.602
		95% BCA Bootstrap UCL	3.999
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.451	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	40.94		
nu star	16.24		
A-D Test Statistic	2.978	**Nonparametric Statistics**	
5% A-D Critical Value	0.801	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.801	Mean	2.734
5% K-S Critical Value	0.215	SD	13.88
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.861
		95% KM (t) UCL	4.154
Assuming Gamma Distribution		95% KM (z) UCL	4.15
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.952
Minimum	1.5	95% KM (bootstrap t) UCL	13.31
Maximum	230	95% KM (BCA) UCL	5.329
Mean	23.15	95% KM (Percentile Bootstrap) UCL	4.503
Median	21.37	95% KM (Chebyshev) UCL	6.487
SD	17.6	97.5% KM (Chebyshev) UCL	8.111
k star	2.5	99% KM (Chebyshev) UCL	11.3
Theta star	9.263		
Nu star	1670	**Potential UCLs to Use**	
AppChi2	1576	95% KM (BCA) UCL	5.329
95% Gamma Approximate UCL	24.53		
95% Adjusted Gamma UCL	24.54		

Note: DL/2 is not a recommended method.

Result (molybdenum)

General Statistics

Number of Valid Data	233	Number of Detected Data	104
Number of Distinct Detected Data	100	Number of Non-Detect Data	129
		Percent Non-Detects	55.36%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.154	Minimum Detected	-1.872
Maximum Detected	67.9	Maximum Detected	4.218
Mean of Detected	4.084	Mean of Detected	0.465
SD of Detected	9.126	SD of Detected	1.233
Minimum Non-Detect	0.039	Minimum Non-Detect	-3.244
Maximum Non-Detect	2.04	Maximum Non-Detect	0.713
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	193
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	40
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	82.83%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.333	Lilliefors Test Statistic	0.0795
5% Lilliefors Critical Value	0.0869	5% Lilliefors Critical Value	0.0869
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.015	Mean	-0.544
SD	6.362	SD	1.369
95% DL/2 (t) UCL	2.704	95% H-Stat (DL/2) UCL	1.682
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.043
		SD in Log Scale	1.737
		Mean in Original Scale	1.917
		SD in Original Scale	6.388
		95% Percentile Bootstrap UCL	2.635
		95% BCA Bootstrap UCL	2.915

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.636	**Data appear Lognormal at 5% Significance Level**	
Theta Star	6.422		
nu star	132.3		
A-D Test Statistic	5.879	**Nonparametric Statistics**	
5% A-D Critical Value	0.805	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.805	Mean	1.957
5% K-S Critical Value	0.0925	SD	6.363
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.419
		95% KM (t) UCL	2.649
Assuming Gamma Distribution		95% KM (z) UCL	2.647
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.646
Minimum	1E-09	95% KM (bootstrap t) UCL	3.22
Maximum	67.9	95% KM (BCA) UCL	2.744
Mean	3.833	95% KM (Percentile Bootstrap) UCL	2.692
Median	1.652	95% KM (Chebyshev) UCL	3.784
SD	6.868	97.5% KM (Chebyshev) UCL	4.574
k star	0.277	99% KM (Chebyshev) UCL	6.127
Theta star	13.85		
Nu star	129	**Potential UCLs to Use**	
AppChi2	103.8	95% KM (BCA) UCL	2.744
95% Gamma Approximate UCL	4.765		
95% Adjusted Gamma UCL	4.772		

Note: DL/2 is not a recommended method.

Result (naphthalene)

General Statistics

Number of Valid Data	334	Number of Detected Data	66
Number of Distinct Detected Data	62	Number of Non-Detect Data	268
		Percent Non-Detects	80.24%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.75	Minimum Detected	1.012
Maximum Detected	48500	Maximum Detected	10.79
Mean of Detected	7583	Mean of Detected	6.657
SD of Detected	11835	SD of Detected	2.982
Minimum Non-Detect	5.1	Minimum Non-Detect	1.629
Maximum Non-Detect	33000	Maximum Non-Detect	10.4
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	329
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.50%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.261	Lilliefors Test Statistic	0.142
5% Lilliefors Critical Value	0.109	5% Lilliefors Critical Value	0.109
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1651	Mean	3.191
SD	6094	SD	2.728
95% DL/2 (t) UCL	2201	95% H-Stat (DL/2) UCL	1021
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.28
		SD in Log Scale	4.563
		Mean in Original Scale	1500
		SD in Original Scale	6040
		95% Percentile Bootstrap UCL	2087
		95% BCA Bootstrap UCL	2126
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.299	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	25380		
nu star	39.44		
A-D Test Statistic	1.21	**Nonparametric Statistics**	
5% A-D Critical Value	0.864	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.864	Mean	1508
5% K-S Critical Value	0.119	SD	6034
Data not Gamma Distributed at 5% Significance Level		SE of Mean	333
		95% KM (t) UCL	2058
Assuming Gamma Distribution		95% KM (z) UCL	2056
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2051
Minimum	1E-09	95% KM (bootstrap t) UCL	2206
Maximum	167885	95% KM (BCA) UCL	2126
Mean	29087	95% KM (Percentile Bootstrap) UCL	2076
Median	16068	95% KM (Chebyshev) UCL	2960
SD	38473	97.5% KM (Chebyshev) UCL	3588
k star	0.154	99% KM (Chebyshev) UCL	4821
Theta star	188883		
Nu star	102.9	**Potential UCLs to Use**	
AppChi2	80.47	97.5% KM (Chebyshev) UCL	3588
95% Gamma Approximate UCL	37185		
95% Adjusted Gamma UCL	37224		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)

General Statistics

Number of Valid Data	334	Number of Detected Data	56
Number of Distinct Detected Data	55	Number of Non-Detect Data	278
		Percent Non-Detects	83.23%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.89	Minimum Detected	-0.117
Maximum Detected	14250	Maximum Detected	9.565
Mean of Detected	1908	Mean of Detected	5.556
SD of Detected	2933	SD of Detected	2.867
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	6813	Maximum Non-Detect	8.827
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	330
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.258	Lilliefors Test Statistic	0.158
5% Lilliefors Critical Value	0.118	5% Lilliefors Critical Value	0.118
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	413.9	Mean	1.909
SD	1442	SD	2.844
95% DL/2 (t) UCL	544	95% H-Stat (DL/2) UCL	471.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.166
		SD in Log Scale	4.709
		Mean in Original Scale	320.6
		SD in Original Scale	1389
		95% Percentile Bootstrap UCL	454.8
		95% BCA Bootstrap UCL	487.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.332	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	5744		
nu star	37.21		
A-D Test Statistic	0.527	**Nonparametric Statistics**	
5% A-D Critical Value	0.854	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.854	Mean	325.7
5% K-S Critical Value	0.128	SD	1391
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	77.04
		95% KM (t) UCL	452.8
Assuming Gamma Distribution		95% KM (z) UCL	452.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	451.5
Minimum	0.89	95% KM (bootstrap t) UCL	489.1
Maximum	14250	95% KM (BCA) UCL	465.3
Mean	2089	95% KM (Percentile Bootstrap) UCL	463.2
Median	1794	95% KM (Chebyshev) UCL	661.5
SD	1486	97.5% KM (Chebyshev) UCL	806.8
k star	1.373	99% KM (Chebyshev) UCL	1092
Theta star	1521		
Nu star	917.3	**Potential UCLs to Use**	
AppChi2	848	95% KM (t) UCL	452.8
95% Gamma Approximate UCL	2260		
95% Adjusted Gamma UCL	2261		

Note: DL/2 is not a recommended method.

Result (nickel)

General Statistics

Number of Valid Observations	233	Number of Distinct Observations	165

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.66	Minimum of Log Data	0.978
Maximum	71.5	Maximum of Log Data	4.27
Mean	22.56	Mean of log Data	3.048
Median	21	SD of log Data	0.38
SD	8.977		
Coefficient of Variation	0.398		
Skewness	2.268		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.132	Lilliefors Test Statistic	0.111
Lilliefors Critical Value	0.058	Lilliefors Critical Value	0.058
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	23.54	95% H-UCL	23.65
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	25.18
95% Adjusted-CLT UCL	23.63	97.5% Chebyshev (MVUE) UCL	26.28
95% Modified-t UCL	23.55	99% Chebyshev (MVUE) UCL	28.43
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.356	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3.068		
nu star	3428		
Approximate Chi Square Value (.05)	3293	**Nonparametric Statistics**	
Adjusted Level of Significance	0.049	95% CLT UCL	23.53
Adjusted Chi Square Value	3292	95% Jackknife UCL	23.54
		95% Standard Bootstrap UCL	23.54
Anderson-Darling Test Statistic	4.692	95% Bootstrap-t UCL	23.59
Anderson-Darling 5% Critical Value	0.754	95% Hall's Bootstrap UCL	23.69
Kolmogorov-Smirnov Test Statistic	0.0964	95% Percentile Bootstrap UCL	23.58
Kolmogorov-Smirnov 5% Critical Value	0.0599	95% BCA Bootstrap UCL	23.64
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	25.13
		97.5% Chebyshev(Mean, Sd) UCL	26.24
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	28.42
95% Approximate Gamma UCL	23.49		
95% Adjusted Gamma UCL	23.5		
Potential UCL to Use		Use 95% Student's-t UCL	23.54
		or 95% Modified-t UCL	23.55

Result (n-propylbenzene)

General Statistics

Number of Valid Data	334	Number of Detected Data	105
Number of Distinct Detected Data	96	Number of Non-Detect Data	229
		Percent Non-Detects	68.56%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.62	Minimum Detected	-0.478
Maximum Detected	39000	Maximum Detected	10.57
Mean of Detected	2092	Mean of Detected	5.036
SD of Detected	5439	SD of Detected	2.924
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	328
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.20%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.35	Lilliefors Test Statistic	0.116
5% Lilliefors Critical Value	0.0865	5% Lilliefors Critical Value	0.0865
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	679.7	Mean	2.106
SD	3192	SD	2.939
95% DL/2 (t) UCL	967.8	95% H-Stat (DL/2) UCL	565.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.298
		SD in Log Scale	4.558
		Mean in Original Scale	658.2
		SD in Original Scale	3191
		95% Percentile Bootstrap UCL	971.7
		95% BCA Bootstrap UCL	1028
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.268	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	7818		
nu star	56.19		
A-D Test Statistic	2.201	**Nonparametric Statistics**	
5% A-D Critical Value	0.882	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.882	Mean	660
5% K-S Critical Value	0.0963	SD	3187
Data not Gamma Distributed at 5% Significance Level		SE of Mean	175.2
		95% KM (t) UCL	949
Assuming Gamma Distribution		95% KM (z) UCL	948.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	947.7
Minimum	0.62	95% KM (bootstrap t) UCL	1142
Maximum	39000	95% KM (BCA) UCL	986.3
Mean	2312	95% KM (Percentile Bootstrap) UCL	987.3
Median	1442	95% KM (Chebyshev) UCL	1424
SD	3436	97.5% KM (Chebyshev) UCL	1754
k star	0.634	99% KM (Chebyshev) UCL	2403
Theta star	3646		
Nu star	423.6	**Potential UCLs to Use**	
AppChi2	376.9	97.5% KM (Chebyshev) UCL	1754
95% Gamma Approximate UCL	2598		
95% Adjusted Gamma UCL	2600		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	333	Number of Detected Data	70
Number of Distinct Detected Data	65	Number of Non-Detect Data	263
		Percent Non-Detects	78.98%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	123375	Maximum Detected	11.72
Mean of Detected	4418	Mean of Detected	4.916
SD of Detected	15767	SD of Detected	3.22
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	324
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	97.30%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.39	Lilliefors Test Statistic	0.0938
5% Lilliefors Critical Value	0.106	5% Lilliefors Critical Value	0.106
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	973.7	Mean	1.856
SD	7409	SD	2.799
95% DL/2 (t) UCL	1643	95% H-Stat (DL/2) UCL	367
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.085
		SD in Log Scale	5.427
		Mean in Original Scale	928.8
		SD in Original Scale	7410
		95% Percentile Bootstrap UCL	1703
		95% BCA Bootstrap UCL	2132
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.211	**Data appear Lognormal at 5% Significance Level**	
Theta Star	20984		
nu star	29.47		
A-D Test Statistic	2.95	**Nonparametric Statistics**	
5% A-D Critical Value	0.905	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.905	Mean	931.5
5% K-S Critical Value	0.118	SD	7399
Data not Gamma Distributed at 5% Significance Level		SE of Mean	408.4
		95% KM (t) UCL	1605
Assuming Gamma Distribution		95% KM (z) UCL	1603
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1601
Minimum	1.1	95% KM (bootstrap t) UCL	2907
Maximum	123375	95% KM (BCA) UCL	1670
Mean	8606	95% KM (Percentile Bootstrap) UCL	1700
Median	2765	95% KM (Chebyshev) UCL	2712
SD	15917	97.5% KM (Chebyshev) UCL	3482
k star	0.413	99% KM (Chebyshev) UCL	4995
Theta star	20846		
Nu star	274.9	**Potential UCLs to Use**	
AppChi2	237.5	97.5% KM (Chebyshev) UCL	3482
95% Gamma Approximate UCL	9961		
95% Adjusted Gamma UCL	9967		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	334	Number of Detected Data	94
Number of Distinct Detected Data	87	Number of Non-Detect Data	240
		Percent Non-Detects	71.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	242500	Maximum Detected	12.4
Mean of Detected	8976	Mean of Detected	5.407
SD of Detected	28950	SD of Detected	3.299
Minimum Non-Detect	0.81	Minimum Non-Detect	-0.211
Maximum Non-Detect	5150	Maximum Non-Detect	8.547
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	312
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	22
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.41%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.378	Lilliefors Test Statistic	0.093
5% Lilliefors Critical Value	0.0914	5% Lilliefors Critical Value	0.0914
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2553	Mean	2.442
SD	15821	SD	2.936
95% DL/2 (t) UCL	3981	95% H-Stat (DL/2) UCL	862.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.226
		SD in Log Scale	5.312
		Mean in Original Scale	2526
		SD in Original Scale	15824
		95% Percentile Bootstrap UCL	4101
		95% BCA Bootstrap UCL	5091
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.2	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	44881		
nu star	37.6		
A-D Test Statistic	4.759	**Nonparametric Statistics**	
5% A-D Critical Value	0.912	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.912	Mean	2529
5% K-S Critical Value	0.102	SD	15800
Data not Gamma Distributed at 5% Significance Level		SE of Mean	869.2
		95% KM (t) UCL	3963
Assuming Gamma Distribution		95% KM (z) UCL	3959
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3957
Minimum	1.5	95% KM (bootstrap t) UCL	5582
Maximum	242500	95% KM (BCA) UCL	4344
Mean	9251	95% KM (Percentile Bootstrap) UCL	4104
Median	7910	95% KM (Chebyshev) UCL	6318
SD	15506	97.5% KM (Chebyshev) UCL	7957
k star	0.579	99% KM (Chebyshev) UCL	11177
Theta star	15967		
Nu star	387	**Potential UCLs to Use**	
AppChi2	342.4	97.5% KM (Chebyshev) UCL	7957
95% Gamma Approximate UCL	10456		
95% Adjusted Gamma UCL	10462		

Note: DL/2 is not a recommended method.

Result (phenanthrene)

General Statistics

Number of Valid Data	334	Number of Detected Data	121
Number of Distinct Detected Data	101	Number of Non-Detect Data	213
		Percent Non-Detects	63.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	59000	Maximum Detected	10.99
Mean of Detected	1852	Mean of Detected	5.561
SD of Detected	6873	SD of Detected	2.086
Minimum Non-Detect	3.75	Minimum Non-Detect	1.322
Maximum Non-Detect	11000	Maximum Non-Detect	9.306
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	330
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.394	Lilliefors Test Statistic	0.0886
5% Lilliefors Critical Value	0.0805	5% Lilliefors Critical Value	0.0805
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	726.4	Mean	4.035
SD	4224	SD	2.018
95% DL/2 (t) UCL	1108	95% H-Stat (DL/2) UCL	392.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.1
		SD in Log Scale	2.596
		Mean in Original Scale	679.9
		SD in Original Scale	4219
		95% Percentile Bootstrap UCL	1104
		95% BCA Bootstrap UCL	1376
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.341	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	5436		
nu star	82.43		
A-D Test Statistic	5.418	**Nonparametric Statistics**	
5% A-D Critical Value	0.857	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.857	Mean	680
5% K-S Critical Value	0.0907	SD	4214
Data not Gamma Distributed at 5% Significance Level		SE of Mean	231.5
		95% KM (t) UCL	1062
Assuming Gamma Distribution		95% KM (z) UCL	1061
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1061
Minimum	2.5	95% KM (bootstrap t) UCL	1803
Maximum	59000	95% KM (BCA) UCL	1103
Mean	1875	95% KM (Percentile Bootstrap) UCL	1111
Median	1736	95% KM (Chebyshev) UCL	1689
SD	4129	97.5% KM (Chebyshev) UCL	2126
k star	0.822	99% KM (Chebyshev) UCL	2984
Theta star	2282		
Nu star	548.8	**Potential UCLs to Use**	
AppChi2	495.5	97.5% KM (Chebyshev) UCL	2126
95% Gamma Approximate UCL	2077		
95% Adjusted Gamma UCL	2078		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	333	Number of Detected Data	64
Number of Distinct Detected Data	61	Number of Non-Detect Data	269
		Percent Non-Detects	80.78%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	18000	Maximum Detected	9.798
Mean of Detected	1478	Mean of Detected	5.126
SD of Detected	2915	SD of Detected	2.781
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	332
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	99.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.306	Lilliefors Test Statistic	0.112
5% Lilliefors Critical Value	0.111	5% Lilliefors Critical Value	0.111
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	340.3	Mean	1.778
SD	1445	SD	2.704
95% DL/2 (t) UCL	470.9	95% H-Stat (DL/2) UCL	245.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.908
		SD in Log Scale	4.565
		Mean in Original Scale	284.6
		SD in Original Scale	1397
		95% Percentile Bootstrap UCL	425
		95% BCA Bootstrap UCL	466.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.311	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	4761		
nu star	39.75		
A-D Test Statistic	0.868	**Nonparametric Statistics**	
5% A-D Critical Value	0.861	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.861	Mean	287.8
5% K-S Critical Value	0.121	SD	1397
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	77.27
		95% KM (t) UCL	415.2
Assuming Gamma Distribution		95% KM (z) UCL	414.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	414.1
Minimum	1.1	95% KM (bootstrap t) UCL	501.1
Maximum	18000	95% KM (BCA) UCL	414
Mean	1416	95% KM (Percentile Bootstrap) UCL	427.3
Median	1455	95% KM (Chebyshev) UCL	624.6
SD	1285	97.5% KM (Chebyshev) UCL	770.3
k star	1.294	99% KM (Chebyshev) UCL	1057
Theta star	1094		
Nu star	862	**Potential UCLs to Use**	
AppChi2	794.8	95% KM (t) UCL	415.2
95% Gamma Approximate UCL	1535		
95% Adjusted Gamma UCL	1536		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	334	Number of Detected Data	122
Number of Distinct Detected Data	96	Number of Non-Detect Data	212
		Percent Non-Detects	63.47%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.625	Minimum Detected	0.965
Maximum Detected	13000	Maximum Detected	9.473
Mean of Detected	739.4	Mean of Detected	5.088
SD of Detected	1810	SD of Detected	1.858
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.342	Lilliefors Test Statistic	0.0464
5% Lilliefors Critical Value	0.0802	5% Lilliefors Critical Value	0.0802
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	386.4	Mean	3.927
SD	1401	SD	1.872
95% DL/2 (t) UCL	512.9	95% H-Stat (DL/2) UCL	301.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.993
		SD in Log Scale	2.271
		Mean in Original Scale	278.7
		SD in Original Scale	1146
		95% Percentile Bootstrap UCL	386.6
		95% BCA Bootstrap UCL	421
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.424	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1746		
nu star	103.4		
A-D Test Statistic	3.505	**Nonparametric Statistics**	
5% A-D Critical Value	0.836	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.836	Mean	282.2
5% K-S Critical Value	0.0894	SD	1148
Data not Gamma Distributed at 5% Significance Level		SE of Mean	63.32
		95% KM (t) UCL	386.7
Assuming Gamma Distribution		95% KM (z) UCL	386.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	386.4
Minimum	2.625	95% KM (bootstrap t) UCL	440.4
Maximum	13000	95% KM (BCA) UCL	397.7
Mean	742.2	95% KM (Percentile Bootstrap) UCL	386.1
Median	730.6	95% KM (Chebyshev) UCL	558.3
SD	1091	97.5% KM (Chebyshev) UCL	677.7
k star	1.029	99% KM (Chebyshev) UCL	912.3
Theta star	721.3		
Nu star	687.3	**Potential UCLs to Use**	
AppChi2	627.5	95% KM (Chebyshev) UCL	558.3
95% Gamma Approximate UCL	812.9		
95% Adjusted Gamma UCL	813.2		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	334	Number of Detected Data	94
Number of Distinct Detected Data	89	Number of Non-Detect Data	240
		Percent Non-Detects	71.86%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.91	Minimum Detected	-0.0943
Maximum Detected	11313	Maximum Detected	9.334
Mean of Detected	820.4	Mean of Detected	4.618
SD of Detected	1668	SD of Detected	2.66
Minimum Non-Detect	0.51	Minimum Non-Detect	-0.673
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.312	Lilliefors Test Statistic	0.115
5% Lilliefors Critical Value	0.0914	5% Lilliefors Critical Value	0.0914
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	291.1	Mean	1.892
SD	1043	SD	2.752
95% DL/2 (t) UCL	385.3	95% H-Stat (DL/2) UCL	285.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.58
		SD in Log Scale	4.176
		Mean in Original Scale	231.4
		SD in Original Scale	955.6
		95% Percentile Bootstrap UCL	322.2
		95% BCA Bootstrap UCL	343
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.322	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2548		
nu star	60.53		
A-D Test Statistic	1.276	**Nonparametric Statistics**	
5% A-D Critical Value	0.862	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.862	Mean	235
5% K-S Critical Value	0.0999	SD	956.7
Data not Gamma Distributed at 5% Significance Level		SE of Mean	52.8
		95% KM (t) UCL	322.1
Assuming Gamma Distribution		95% KM (z) UCL	321.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	321.7
Minimum	0.91	95% KM (bootstrap t) UCL	372.4
Maximum	11313	95% KM (BCA) UCL	333.7
Mean	835.8	95% KM (Percentile Bootstrap) UCL	323.8
Median	795.4	95% KM (Chebyshev) UCL	465.1
SD	884.8	97.5% KM (Chebyshev) UCL	564.7
k star	0.97	99% KM (Chebyshev) UCL	760.4
Theta star	861.6		
Nu star	648	**Potential UCLs to Use**	
AppChi2	590	97.5% KM (Chebyshev) UCL	564.7
95% Gamma Approximate UCL	918.1		
95% Adjusted Gamma UCL	918.5		

Note: DL/2 is not a recommended method.

Result (selenium)

General Statistics

Number of Valid Data	233	Number of Detected Data	22
Number of Distinct Detected Data	21	Number of Non-Detect Data	211
		Percent Non-Detects	90.56%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.785	Minimum Detected	-0.242
Maximum Detected	11	Maximum Detected	2.398
Mean of Detected	2.088	Mean of Detected	0.514
SD of Detected	2.114	SD of Detected	0.587
Minimum Non-Detect	0.776	Minimum Non-Detect	-0.254
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	217
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	93.13%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.515	Lilliefors Test Statistic	0.879
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.655	Mean	-0.587
SD	0.793	SD	0.439
95% DL/2 (t) UCL	0.74	95% H-Stat (DL/2) UCL	0.625
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.812
		SD in Log Scale	1.109
		Mean in Original Scale	0.359
		SD in Original Scale	0.862
		95% Percentile Bootstrap UCL	0.461
		95% BCA Bootstrap UCL	0.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.103	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.993		
nu star	92.51		
A-D Test Statistic	1.398	**Nonparametric Statistics**	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	0.911
5% K-S Critical Value	0.187	SD	0.74
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0497
		95% KM (t) UCL	0.993
Assuming Gamma Distribution		95% KM (z) UCL	0.993
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.982
Minimum	0.785	95% KM (bootstrap t) UCL	1.075
Maximum	11	95% KM (BCA) UCL	1.125
Mean	2.09	95% KM (Percentile Bootstrap) UCL	1.055
Median	2.039	95% KM (Chebyshev) UCL	1.128
SD	0.78	97.5% KM (Chebyshev) UCL	1.222
k star	11.47	99% KM (Chebyshev) UCL	1.406
Theta star	0.182		
Nu star	5344	**Potential UCLs to Use**	
AppChi2	5175	95% KM (t) UCL	0.993
95% Gamma Approximate UCL	2.158	95% KM (% Bootstrap) UCL	1.055
95% Adjusted Gamma UCL	2.159		

Note: DL/2 is not a recommended method.

Result (tert-butyl alcohol (tba))

General Statistics

Number of Valid Data	334	Number of Detected Data	40
Number of Distinct Detected Data	36	Number of Non-Detect Data	294
		Percent Non-Detects	88.02%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	11.88	Minimum Detected	2.474
Maximum Detected	690	Maximum Detected	6.537
Mean of Detected	116.5	Mean of Detected	4.251
SD of Detected	147.8	SD of Detected	0.96
Minimum Non-Detect	8.1	Minimum Non-Detect	2.092
Maximum Non-Detect	123750	Maximum Non-Detect	11.73
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	334
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.648	Lilliefors Test Statistic	0.953
5% Lilliefors Critical Value	0.94	5% Lilliefors Critical Value	0.94
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1745	Mean	4.376
SD	6576	SD	2.276
95% DL/2 (t) UCL	2339	95% H-Stat (DL/2) UCL	1683
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.88
		SD in Log Scale	1.373
		Mean in Original Scale	20.98
		SD in Original Scale	62.33
		95% Percentile Bootstrap UCL	27.17
		95% BCA Bootstrap UCL	27.95
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.056	**Data appear Lognormal at 5% Significance Level**	
Theta Star	110.3		
nu star	84.48		
A-D Test Statistic	1.924	**Nonparametric Statistics**	
5% A-D Critical Value	0.776	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.776	Mean	31.71
5% K-S Critical Value	0.143	SD	71.58
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.759
		95% KM (t) UCL	39.56
Assuming Gamma Distribution		95% KM (z) UCL	39.54
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	38.58
Minimum	11.88	95% KM (bootstrap t) UCL	42.56
Maximum	690	95% KM (BCA) UCL	45.92
Mean	126.5	95% KM (Percentile Bootstrap) UCL	41.6
Median	130	95% KM (Chebyshev) UCL	52.45
SD	64.08	97.5% KM (Chebyshev) UCL	61.43
k star	4.404	99% KM (Chebyshev) UCL	79.06
Theta star	28.71		
Nu star	2942	**Potential UCLs to Use**	
AppChi2	2817	95% KM (t) UCL	39.56
95% Gamma Approximate UCL	132.1	95% KM (% Bootstrap) UCL	41.6
95% Adjusted Gamma UCL	132.1		

Note: DL/2 is not a recommended method.

Result (tert-butylbenzene)

General Statistics

Number of Valid Data	333	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	325
		Percent Non-Detects	97.60%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	690	Maximum Detected	6.537
Mean of Detected	188.8	Mean of Detected	3.931
SD of Detected	239.5	SD of Detected	2.161
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	12375	Maximum Non-Detect	9.423
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	333
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.806	Lilliefors Test Statistic	0.89
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	160.6	Mean	1.552
SD	636.1	SD	2.453
95% DL/2 (t) UCL	218.1	95% H-Stat (DL/2) UCL	149.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-7.964
		SD in Log Scale	4.042
		Mean in Original Scale	4.604
		SD in Original Scale	45.24
		95% Percentile Bootstrap UCL	8.935
		95% BCA Bootstrap UCL	11.13
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.388	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	486.7		
nu star	6.205		
A-D Test Statistic	0.363	**Nonparametric Statistics**	
5% A-D Critical Value	0.765	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765	Mean	7.487
5% K-S Critical Value	0.309	SD	46.82
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.861
		95% KM (t) UCL	12.21
Assuming Gamma Distribution		95% KM (z) UCL	12.19
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.1
Minimum	2.5	95% KM (bootstrap t) UCL	15.67
Maximum	690	95% KM (BCA) UCL	84.26
Mean	188.8	95% KM (Percentile Bootstrap) UCL	76.94
Median	188.8	95% KM (Chebyshev) UCL	19.96
SD	34.77	97.5% KM (Chebyshev) UCL	25.36
k star	15.92	99% KM (Chebyshev) UCL	35.96
Theta star	11.86		
Nu star	10603	**Potential UCLs to Use**	
AppChi2	10365	95% KM (t) UCL	12.21
95% Gamma Approximate UCL	193.1		
95% Adjusted Gamma UCL	193.1		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics

Number of Valid Data	334	Number of Detected Data	76
Number of Distinct Detected Data	66	Number of Non-Detect Data	258
		Percent Non-Detects	77.25%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.73	Minimum Detected	-0.315
Maximum Detected	18000	Maximum Detected	9.798
Mean of Detected	1365	Mean of Detected	3.591
SD of Detected	3326	SD of Detected	3.107
Minimum Non-Detect	0.4	Minimum Non-Detect	-0.916
Maximum Non-Detect	6250	Maximum Non-Detect	8.74
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	330
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.387	Lilliefors Test Statistic	0.17
5% Lilliefors Critical Value	0.102	5% Lilliefors Critical Value	0.102
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	386.9	Mean	1.901
SD	1709	SD	2.608
95% DL/2 (t) UCL	541.2	95% H-Stat (DL/2) UCL	296.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.331
		SD in Log Scale	4.426
		Mean in Original Scale	311
		SD in Original Scale	1679
		95% Percentile Bootstrap UCL	479
		95% BCA Bootstrap UCL	501.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.203	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	6717		
nu star	30.89		
A-D Test Statistic	6.111	**Nonparametric Statistics**	
5% A-D Critical Value	0.909	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.909	Mean	314.6
5% K-S Critical Value	0.113	SD	1679
Data not Gamma Distributed at 5% Significance Level		SE of Mean	92.6
		95% KM (t) UCL	467.3
Assuming Gamma Distribution		95% KM (z) UCL	466.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	466.4
Minimum	0.73	95% KM (bootstrap t) UCL	536.4
Maximum	18057	95% KM (BCA) UCL	473.9
Mean	2154	95% KM (Percentile Bootstrap) UCL	477.2
Median	1023	95% KM (Chebyshev) UCL	718.2
SD	3185	97.5% KM (Chebyshev) UCL	892.9
k star	0.53	99% KM (Chebyshev) UCL	1236
Theta star	4061		
Nu star	354.3	**Potential UCLs to Use**	
AppChi2	311.7	97.5% KM (Chebyshev) UCL	892.9
95% Gamma Approximate UCL	2449		
95% Adjusted Gamma UCL	2450		

Note: DL/2 is not a recommended method.

Result (vanadium)

General Statistics

Number of Valid Observations	233	Number of Distinct Observations	189

Raw Statistics		**Log-transformed Statistics**	
Minimum	5.48	Minimum of Log Data	1.701
Maximum	293	Maximum of Log Data	5.68
Mean	47.82	Mean of log Data	3.786
Median	43.4	SD of log Data	0.397
SD	23.77		
Coefficient of Variation	0.497		
Skewness	5.266		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.124	Lilliefors Test Statistic	0.0444
Lilliefors Critical Value	0.058	Lilliefors Critical Value	0.058
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	50.4	95% H-UCL	49.92
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	53.28
95% Adjusted-CLT UCL	50.96	97.5% Chebyshev (MVUE) UCL	55.7
95% Modified-t UCL	50.48	99% Chebyshev (MVUE) UCL	60.46
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.226	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	7.682		
nu star	2901		
Approximate Chi Square Value (.05)	2777	**Nonparametric Statistics**	
Adjusted Level of Significance	0.049	95% CLT UCL	50.38
Adjusted Chi Square Value	2776	95% Jackknife UCL	50.4
		95% Standard Bootstrap UCL	50.34
Anderson-Darling Test Statistic	1.722	95% Bootstrap-t UCL	51.31
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	52.27
Kolmogorov-Smirnov Test Statistic	0.0591	95% Percentile Bootstrap UCL	50.49
Kolmogorov-Smirnov 5% Critical Value	0.0599	95% BCA Bootstrap UCL	50.84
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	54.61
		97.5% Chebyshev(Mean, Sd) UCL	57.55
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	63.32
95% Approximate Gamma UCL	49.96		
95% Adjusted Gamma UCL	49.97		
Potential UCL to Use		Use 95% Approximate Gamma UCL	49.96

Result (xylenes, total)

General Statistics

Number of Valid Data	333	Number of Detected Data	99
Number of Distinct Detected Data	97	Number of Non-Detect Data	234
		Percent Non-Detects	70.27%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	365000	Maximum Detected	12.81
Mean of Detected	11638	Mean of Detected	5.535
SD of Detected	41234	SD of Detected	3.323
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	5150	Maximum Non-Detect	8.547
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	309
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	24
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.79%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.389	Lilliefors Test Statistic	0.0841
5% Lilliefors Critical Value	0.089	5% Lilliefors Critical Value	0.089
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3485	Mean	2.513
SD	23024	SD	3.014
95% DL/2 (t) UCL	5566	95% H-Stat (DL/2) UCL	1162
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.947
		SD in Log Scale	5.361
		Mean in Original Scale	3460
		SD in Original Scale	23027
		95% Percentile Bootstrap UCL	5856
		95% BCA Bootstrap UCL	7039

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.194	**Data appear Lognormal at 5% Significance Level**	
Theta Star	59924		
nu star	38.45		
A-D Test Statistic	5.278	**Nonparametric Statistics**	
5% A-D Critical Value	0.919	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.919	Mean	3463
5% K-S Critical Value	0.0999	SD	22992
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1266
		95% KM (t) UCL	5551
Assuming Gamma Distribution		95% KM (z) UCL	5546
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5544
Minimum	1.5	95% KM (bootstrap t) UCL	8159
Maximum	365000	95% KM (BCA) UCL	5879
Mean	11995	95% KM (Percentile Bootstrap) UCL	5609
Median	9552	95% KM (Chebyshev) UCL	8983
SD	22835	97.5% KM (Chebyshev) UCL	11371
k star	0.53	99% KM (Chebyshev) UCL	16063
Theta star	22612		
Nu star	353.3	**Potential UCLs to Use**	
AppChi2	310.7	97.5% KM (Chebyshev) UCL	11371
95% Gamma Approximate UCL	13638		
95% Adjusted Gamma UCL	13645		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	233	Number of Distinct Observations	187

Raw Statistics		**Log-transformed Statistics**	
Minimum	25.4	Minimum of Log Data	3.235
Maximum	1740	Maximum of Log Data	7.462
Mean	122.3	Mean of log Data	4.551
Median	83.13	SD of log Data	0.592
SD	152.6		
Coefficient of Variation	1.247		
Skewness	6.563		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.287	Lilliefors Test Statistic	0.133
Lilliefors Critical Value	0.058	Lilliefors Critical Value	0.058
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	138.8	95% H-UCL	121.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	133.4
95% Adjusted-CLT UCL	143.3	97.5% Chebyshev (MVUE) UCL	142.4
95% Modified-t UCL	139.5	99% Chebyshev (MVUE) UCL	159.9
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.083	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	58.71		
nu star	970.9		
Approximate Chi Square Value (.05)	899.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.049	95% CLT UCL	138.8
Adjusted Chi Square Value	899.1	95% Jackknife UCL	138.8
		95% Standard Bootstrap UCL	138.5
Anderson-Darling Test Statistic	17.34	95% Bootstrap-t UCL	145.6
Anderson-Darling 5% Critical Value	0.766	95% Hall's Bootstrap UCL	152.3
Kolmogorov-Smirnov Test Statistic	0.188	95% Percentile Bootstrap UCL	140.2
Kolmogorov-Smirnov 5% Critical Value	0.0606	95% BCA Bootstrap UCL	144.9
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	165.9
		97.5% Chebyshev(Mean, Sd) UCL	184.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	221.8
95% Approximate Gamma UCL	132		
95% Adjusted Gamma UCL	132.1		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	165.9

	General UCL Statistics for Data Sets with Non-Detects		
User Selected Options			
From File	C:\Documents and Settings\sselden\Desktop\cenco\soil gas\Area 3.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Result (benzene)			
	General Statistics		
Number of Valid Data	81	Number of Detected Data	28
Number of Distinct Detected Data	25	Number of Non-Detect Data	53
		Percent Non-Detects	65.43%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	280	Maximum Detected	5.635
Mean of Detected	45.71	Mean of Detected	2.655
SD of Detected	74.22	SD of Detected	1.653
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
	UCL Statistics		
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.623	Lilliefors Test Statistic	0.941
5% Lilliefors Critical Value	0.924	5% Lilliefors Critical Value	0.924
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	16.13	Mean	0.464
SD	48.24	SD	1.868
95% DL/2 (t) UCL	25.05	95% H-Stat (DL/2) UCL	8.142
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.779
		SD in Log Scale	3.186
		Mean in Original Scale	15.99
		SD in Original Scale	48.29
		95% Percentile Bootstrap UCL	25.47
		95% BCA Bootstrap UCL	28.55
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.504	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	90.68		
nu star	28.23		
A-D Test Statistic	0.962	**Nonparametric Statistics**	
5% A-D Critical Value	0.806	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.806	Mean	16.59
5% K-S Critical Value	0.174	SD	47.8
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	5.408
		95% KM (t) UCL	25.59
Assuming Gamma Distribution		95% KM (z) UCL	25.48
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	25.42
Minimum	1E-09	95% KM (bootstrap t) UCL	30.43
Maximum	687.3	95% KM (BCA) UCL	26.23
Mean	161.8	95% KM (Percentile Bootstrap) UCL	25.73
Median	53	95% KM (Chebyshev) UCL	40.16
SD	197.9	97.5% KM (Chebyshev) UCL	50.36
k star	0.198	99% KM (Chebyshev) UCL	70.4
Theta star	815.6		
Nu star	32.14	**Potential UCLs to Use**	
AppChi2	20.19	95% KM (t) UCL	25.59
95% Gamma Approximate UCL	257.7		
95% Adjusted Gamma UCL	259.9		
Note: DL/2 is not a recommended method.			

Result (ethylbenzene)

General Statistics

Number of Valid Data	81	Number of Detected Data	23
Number of Distinct Detected Data	22	Number of Non-Detect Data	58
		Percent Non-Detects	71.60%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	400	Maximum Detected	5.991
Mean of Detected	64.04	Mean of Detected	2.67
SD of Detected	102.9	SD of Detected	1.925
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.673	Lilliefors Test Statistic	0.934
5% Lilliefors Critical Value	0.914	5% Lilliefors Critical Value	0.914
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	18.54	Mean	0.262
SD	61.17	SD	1.829
95% DL/2 (t) UCL	29.85	95% H-Stat (DL/2) UCL	7.517
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.156
		SD in Log Scale	3.999
		Mean in Original Scale	18.29
		SD in Original Scale	61.25
		95% Percentile Bootstrap UCL	30.43
		95% BCA Bootstrap UCL	34.68
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.408	**Data appear Lognormal at 5% Significance Level**	
Theta Star	157		
nu star	18.76		
A-D Test Statistic	1.028	**Nonparametric Statistics**	
5% A-D Critical Value	0.819	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.819	Mean	18.9
5% K-S Critical Value	0.193	SD	60.68
Data not Gamma Distributed at 5% Significance Level		SE of Mean	6.894
		95% KM (t) UCL	30.37
Assuming Gamma Distribution		95% KM (z) UCL	30.24
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	30.19
Minimum	1E-09	95% KM (bootstrap t) UCL	38.45
Maximum	2879	95% KM (BCA) UCL	31.5
Mean	620.5	95% KM (Percentile Bootstrap) UCL	30.85
Median	210	95% KM (Chebyshev) UCL	48.95
SD	818.6	97.5% KM (Chebyshev) UCL	61.95
k star	0.19	99% KM (Chebyshev) UCL	87.5
Theta star	3270		
Nu star	30.74	**Potential UCLs to Use**	
AppChi2	19.07	95% KM (Chebyshev) UCL	48.95
95% Gamma Approximate UCL	999.9		
95% Adjusted Gamma UCL	1009		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	81	Number of Detected Data	14
Number of Distinct Detected Data	13	Number of Non-Detect Data	67
		Percent Non-Detects	82.72%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	340	Maximum Detected	5.829
Mean of Detected	68.55	Mean of Detected	3.081
SD of Detected	105.2	SD of Detected	1.76
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	10	Maximum Non-Detect	2.303
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	71
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.65%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.661	Lilliefors Test Statistic	0.957
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.32	Mean	-0.0124
SD	49.67	SD	1.61
95% DL/2 (t) UCL	21.5	95% H-Stat (DL/2) UCL	3.962
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.087
		SD in Log Scale	4.116
		Mean in Original Scale	12.01
		SD in Original Scale	49.74
		95% Percentile Bootstrap UCL	22.22
		95% BCA Bootstrap UCL	25.75
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.477	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	143.7		
nu star	13.35		
A-D Test Statistic	0.396	**Nonparametric Statistics**	
5% A-D Critical Value	0.789	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.789	Mean	12.76
5% K-S Critical Value	0.241	SD	49.26
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	5.68
		95% KM (t) UCL	22.21
Assuming Gamma Distribution		95% KM (z) UCL	22.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	21.36
Minimum	1E-09	95% KM (bootstrap t) UCL	40.53
Maximum	7262	95% KM (BCA) UCL	25.08
Mean	1975	95% KM (Percentile Bootstrap) UCL	23.51
Median	1087	95% KM (Chebyshev) UCL	37.52
SD	2182	97.5% KM (Chebyshev) UCL	48.23
k star	0.251	99% KM (Chebyshev) UCL	69.27
Theta star	7871		
Nu star	40.65	**Potential UCLs to Use**	
AppChi2	27.04	95% KM (t) UCL	22.21
95% Gamma Approximate UCL	2969		
95% Adjusted Gamma UCL	2991		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	81	Number of Detected Data	37
Number of Distinct Detected Data	32	Number of Non-Detect Data	44
		Percent Non-Detects	54.32%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	980	Maximum Detected	6.888
Mean of Detected	91.17	Mean of Detected	2.283
SD of Detected	202.6	SD of Detected	2.165
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.525	Lilliefors Test Statistic	0.831
5% Lilliefors Critical Value	0.936	5% Lilliefors Critical Value	0.936
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	41.92	Mean	0.666
SD	143.3	SD	2.082
95% DL/2 (t) UCL	68.41	95% H-Stat (DL/2) UCL	18.04
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.016
		SD in Log Scale	3.761
		Mean in Original Scale	41.7
		SD in Original Scale	143.4
		95% Percentile Bootstrap UCL	70.43
		95% BCA Bootstrap UCL	77.92

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.301	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	302.9		
nu star	22.27		
A-D Test Statistic	3.629	**Nonparametric Statistics**	
5% A-D Critical Value	0.855	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.855	Mean	42.19
5% K-S Critical Value	0.157	SD	142.3
Data not Gamma Distributed at 5% Significance Level		SE of Mean	16.03
		95% KM (t) UCL	68.87
Assuming Gamma Distribution		95% KM (z) UCL	68.56
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	68.67
Minimum	1E-09	95% KM (bootstrap t) UCL	91.24
Maximum	998	95% KM (BCA) UCL	69.73
Mean	160	95% KM (Percentile Bootstrap) UCL	71.75
Median	4.2	95% KM (Chebyshev) UCL	112.1
SD	262.9	97.5% KM (Chebyshev) UCL	142.3
k star	0.123	99% KM (Chebyshev) UCL	201.7
Theta star	1302		
Nu star	19.91	**Potential UCLs to Use**	
AppChi2	10.79	97.5% KM (Chebyshev) UCL	142.3
95% Gamma Approximate UCL	295.4		
95% Adjusted Gamma UCL	298.8		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics

Number of Valid Data	81	Number of Detected Data	25
Number of Distinct Detected Data	22	Number of Non-Detect Data	56
		Percent Non-Detects	69.14%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	590	Maximum Detected	6.38
Mean of Detected	54.82	Mean of Detected	2.055
SD of Detected	124.9	SD of Detected	2.032
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	10	Maximum Non-Detect	2.303
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	71
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	87.65%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.491	Lilliefors Test Statistic	0.854
5% Lilliefors Critical Value	0.918	5% Lilliefors Critical Value	0.918
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	17.32	Mean	0.183
SD	72.9	SD	1.699
95% DL/2 (t) UCL	30.8	95% H-Stat (DL/2) UCL	5.635
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.578
		SD in Log Scale	4.009
		Mean in Original Scale	16.97
		SD in Original Scale	72.98
		95% Percentile Bootstrap UCL	32.08
		95% BCA Bootstrap UCL	40.66
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.331	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	165.7		
nu star	16.54		
A-D Test Statistic	2.102	**Nonparametric Statistics**	
5% A-D Critical Value	0.842	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.842	Mean	17.61
5% K-S Critical Value	0.188	SD	72.38
Data not Gamma Distributed at 5% Significance Level		SE of Mean	8.208
		95% KM (t) UCL	31.27
Assuming Gamma Distribution		95% KM (z) UCL	31.12
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	31.02
Minimum	1E-09	95% KM (bootstrap t) UCL	50.6
Maximum	3520	95% KM (BCA) UCL	33.27
Mean	631.1	95% KM (Percentile Bootstrap) UCL	33.58
Median	120	95% KM (Chebyshev) UCL	53.39
SD	940.4	97.5% KM (Chebyshev) UCL	68.87
k star	0.152	99% KM (Chebyshev) UCL	99.28
Theta star	4161		
Nu star	24.57	**Potential UCLs to Use**	
AppChi2	14.28	97.5% KM (Chebyshev) UCL	68.87
95% Gamma Approximate UCL	1086		
95% Adjusted Gamma UCL	1097		

Note: DL/2 is not a recommended method.

Result (xylenes, total)

General Statistics

Number of Valid Data	81	Number of Detected Data	37
Number of Distinct Detected Data	32	Number of Non-Detect Data	44
		Percent Non-Detects	54.32%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	1250	Maximum Detected	7.131
Mean of Detected	117.1	Mean of Detected	2.38
SD of Detected	268.5	SD of Detected	2.262
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.506	Lilliefors Test Statistic	0.833
5% Lilliefors Critical Value	0.936	5% Lilliefors Critical Value	0.936
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	53.76	Mean	0.711
SD	189.3	SD	2.162
95% DL/2 (t) UCL	88.78	95% H-Stat (DL/2) UCL	22.85
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.069
		SD in Log Scale	3.932
		Mean in Original Scale	53.54
		SD in Original Scale	189.4
		95% Percentile Bootstrap UCL	88.21
		95% BCA Bootstrap UCL	101.7

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.285	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	410.5		
nu star	21.11		
A-D Test Statistic	3.587	**Nonparametric Statistics**	
5% A-D Critical Value	0.861	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.861	Mean	54.04
5% K-S Critical Value	0.158	SD	188.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	21.19
		95% KM (t) UCL	89.3
Assuming Gamma Distribution		95% KM (z) UCL	88.89
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	89.03
Minimum	1E-09	95% KM (bootstrap t) UCL	124.1
Maximum	1377	95% KM (BCA) UCL	91.6
Mean	211.3	95% KM (Percentile Bootstrap) UCL	91.2
Median	5.7	95% KM (Chebyshev) UCL	146.4
SD	356.1	97.5% KM (Chebyshev) UCL	186.4
k star	0.117	99% KM (Chebyshev) UCL	264.9
Theta star	1803		
Nu star	18.98	**Potential UCLs to Use**	
AppChi2	10.1	97.5% KM (Chebyshev) UCL	186.4
95% Gamma Approximate UCL	396.9		
95% Adjusted Gamma UCL	401.6		

Note: DL/2 is not a recommended method.

	General UCL Statistics for Data Sets with Non-Detects		
User Selected Options			
From File	C:\Documents and Settings\sselden\Desktop\cenco\Area 4 0-0.5 proucl input.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Result (1,2,4-trimethylbenzene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	20
		Percent Non-Detects	76.92%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2	Minimum Detected	0.693
Maximum Detected	9200	Maximum Detected	9.127
Mean of Detected	1974	Mean of Detected	4.121
SD of Detected	3689	SD of Detected	3.515
Minimum Non-Detect	0.97	Minimum Non-Detect	-0.0305
Maximum Non-Detect	400	Maximum Non-Detect	5.991
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.649	Shapiro Wilk Test Statistic	0.86
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	463.8	Mean	1.115
SD	1853	SD	2.536
95% DL/2 (t) UCL	1085	95% H-Stat (DL/2) UCL	462.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-5.074
		SD in Log Scale	5.869
		Mean in Original Scale	455.4
		SD in Original Scale	1855
		95% Percentile Bootstrap UCL	1162
		95% BCA Bootstrap UCL	1617

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.216	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	9120		
nu star	2.597		
A-D Test Statistic	0.652	**Nonparametric Statistics**	
5% A-D Critical Value	0.799	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.799	Mean	457
5% K-S Critical Value	0.363	SD	1818
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	390.7
		95% KM (t) UCL	1124
Assuming Gamma Distribution		95% KM (z) UCL	1100
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1077
Minimum	1E-09	95% KM (bootstrap t) UCL	166115
Maximum	9200	95% KM (BCA) UCL	1519
Mean	1567	95% KM (Percentile Bootstrap) UCL	1166
Median	1602	95% KM (Chebyshev) UCL	2160
SD	1850	97.5% KM (Chebyshev) UCL	2897
k star	0.16	99% KM (Chebyshev) UCL	4344
Theta star	9788		
Nu star	8.325	**Potential UCLs to Use**	
AppChi2	2.925	95% KM (t) UCL	1124
95% Gamma Approximate UCL	4461		
95% Adjusted Gamma UCL	4802		
Note: DL/2 is not a recommended method.			

Result (1-methylnaphthalene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	20
		Percent Non-Detects	76.92%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	29	Minimum Detected	3.367
Maximum Detected	250000	Maximum Detected	12.43
Mean of Detected	42526	Mean of Detected	6.88
SD of Detected	101648	SD of Detected	3.244
Minimum Non-Detect	23	Minimum Non-Detect	3.135
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	22
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	84.62%
Warning: There are only 6 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.506	Shapiro Wilk Test Statistic	0.927
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	9856	Mean	4.533
SD	48984	SD	2.044
95% DL/2 (t) UCL	26265	95% H-Stat (DL/2) UCL	2781
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.891
		SD in Log Scale	4.378
		Mean in Original Scale	9820
		SD in Original Scale	48992
		95% Percentile Bootstrap UCL	29033
		95% BCA Bootstrap UCL	38800

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.209	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	203605		
nu star	2.506		
A-D Test Statistic	0.749	**Nonparametric Statistics**	
5% A-D Critical Value	0.804	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.804	Mean	9842
5% K-S Critical Value	0.364	SD	48036
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	10320
		95% KM (t) UCL	27469
Assuming Gamma Distribution		95% KM (z) UCL	26816
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	26218
Minimum	1E-09	95% KM (bootstrap t) UCL	1148057
Maximum	250000	95% KM (BCA) UCL	38502
Mean	28564	95% KM (Percentile Bootstrap) UCL	29077
Median	1E-09	95% KM (Chebyshev) UCL	54825
SD	67031	97.5% KM (Chebyshev) UCL	74289
k star	0.0703	99% KM (Chebyshev) UCL	112522
Theta star	406578		
Nu star	3.653	**Potential UCLs to Use**	
AppChi2	0.59	95% KM (t) UCL	27469
95% Gamma Approximate UCL	176957		
95% Adjusted Gamma UCL	201450		
Note: DL/2 is not a recommended method.			

Result (2-butanone)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	15
		Percent Non-Detects	57.69%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	22	Minimum Detected	3.091
Maximum Detected	100	Maximum Detected	4.605
Mean of Detected	44	Mean of Detected	3.659
SD of Detected	25.57	SD of Detected	0.498
Minimum Non-Detect	16	Minimum Non-Detect	2.773
Maximum Non-Detect	4000	Maximum Non-Detect	8.294
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.771	Shapiro Wilk Test Statistic	0.856
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	164.5	Mean	3.406
SD	463	SD	1.478
95% DL/2 (t) UCL	319.6	95% H-Stat (DL/2) UCL	231.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.942
		SD in Log Scale	0.748
		Mean in Original Scale	25.46
		SD in Original Scale	23.09
		95% Percentile Bootstrap UCL	33.24
		95% BCA Bootstrap UCL	34.78
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.083	**Data appear Lognormal at 5% Significance Level**	
Theta Star	14.27		
nu star	67.83		
A-D Test Statistic	0.966	**Nonparametric Statistics**	
5% A-D Critical Value	0.732	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.732	Mean	32.52
5% K-S Critical Value	0.256	SD	20.12
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.401
		95% KM (t) UCL	40.04
Assuming Gamma Distribution		95% KM (z) UCL	39.76
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	38.95
Minimum	22	95% KM (bootstrap t) UCL	44.44
Maximum	100	95% KM (BCA) UCL	42.33
Mean	44.71	95% KM (Percentile Bootstrap) UCL	41
Median	43.9	95% KM (Chebyshev) UCL	51.7
SD	16.45	97.5% KM (Chebyshev) UCL	60
k star	8.191	99% KM (Chebyshev) UCL	76.31
Theta star	5.458		
Nu star	425.9	**Potential UCLs to Use**	
AppChi2	379.1	95% KM (t) UCL	40.04
95% Gamma Approximate UCL	50.23	95% KM (% Bootstrap) UCL	41
95% Adjusted Gamma UCL	50.62		
Note: DL/2 is not a recommended method.			

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	45	Minimum Detected	3.807
Maximum Detected	320000	Maximum Detected	12.68
Mean of Detected	65508	Mean of Detected	7.486
SD of Detected	142278	SD of Detected	3.543
Minimum Non-Detect	23	Minimum Non-Detect	3.135
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.46%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.564	Shapiro Wilk Test Statistic	0.925
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12644	Mean	4.566
SD	62697	SD	2.122
95% DL/2 (t) UCL	33647	95% H-Stat (DL/2) UCL	3709
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.433
		SD in Log Scale	4.753
		Mean in Original Scale	12608
		SD in Original Scale	62704
		95% Percentile Bootstrap UCL	37103
		95% BCA Bootstrap UCL	49650

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.215	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	304985		
nu star	2.148		
A-D Test Statistic	0.535	**Nonparametric Statistics**	
5% A-D Critical Value	0.774	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.774	Mean	12639
5% K-S Critical Value	0.388	SD	61480
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	13480
		95% KM (t) UCL	35666
Assuming Gamma Distribution		95% KM (z) UCL	34813
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	33612
Minimum	1E-09	95% KM (bootstrap t) UCL	965868
Maximum	667205	95% KM (BCA) UCL	49724
Mean	86675	95% KM (Percentile Bootstrap) UCL	37218
Median	10561	95% KM (Chebyshev) UCL	71399
SD	159805	97.5% KM (Chebyshev) UCL	96824
k star	0.0943	99% KM (Chebyshev) UCL	146767
Theta star	918657		
Nu star	4.906	**Potential UCLs to Use**	
AppChi2	1.109	95% KM (t) UCL	35666
95% Gamma Approximate UCL	383418		
95% Adjusted Gamma UCL	426617		
Note: DL/2 is not a recommended method.			

Result (acetone)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	15
Number of Distinct Detected Data	8	Number of Non-Detect Data	11
		Percent Non-Detects	42.31%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	65	Minimum Detected	4.174
Maximum Detected	200	Maximum Detected	5.298
Mean of Detected	111.6	Mean of Detected	4.659
SD of Detected	38.28	SD of Detected	0.35
Minimum Non-Detect	40	Minimum Non-Detect	3.689
Maximum Non-Detect	10000	Maximum Non-Detect	9.21
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.911	Shapiro Wilk Test Statistic	0.902
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	626.6	Mean	5.278
SD	1159	SD	1.498
95% DL/2 (t) UCL	1015	95% H-Stat (DL/2) UCL	2540
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.529
		SD in Log Scale	0.36
		Mean in Original Scale	98.51
		SD in Original Scale	35.17
		95% Percentile Bootstrap UCL	110.3
		95% BCA Bootstrap UCL	110.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	7.349	**Data appear Normal at 5% Significance Level**	
Theta Star	15.19		
nu star	220.5		
A-D Test Statistic	0.599	**Nonparametric Statistics**	
5% A-D Critical Value	0.738	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.738	Mean	103.8
5% K-S Critical Value	0.222	SD	37.97
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	9.263
		95% KM (t) UCL	119.7
Assuming Gamma Distribution		95% KM (z) UCL	119.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	119.7
Minimum	54.95	95% KM (bootstrap t) UCL	121.6
Maximum	200	95% KM (BCA) UCL	119.1
Mean	110	95% KM (Percentile Bootstrap) UCL	119.7
Median	120	95% KM (Chebyshev) UCL	144.2
SD	35.88	97.5% KM (Chebyshev) UCL	161.7
k star	7.77	99% KM (Chebyshev) UCL	196
Theta star	14.16		
Nu star	404	**Potential UCLs to Use**	
AppChi2	358.5	95% KM (t) UCL	119.7
95% Gamma Approximate UCL	124	95% KM (Percentile Bootstrap) UCL	119.7
95% Adjusted Gamma UCL	125		
Note: DL/2 is not a recommended method.			

Result (anthracene)

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	110	Minimum Detected	4.7
Maximum Detected	510	Maximum Detected	6.234
Mean of Detected	234	Mean of Detected	5.267
SD of Detected	170.7	SD of Detected	0.662
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.808	Shapiro Wilk Test Statistic	0.865
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	507	Mean	4.199
SD	2143	SD	1.428
95% DL/2 (t) UCL	1225	95% H-Stat (DL/2) UCL	386.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.316
		SD in Log Scale	1.152
		Mean in Original Scale	61.44
		SD in Original Scale	110.2
		95% Percentile Bootstrap UCL	101.1
		95% BCA Bootstrap UCL	115.4

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.256	**Data appear Normal at 5% Significance Level**	
Theta Star	186.3		
nu star	12.56		
A-D Test Statistic	0.491	**Nonparametric Statistics**	
5% A-D Critical Value	0.683	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.683	Mean	135
5% K-S Critical Value	0.36	SD	84.35
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	18.87
		95% KM (t) UCL	167.3
Assuming Gamma Distribution		95% KM (z) UCL	166.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	160.3
Minimum	110	95% KM (bootstrap t) UCL	301.1
Maximum	510	95% KM (BCA) UCL	308.3
Mean	235.1	95% KM (Percentile Bootstrap) UCL	184.6
Median	235.4	95% KM (Chebyshev) UCL	217.3
SD	69.51	97.5% KM (Chebyshev) UCL	252.9
k star	11.88	99% KM (Chebyshev) UCL	322.8
Theta star	19.79		
Nu star	617.6	**Potential UCLs to Use**	
AppChi2	561	95% KM (t) UCL	167.3
95% Gamma Approximate UCL	258.8	95% KM (Percentile Bootstrap) UCL	184.6
95% Adjusted Gamma UCL	260.5		
Note: DL/2 is not a recommended method.			

Result (arsenic)			
General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	26
Raw Statistics		**Log-transformed Statistics**	
Minimum	3.14	Minimum of Log Data	1.144
Maximum	11.6	Maximum of Log Data	2.451
Mean	6.7	Mean of log Data	1.856
Median	6.355	SD of log Data	0.316
SD	2.029		
Coefficient of Variation	0.303		
Skewness	0.411		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.973	Shapiro Wilk Test Statistic	0.97
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	7.38	95% H-UCL	7.548
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8.561
95% Adjusted-CLT UCL	7.389	97.5% Chebyshev (MVUE) UCL	9.361
95% Modified-t UCL	7.386	99% Chebyshev (MVUE) UCL	10.93
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	9.755	**Data appear Normal at 5% Significance Level**	
Theta Star	0.687		
nu star	507.2		
Approximate Chi Square Value (.05)	456	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	7.355
Adjusted Chi Square Value	452.8	95% Jackknife UCL	7.38
		95% Standard Bootstrap UCL	7.345
Anderson-Darling Test Statistic	0.212	95% Bootstrap-t UCL	7.422
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	7.393
Kolmogorov-Smirnov Test Statistic	0.078	95% Percentile Bootstrap UCL	7.368
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	7.35
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8.435
		97.5% Chebyshev(Mean, Sd) UCL	9.186
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10.66
95% Approximate Gamma UCL	7.453		
95% Adjusted Gamma UCL	7.506		
Potential UCL to Use		Use 95% Student's-t UCL	7.38

Result (barium)

General Statistics

Number of Valid Observations	26	Number of Distinct Observations	23

Raw Statistics		**Log-transformed Statistics**	
Minimum	87.1	Minimum of Log Data	4.467
Maximum	562	Maximum of Log Data	6.332
Mean	181	Mean of log Data	5.128
Median	158	SD of log Data	0.349
SD	87.8		
Coefficient of Variation	0.485		
Skewness	3.463		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.634	Shapiro Wilk Test Statistic	0.879
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	210.4	95% H-UCL	203.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	233.3
95% Adjusted-CLT UCL	221.8	97.5% Chebyshev (MVUE) UCL	256.8
95% Modified-t UCL	212.4	99% Chebyshev (MVUE) UCL	303.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.475	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	27.95		
nu star	336.7		
Approximate Chi Square Value (.05)	295.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	209.3
Adjusted Chi Square Value	292.6	95% Jackknife UCL	210.4
		95% Standard Bootstrap UCL	209.1
Anderson-Darling Test Statistic	1.365	95% Bootstrap-t UCL	236.3
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	330.7
Kolmogorov-Smirnov Test Statistic	0.216	95% Percentile Bootstrap UCL	210.6
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	226.6
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	256.1
		97.5% Chebyshev(Mean, Sd) UCL	288.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	352.3
95% Approximate Gamma UCL	206.5		
95% Adjusted Gamma UCL	208.3		
Potential UCL to Use		Use 95% Student's-t UCL	210.4
		or 95% Modified-t UCL	212.4

Result (benzene)

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	3500	Maximum Detected	8.161
Mean of Detected	867.2	Mean of Detected	3.863
SD of Detected	1512	SD of Detected	3.468
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	27	Maximum Non-Detect	3.296
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.694	Shapiro Wilk Test Statistic	0.933
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	167.7	Mean	0.286
SD	697.9	SD	2.359
95% DL/2 (t) UCL	401.5	95% H-Stat (DL/2) UCL	79.49
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.63
		SD in Log Scale	6.18
		Mean in Original Scale	166.8
		SD in Original Scale	698.1
		95% Percentile Bootstrap UCL	405.8
		95% BCA Bootstrap UCL	601

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.232	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	3746		
nu star	2.315		
A-D Test Statistic	0.367	**Nonparametric Statistics**	
5% A-D Critical Value	0.759	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.759	Mean	167.6
5% K-S Critical Value	0.385	SD	684.3
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	150.1
		95% KM (t) UCL	423.9
Assuming Gamma Distribution		95% KM (z) UCL	414.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	399.2
Minimum	1E-09	95% KM (bootstrap t) UCL	17793
Maximum	4139	95% KM (BCA) UCL	913.5
Mean	1013	95% KM (Percentile Bootstrap) UCL	501.1
Median	209	95% KM (Chebyshev) UCL	821.7
SD	1574	97.5% KM (Chebyshev) UCL	1105
k star	0.0975	99% KM (Chebyshev) UCL	1661
Theta star	10388		
Nu star	5.072	**Potential UCLs to Use**	
AppChi2	1.185	95% KM (t) UCL	423.9
95% Gamma Approximate UCL	4335		
95% Adjusted Gamma UCL	4811		
Note: DL/2 is not a recommended method.			

Result (benzo(a)anthracene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	110	Minimum Detected	4.7
Maximum Detected	570	Maximum Detected	6.346
Mean of Detected	300	Mean of Detected	5.504
SD of Detected	200	SD of Detected	0.724
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.905	Shapiro Wilk Test Statistic	0.917
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	519.9	Mean	4.248
SD	2142	SD	1.47
95% DL/2 (t) UCL	1237	95% H-Stat (DL/2) UCL	426.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.175
		SD in Log Scale	1.378
		Mean in Original Scale	71.81
		SD in Original Scale	139.4
		95% Percentile Bootstrap UCL	118.4
		95% BCA Bootstrap UCL	135.6

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.198	**Data appear Normal at 5% Significance Level**	
Theta Star	250.4		
nu star	11.98		
A-D Test Statistic	0.32	**Nonparametric Statistics**	
5% A-D Critical Value	0.683	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.683	Mean	148.1
5% K-S Critical Value	0.36	SD	110.3
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	24.67
		95% KM (t) UCL	190.3
Assuming Gamma Distribution		95% KM (z) UCL	188.7
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	180.9
Minimum	110	95% KM (bootstrap t) UCL	190.7
Maximum	570	95% KM (BCA) UCL	445.4
Mean	304	95% KM (Percentile Bootstrap) UCL	285.6
Median	300.6	95% KM (Chebyshev) UCL	255.7
SD	101.8	97.5% KM (Chebyshev) UCL	302.2
k star	7.21	99% KM (Chebyshev) UCL	393.6
Theta star	42.16		
Nu star	374.9	**Potential UCLs to Use**	
AppChi2	331	95% KM (t) UCL	190.3
95% Gamma Approximate UCL	344.3	95% KM (Percentile Bootstrap) UCL	285.6
95% Adjusted Gamma UCL	347.1		
Note: DL/2 is not a recommended method.			

Result (benzo(a)pyrene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	200	Minimum Detected	5.298
Maximum Detected	480	Maximum Detected	6.174
Mean of Detected	304	Mean of Detected	5.666
SD of Detected	112.8	SD of Detected	0.348
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.888	Shapiro Wilk Test Statistic	0.933
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	520.4	Mean	4.275
SD	2140	SD	1.478
95% DL/2 (t) UCL	1237	95% H-Stat (DL/2) UCL	457.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.443
		SD in Log Scale	0.716
		Mean in Original Scale	113.4
		SD in Original Scale	107.4
		95% Percentile Bootstrap UCL	150.5
		95% BCA Bootstrap UCL	160.9

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	4.151	**Data appear Normal at 5% Significance Level**	
Theta Star	73.23		
nu star	41.51		
A-D Test Statistic	0.344	**Nonparametric Statistics**	
5% A-D Critical Value	0.679	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.679	Mean	220.8
5% K-S Critical Value	0.358	SD	61.38
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	13.72
		95% KM (t) UCL	244.2
Assuming Gamma Distribution		95% KM (z) UCL	243.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	248.9
Minimum	200	95% KM (bootstrap t) UCL	275.8
Maximum	480	95% KM (BCA) UCL	355.2
Mean	303.7	95% KM (Percentile Bootstrap) UCL	281.2
Median	304.5	95% KM (Chebyshev) UCL	280.6
SD	46.72	97.5% KM (Chebyshev) UCL	306.5
k star	42.21	99% KM (Chebyshev) UCL	357.4
Theta star	7.194		
Nu star	2195	**Potential UCLs to Use**	
AppChi2	2087	95% KM (t) UCL	244.2
95% Gamma Approximate UCL	319.4	95% KM (Percentile Bootstrap) UCL	281.2
95% Adjusted Gamma UCL	320.4		
Note: DL/2 is not a recommended method.			

Result (benzo(b)fluoranthene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	4	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	110	Minimum Detected	4.7
Maximum Detected	470	Maximum Detected	6.153
Mean of Detected	240	Mean of Detected	5.261
SD of Detected	175.8	SD of Detected	0.732
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.762	Shapiro Wilk Test Statistic	0.753
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	508.3	Mean	4.201
SD	2143	SD	1.432
95% DL/2 (t) UCL	1226	95% H-Stat (DL/2) UCL	414.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.212
		SD in Log Scale	1.224
		Mean in Original Scale	61
		SD in Original Scale	113.9
		95% Percentile Bootstrap UCL	98.85
		95% BCA Bootstrap UCL	112.6

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.107	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	216.7		
nu star	11.07		
A-D Test Statistic	0.754	**Nonparametric Statistics**	
5% A-D Critical Value	0.684	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.684	Mean	136.1
5% K-S Critical Value	0.36	SD	87.44
Data not Gamma Distributed at 5% Significance Level		SE of Mean	19.55
		95% KM (t) UCL	169.5
Assuming Gamma Distribution		95% KM (z) UCL	168.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	166.6
Minimum	110	95% KM (bootstrap t) UCL	799.8
Maximum	470	95% KM (BCA) UCL	393.3
Mean	240.7	95% KM (Percentile Bootstrap) UCL	195.8
Median	240	95% KM (Chebyshev) UCL	221.3
SD	70.63	97.5% KM (Chebyshev) UCL	258.2
k star	10.57	99% KM (Chebyshev) UCL	330.6
Theta star	22.76		
Nu star	549.8	**Potential UCLs to Use**	
AppChi2	496.4	95% KM (t) UCL	169.5
95% Gamma Approximate UCL	266.6	95% KM (% Bootstrap) UCL	195.8
95% Adjusted Gamma UCL	268.4		
Note: DL/2 is not a recommended method.			

Result (benzo(ghi)perylene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	19
		Percent Non-Detects	73.08%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	58	Minimum Detected	4.06
Maximum Detected	530	Maximum Detected	6.273
Mean of Detected	234.1	Mean of Detected	5.186
SD of Detected	167.3	SD of Detected	0.849
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 7 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Test Statistic	0.91
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	523.5	Mean	4.36
SD	2140	SD	1.416
95% DL/2 (t) UCL	1240	95% H-Stat (DL/2) UCL	387.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.59
		SD in Log Scale	1.245
		Mean in Original Scale	81.89
		SD in Original Scale	126
		95% Percentile Bootstrap UCL	123.8
		95% BCA Bootstrap UCL	137.4

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.241	**Data appear Normal at 5% Significance Level**	
Theta Star	188.6		
nu star	17.38		
A-D Test Statistic	0.304	**Nonparametric Statistics**	
5% A-D Critical Value	0.715	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.715	Mean	108.1
5% K-S Critical Value	0.315	SD	113.7
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	24.62
		95% KM (t) UCL	150.2
Assuming Gamma Distribution		95% KM (z) UCL	148.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	146.5
Minimum	58	95% KM (bootstrap t) UCL	160.8
Maximum	530	95% KM (BCA) UCL	268.3
Mean	234.3	95% KM (Percentile Bootstrap) UCL	195.8
Median	240.6	95% KM (Chebyshev) UCL	215.5
SD	90.85	97.5% KM (Chebyshev) UCL	261.9
k star	5.273	99% KM (Chebyshev) UCL	353.1
Theta star	44.43		
Nu star	274.2	**Potential UCLs to Use**	
AppChi2	236.9	95% KM (t) UCL	150.2
95% Gamma Approximate UCL	271.3	95% KM (Percentile Bootstrap) UCL	195.8
95% Adjusted Gamma UCL	273.9		
Note: DL/2 is not a recommended method.			

Result (beryllium)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	25
Number of Distinct Detected Data	25	Number of Non-Detect Data	1
		Percent Non-Detects	3.85%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.285	Minimum Detected	-1.255
Maximum Detected	1.05	Maximum Detected	0.0488
Mean of Detected	0.56	Mean of Detected	-0.625
SD of Detected	0.181	SD of Detected	0.305
Minimum Non-Detect	0.276	Minimum Non-Detect	-1.287
Maximum Non-Detect	0.276	Maximum Non-Detect	-1.287
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.881	Shapiro Wilk Test Statistic	0.951
5% Shapiro Wilk Critical Value	0.918	5% Shapiro Wilk Critical Value	0.918
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.544	Mean	-0.678
SD	0.195	SD	0.4
95% DL/2 (t) UCL	0.609	95% H-Stat (DL/2) UCL	0.618
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.546	Mean in Log Scale	-0.654
SD	0.188	SD in Log Scale	0.332
95% MLE (t) UCL	0.609	Mean in Original Scale	0.548
95% MLE (Tiku) UCL	0.608	SD in Original Scale	0.187
		95% Percentile Bootstrap UCL	0.607
		95% BCA Bootstrap UCL	0.622
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	9.841	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.0569		
nu star	492		
A-D Test Statistic	0.613	**Nonparametric Statistics**	
5% A-D Critical Value	0.745	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.745	Mean	0.549
5% K-S Critical Value	0.174	SD	0.181
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0363
		95% KM (t) UCL	0.611
Assuming Gamma Distribution		95% KM (z) UCL	0.609
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.611
Minimum	0.148	95% KM (bootstrap t) UCL	0.624
Maximum	1.05	95% KM (BCA) UCL	0.607
Mean	0.544	95% KM (Percentile Bootstrap) UCL	0.609
Median	0.526	95% KM (Chebyshev) UCL	0.708
SD	0.195	97.5% KM (Chebyshev) UCL	0.776
k star	6.841	99% KM (Chebyshev) UCL	0.911
Theta star	0.0795		
Nu star	355.7	**Potential UCLs to Use**	
AppChi2	313	95% KM (BCA) UCL	0.607
95% Gamma Approximate UCL	0.618		
95% Adjusted Gamma UCL	0.624		
Note: DL/2 is not a recommended method.			

Result (cadmium)

General Statistics

Number of Valid Data	26	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	17
		Percent Non-Detects	65.38%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.625	Minimum Detected	-0.47
Maximum Detected	1.66	Maximum Detected	0.507
Mean of Detected	0.897	Mean of Detected	-0.158
SD of Detected	0.335	SD of Detected	0.315
Minimum Non-Detect	0.516	Minimum Non-Detect	-0.662
Maximum Non-Detect	0.66	Maximum Non-Detect	-0.416
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	19
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	73.08%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.76	Shapiro Wilk Test Statistic	0.842
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.491	Mean	-0.899
SD	0.356	SD	0.58
95% DL/2 (t) UCL	0.61	95% H-Stat (DL/2) UCL	0.518
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.304	Mean in Log Scale	-0.8
SD	0.558	SD in Log Scale	0.513
95% MLE (t) UCL	0.491	Mean in Original Scale	0.52
95% MLE (Tiku) UCL	0.66	SD in Original Scale	0.338
		95% Percentile Bootstrap UCL	0.632
		95% BCA Bootstrap UCL	0.655

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	6.936	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.129		
nu star	124.8		
A-D Test Statistic	0.795	**Nonparametric Statistics**	
5% A-D Critical Value	0.722	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.722	Mean	0.719
5% K-S Critical Value	0.279	SD	0.226
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0471
		95% KM (t) UCL	0.8
Assuming Gamma Distribution		95% KM (z) UCL	0.797
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.788
Minimum	0.625	95% KM (bootstrap t) UCL	0.928
Maximum	1.66	95% KM (BCA) UCL	0.884
Mean	0.898	95% KM (Percentile Bootstrap) UCL	0.83
Median	0.899	95% KM (Chebyshev) UCL	0.925
SD	0.19	97.5% KM (Chebyshev) UCL	1.013
k star	25.91	99% KM (Chebyshev) UCL	1.188
Theta star	0.0347		
Nu star	1347	**Potential UCLs to Use**	
AppChi2	1263	95% KM (t) UCL	0.8
95% Gamma Approximate UCL	0.958	95% KM (% Bootstrap) UCL	0.83
95% Adjusted Gamma UCL	0.962		
Note: DL/2 is not a recommended method.			

Result (chromium)			
General Statistics			
Number of Valid Observations	26	Number of Distinct Observations	26
Raw Statistics		**Log-transformed Statistics**	
Minimum	13.7	Minimum of Log Data	2.617
Maximum	225	Maximum of Log Data	5.416
Mean	45.8	Mean of log Data	3.629
Median	35.6	SD of log Data	0.567
SD	40.7		
Coefficient of Variation	0.888		
Skewness	3.7		
Relevant UCL Statistics			
Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.583	Shapiro Wilk Test Statistic	0.932
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	59.44	95% H-UCL	55.61
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	66.39
95% Adjusted-CLT UCL	65.12	97.5% Chebyshev (MVUE) UCL	76.09
95% Modified-t UCL	60.4	99% Chebyshev (MVUE) UCL	95.16
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.432	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	18.83		
nu star	126.5		
Approximate Chi Square Value (.05)	101.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	58.93
Adjusted Chi Square Value	100	95% Jackknife UCL	59.44
		95% Standard Bootstrap UCL	59.13
Anderson-Darling Test Statistic	1.171	95% Bootstrap-t UCL	75.37
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	114.7
Kolmogorov-Smirnov Test Statistic	0.169	95% Percentile Bootstrap UCL	60.2
Kolmogorov-Smirnov 5% Critical Value	0.173	95% BCA Bootstrap UCL	68.14
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	80.59
		97.5% Chebyshev(Mean, Sd) UCL	95.64
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	125.2
95% Approximate Gamma UCL	57.07		
95% Adjusted Gamma UCL	57.92		
Potential UCL to Use		Use 95% Approximate Gamma UCL	57.07

Result (chrysene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	14
		Percent Non-Detects	53.85%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	39	Minimum Detected	3.664
Maximum Detected	650	Maximum Detected	6.477
Mean of Detected	321.8	Mean of Detected	5.369
SD of Detected	235.3	SD of Detected	1.071
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Test Statistic	0.859
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	598.3	Mean	4.71
SD	2132	SD	1.531
95% DL/2 (t) UCL	1312	95% H-Stat (DL/2) UCL	802.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	4.241
		SD in Log Scale	1.38
		Mean in Original Scale	166.2
		SD in Original Scale	214.9
		95% Percentile Bootstrap UCL	235.8
		95% BCA Bootstrap UCL	244.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.089	**Data appear Normal at 5% Significance Level**	
Theta Star	295.5		
nu star	26.13		
A-D Test Statistic	0.623	**Nonparametric Statistics**	
5% A-D Critical Value	0.748	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.748	Mean	177.4
5% K-S Critical Value	0.25	SD	209
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	43.73
		95% KM (t) UCL	252.1
Assuming Gamma Distribution		95% KM (z) UCL	249.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	248.5
Minimum	39	95% KM (bootstrap t) UCL	262.4
Maximum	650	95% KM (BCA) UCL	269
Mean	322.8	95% KM (Percentile Bootstrap) UCL	254.2
Median	331	95% KM (Chebyshev) UCL	368
SD	158.7	97.5% KM (Chebyshev) UCL	450.5
k star	2.482	99% KM (Chebyshev) UCL	612.6
Theta star	130		
Nu star	129.1	**Potential UCLs to Use**	
AppChi2	103.8	95% KM (t) UCL	252.1
95% Gamma Approximate UCL	401.3	95% KM (Percentile Bootstrap) UCL	254.2
95% Adjusted Gamma UCL	407.2		
Note: DL/2 is not a recommended method.			

Result (cobalt)

General Statistics

Number of Valid Observations	26	Number of Distinct Observations	23

Raw Statistics		**Log-transformed Statistics**	
Minimum	6.29	Minimum of Log Data	1.839
Maximum	17.6	Maximum of Log Data	2.868
Mean	11.07	Mean of log Data	2.377
Median	10.6	SD of log Data	0.243
SD	2.674		
Coefficient of Variation	0.242		
Skewness	0.667		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.94	Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	11.97	95% H-UCL	12.09
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13.4
95% Adjusted-CLT UCL	12.01	97.5% Chebyshev (MVUE) UCL	14.4
95% Modified-t UCL	11.98	99% Chebyshev (MVUE) UCL	16.37
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	16.03	**Data appear Normal at 5% Significance Level**	
Theta Star	0.691		
nu star	833.8		
Approximate Chi Square Value (.05)	767.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	11.93
Adjusted Chi Square Value	763.6	95% Jackknife UCL	11.97
		95% Standard Bootstrap UCL	11.92
Anderson-Darling Test Statistic	0.414	95% Bootstrap-t UCL	12.06
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	12.13
Kolmogorov-Smirnov Test Statistic	0.103	95% Percentile Bootstrap UCL	11.96
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	11.97
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13.36
		97.5% Chebyshev(Mean, Sd) UCL	14.35
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	16.29
95% Approximate Gamma UCL	12.02		
95% Adjusted Gamma UCL	12.09		
Potential UCL to Use		Use 95% Student's-t UCL	11.97

Result (copper)

General Statistics

Number of Valid Observations	26	Number of Distinct Observations	24

Raw Statistics		**Log-transformed Statistics**	
Minimum	21.6	Minimum of Log Data	3.073
Maximum	401	Maximum of Log Data	5.994
Mean	65.77	Mean of log Data	3.927
Median	43.85	SD of log Data	0.616
SD	74.31		
Coefficient of Variation	1.13		
Skewness	4.008		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.496	Shapiro Wilk Test Statistic	0.841
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	90.66	95% H-UCL	79.04
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	94.84
95% Adjusted-CLT UCL	102	97.5% Chebyshev (MVUE) UCL	109.6
95% Modified-t UCL	92.57	99% Chebyshev (MVUE) UCL	138.5
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.865	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	35.27		
nu star	96.96		
Approximate Chi Square Value (.05)	75.24	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	89.74
Adjusted Chi Square Value	73.98	95% Jackknife UCL	90.66
		95% Standard Bootstrap UCL	89.06
Anderson-Darling Test Statistic	2.261	95% Bootstrap-t UCL	136.8
Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	180.9
Kolmogorov-Smirnov Test Statistic	0.245	95% Percentile Bootstrap UCL	92.87
Kolmogorov-Smirnov 5% Critical Value	0.173	95% BCA Bootstrap UCL	107.7
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	129.3
		97.5% Chebyshev(Mean, Sd) UCL	156.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	210.8
95% Approximate Gamma UCL	84.75		
95% Adjusted Gamma UCL	86.2		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	129.3

Result (fluoranthene)

General Statistics

Number of Valid Data	26	Number of Detected Data	7
Number of Distinct Detected Data	6	Number of Non-Detect Data	19
		Percent Non-Detects	73.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	110	Minimum Detected	4.7
Maximum Detected	710	Maximum Detected	6.565
Mean of Detected	307.1	Mean of Detected	5.457
SD of Detected	246.7	SD of Detected	0.785
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.813	Shapiro Wilk Test Statistic	0.87
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	540.6	Mean	4.35
SD	2140	SD	1.517
95% DL/2 (t) UCL	1258	95% H-Stat (DL/2) UCL	548.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.668
		SD in Log Scale	1.281
		Mean in Original Scale	99.85
		SD in Original Scale	176.6
		95% Percentile Bootstrap UCL	160.2
		95% BCA Bootstrap UCL	176.5

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.237	**Data appear Normal at 5% Significance Level**	
Theta Star	248.2		
nu star	17.32		
A-D Test Statistic	0.52	**Nonparametric Statistics**	
5% A-D Critical Value	0.715	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.715	Mean	165.8
5% K-S Critical Value	0.315	SD	149.7
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	32.37
		95% KM (t) UCL	221.1
Assuming Gamma Distribution		95% KM (z) UCL	219.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	218.1
Minimum	110	95% KM (bootstrap t) UCL	315.6
Maximum	710	95% KM (BCA) UCL	236.6
Mean	309.4	95% KM (Percentile Bootstrap) UCL	231.6
Median	307.3	95% KM (Chebyshev) UCL	306.9
SD	121.7	97.5% KM (Chebyshev) UCL	368
k star	6.156	99% KM (Chebyshev) UCL	488
Theta star	50.25		
Nu star	320.1	**Potential UCLs to Use**	
AppChi2	279.7	95% KM (t) UCL	221.1
95% Gamma Approximate UCL	354.1	95% KM (Percentile Bootstrap) UCL	231.6
95% Adjusted Gamma UCL	357.3		
Note: DL/2 is not a recommended method.			

Result (fluorene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	110	Minimum Detected	4.7
Maximum Detected	52000	Maximum Detected	10.86
Mean of Detected	10676	Mean of Detected	6.609
SD of Detected	23102	SD of Detected	2.509
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	23
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.46%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.561	Shapiro Wilk Test Statistic	0.803
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2095	Mean	4.287
SD	10180	SD	1.677
95% DL/2 (t) UCL	5505	95% H-Stat (DL/2) UCL	742.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.17
		SD in Log Scale	4.698
		Mean in Original Scale	2054
		SD in Original Scale	10188
		95% Percentile Bootstrap UCL	6048
		95% BCA Bootstrap UCL	10030

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.239	**Data appear Lognormal at 5% Significance Level**	
Theta Star	44684		
nu star	2.389		
A-D Test Statistic	0.861	**Nonparametric Statistics**	
5% A-D Critical Value	0.752	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.752	Mean	2142
5% K-S Critical Value	0.383	SD	9972
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2187
		95% KM (t) UCL	5877
Assuming Gamma Distribution		95% KM (z) UCL	5739
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5541
Minimum	1E-09	95% KM (bootstrap t) UCL	199128
Maximum	52000	95% KM (BCA) UCL	10090
Mean	9724	95% KM (Percentile Bootstrap) UCL	6149
Median	10132	95% KM (Chebyshev) UCL	11673
SD	10133	97.5% KM (Chebyshev) UCL	15797
k star	0.249	99% KM (Chebyshev) UCL	23898
Theta star	39109		
Nu star	12.93	**Potential UCLs to Use**	
AppChi2	5.845	99% KM (Chebyshev) UCL	23898
95% Gamma Approximate UCL	21509		
95% Adjusted Gamma UCL	22726		
Note: DL/2 is not a recommended method.			

Result (Indeno(1,2,3-cd)pyrene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	60	Minimum Detected	4.094
Maximum Detected	670	Maximum Detected	6.507
Mean of Detected	244.8	Mean of Detected	5.1
SD of Detected	249.7	SD of Detected	1.003
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	26
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
Warning: There are only 5 Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set			
the resulting calculations may not be reliable enough tp draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.787	Shapiro Wilk Test Statistic	0.898
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	510	Mean	4.231
SD	2143	SD	1.38
95% DL/2 (t) UCL	1228	95% H-Stat (DL/2) UCL	333.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.253
		SD in Log Scale	1.267
		Mean in Original Scale	66.01
		SD in Original Scale	135.1
		95% Percentile Bootstrap UCL	113.7
		95% BCA Bootstrap UCL	147.4
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.69	**Data appear Normal at 5% Significance Level**	
Theta Star	354.6		
nu star	6.903		
A-D Test Statistic	0.406	**Nonparametric Statistics**	
5% A-D Critical Value	0.687	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.687	Mean	98.22
5% K-S Critical Value	0.362	SD	124.4
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	27.94
		95% KM (t) UCL	145.9
Assuming Gamma Distribution		95% KM (z) UCL	144.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	139.7
Minimum	1E-09	95% KM (bootstrap t) UCL	198.3
Maximum	855.8	95% KM (BCA) UCL	302
Mean	296.4	95% KM (Percentile Bootstrap) UCL	238
Median	234.5	95% KM (Chebyshev) UCL	220
SD	236.2	97.5% KM (Chebyshev) UCL	272.7
k star	0.427	99% KM (Chebyshev) UCL	376.2
Theta star	693.7		
Nu star	22.22	**Potential UCLs to Use**	
AppChi2	12.5	95% KM (t) UCL	145.9
95% Gamma Approximate UCL	526.7	95% KM (Percentile Bootstrap) UCL	238
95% Adjusted Gamma UCL	547.8		
Note: DL/2 is not a recommended method.			

Result (lead)

General Statistics

Number of Valid Observations	26	Number of Distinct Observations	25

Raw Statistics		**Log-transformed Statistics**	
Minimum	10.6	Minimum of Log Data	2.361
Maximum	3810	Maximum of Log Data	8.245
Mean	244.2	Mean of log Data	4.465
Median	88	SD of log Data	1.107
SD	733.6		
Coefficient of Variation	3.004		
Skewness	4.965		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.285	Shapiro Wilk Test Statistic	0.881
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	490	95% H-UCL	286.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	324.9
95% Adjusted-CLT UCL	630.5	97.5% Chebyshev (MVUE) UCL	398.5
95% Modified-t UCL	513.3	99% Chebyshev (MVUE) UCL	543.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.555	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	440.2		
nu star	28.85		
Approximate Chi Square Value (.05)	17.59	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	480.9
Adjusted Chi Square Value	17.01	95% Jackknife UCL	490
		95% Standard Bootstrap UCL	477.3
Anderson-Darling Test Statistic	3.532	95% Bootstrap-t UCL	2768
Anderson-Darling 5% Critical Value	0.799	95% Hall's Bootstrap UCL	1502
Kolmogorov-Smirnov Test Statistic	0.335	95% Percentile Bootstrap UCL	526.2
Kolmogorov-Smirnov 5% Critical Value	0.18	95% BCA Bootstrap UCL	667.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	871.3
		97.5% Chebyshev(Mean, Sd) UCL	1143
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1676
95% Approximate Gamma UCL	400.5		
95% Adjusted Gamma UCL	414.2		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	1676

Result (mercury)

General Statistics

Number of Valid Data	26	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	6
		Percent Non-Detects	23.08%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.092	Minimum Detected	-2.386
Maximum Detected	132	Maximum Detected	4.883
Mean of Detected	6.973	Mean of Detected	-0.948
SD of Detected	29.43	SD of Detected	1.592
Minimum Non-Detect	0.0887	Minimum Non-Detect	-2.422
Maximum Non-Detect	0.098	Maximum Non-Detect	-2.323
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	7
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	19
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	26.92%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.244	Shapiro Wilk Test Statistic	0.703
5% Shapiro Wilk Critical Value	0.905	5% Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.374	Mean	-1.438
SD	25.83	SD	1.661
95% DL/2 (t) UCL	14.03	95% H-Stat (DL/2) UCL	2.625
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.653
		SD in Log Scale	1.914
		Mean in Original Scale	5.368
		SD in Original Scale	25.83
		95% Percentile Bootstrap UCL	15.48
		95% BCA Bootstrap UCL	20.59
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.243	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	28.73		
nu star	9.709		
A-D Test Statistic	5.009	**Nonparametric Statistics**	
5% A-D Critical Value	0.868	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.868	Mean	5.385
5% K-S Critical Value	0.212	SD	25.32
Data not Gamma Distributed at 5% Significance Level		SE of Mean	5.096
		95% KM (t) UCL	14.09
Assuming Gamma Distribution		95% KM (z) UCL	13.77
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	14.03
Minimum	1E-09	95% KM (bootstrap t) UCL	574.7
Maximum	132	95% KM (BCA) UCL	15.52
Mean	5.364	95% KM (Percentile Bootstrap) UCL	15.5
Median	0.155	95% KM (Chebyshev) UCL	27.6
SD	25.83	97.5% KM (Chebyshev) UCL	37.21
k star	0.124	99% KM (Chebyshev) UCL	56.09
Theta star	43.2		
Nu star	6.457	**Potential UCLs to Use**	
AppChi2	1.878	99% KM (Chebyshev) UCL	56.09
95% Gamma Approximate UCL	18.45		
95% Adjusted Gamma UCL	20.14		

Note: DL/2 is not a recommended method.

Result (molybdenum)

General Statistics

Number of Valid Data	26	Number of Detected Data	17
Number of Distinct Detected Data	17	Number of Non-Detect Data	9
		Percent Non-Detects	34.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.371	Minimum Detected	-0.992
Maximum Detected	13.9	Maximum Detected	2.632
Mean of Detected	3.228	Mean of Detected	0.614
SD of Detected	3.875	SD of Detected	1.083
Minimum Non-Detect	0.258	Minimum Non-Detect	-1.355
Maximum Non-Detect	0.297	Maximum Non-Detect	-1.214
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	34.62%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.709	Shapiro Wilk Test Statistic	0.961
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.159	Mean	-0.282
SD	3.444	SD	1.526
95% DL/2 (t) UCL	3.312	95% H-Stat (DL/2) UCL	5.021
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.053	Mean in Log Scale	-0.291
SD	4.529	SD in Log Scale	1.536
95% MLE (t) UCL	2.57	Mean in Original Scale	2.157
95% MLE (Tiku) UCL	2.687	SD in Original Scale	3.444
		95% Percentile Bootstrap UCL	3.267
		95% BCA Bootstrap UCL	3.767
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.888	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	3.636		
nu star	30.18		
A-D Test Statistic	0.531	**Nonparametric Statistics**	
5% A-D Critical Value	0.765	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765	Mean	2.239
5% K-S Critical Value	0.215	SD	3.33
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.673
		95% KM (t) UCL	3.389
Assuming Gamma Distribution		95% KM (z) UCL	3.346
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.375
Minimum	0.371	95% KM (bootstrap t) UCL	4.618
Maximum	13.9	95% KM (BCA) UCL	3.68
Mean	2.259	95% KM (Percentile Bootstrap) UCL	3.457
Median	0.779	95% KM (Chebyshev) UCL	5.173
SD	3.384	97.5% KM (Chebyshev) UCL	6.443
k star	0.765	99% KM (Chebyshev) UCL	8.937
Theta star	2.954		
Nu star	39.77	**Potential UCLs to Use**	
AppChi2	26.32	95% KM (BCA) UCL	3.68
95% Gamma Approximate UCL	3.414		
95% Adjusted Gamma UCL	3.51		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.2	Minimum Detected	1.163
Maximum Detected	1600	Maximum Detected	7.378
Mean of Detected	550.8	Mean of Detected	4.724
SD of Detected	651.9	SD of Detected	2.756
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1.3	Maximum Non-Detect	0.262
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	21
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.77%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.862	Shapiro Wilk Test Statistic	0.859
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	106.3	Mean	0.304
SD	341.9	SD	2.471
95% DL/2 (t) UCL	220.9	95% H-Stat (DL/2) UCL	135.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.829
		SD in Log Scale	5.415
		Mean in Original Scale	105.9
		SD in Original Scale	342.1
		95% Percentile Bootstrap UCL	224.3
		95% BCA Bootstrap UCL	292.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.298	**Data appear Normal at 5% Significance Level**	
Theta Star	1847		
nu star	2.983		
A-D Test Statistic	0.409	**Nonparametric Statistics**	
5% A-D Critical Value	0.723	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.723	Mean	108.5
5% K-S Critical Value	0.375	SD	334.6
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	73.37
		95% KM (t) UCL	233.8
Assuming Gamma Distribution		95% KM (z) UCL	229.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	217.7
Minimum	3.2	95% KM (bootstrap t) UCL	325.4
Maximum	1600	95% KM (BCA) UCL	704.6
Mean	550.8	95% KM (Percentile Bootstrap) UCL	598.5
Median	550.8	95% KM (Chebyshev) UCL	428.3
SD	260.8	97.5% KM (Chebyshev) UCL	566.7
k star	1.606	99% KM (Chebyshev) UCL	838.5
Theta star	343		
Nu star	83.5	**Potential UCLs to Use**	
AppChi2	63.44	95% KM (t) UCL	233.8
95% Gamma Approximate UCL	725	95% KM (Percentile Bootstrap) UCL	598.5
95% Adjusted Gamma UCL	738.5		

Note: DL/2 is not a recommended method.

Result (nickel)

General Statistics

Number of Valid Observations	26	Number of Distinct Observations	26

Raw Statistics		**Log-transformed Statistics**	
Minimum	10.4	Minimum of Log Data	2.342
Maximum	31.5	Maximum of Log Data	3.45
Mean	20.86	Mean of log Data	3.007
Median	20	SD of log Data	0.256
SD	5.109		
Coefficient of Variation	0.245		
Skewness	0.209		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.979	Shapiro Wilk Test Statistic	0.971
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	22.57	95% H-UCL	22.91
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	25.51
95% Adjusted-CLT UCL	22.55	97.5% Chebyshev (MVUE) UCL	27.51
95% Modified-t UCL	22.58	99% Chebyshev (MVUE) UCL	31.44
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	14.75	**Data appear Normal at 5% Significance Level**	
Theta Star	1.414		
nu star	767.2		
Approximate Chi Square Value (.05)	703.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	22.51
Adjusted Chi Square Value	699.9	95% Jackknife UCL	22.57
		95% Standard Bootstrap UCL	22.48
Anderson-Darling Test Statistic	0.231	95% Bootstrap-t UCL	22.59
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	22.54
Kolmogorov-Smirnov Test Statistic	0.0971	95% Percentile Bootstrap UCL	22.51
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	22.48
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	25.23
		97.5% Chebyshev(Mean, Sd) UCL	27.11
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	30.83
95% Approximate Gamma UCL	22.73		
95% Adjusted Gamma UCL	22.86		
Potential UCL to Use		Use 95% Student's-t UCL	22.57

Result (o-xylene)

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	2200	Maximum Detected	7.696
Mean of Detected	477.7	Mean of Detected	2.998
SD of Detected	965.8	SD of Detected	3.34
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.15%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.607	Shapiro Wilk Test Statistic	0.878
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	96.09	Mean	0.178
SD	430.9	SD	2.213
95% DL/2 (t) UCL	240.4	95% H-Stat (DL/2) UCL	62
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.412
		SD in Log Scale	5.39
		Mean in Original Scale	91.87
		SD in Original Scale	431.4
		95% Percentile Bootstrap UCL	260.9
		95% BCA Bootstrap UCL	423.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.224	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	2130		
nu star	2.243		
A-D Test Statistic	0.505	**Nonparametric Statistics**	
5% A-D Critical Value	0.765	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.765	Mean	93.05
5% K-S Critical Value	0.386	SD	422.8
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	92.73
		95% KM (t) UCL	251.4
Assuming Gamma Distribution		95% KM (z) UCL	245.6
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	237.5
Minimum	1.1	95% KM (bootstrap t) UCL	27699
Maximum	2200	95% KM (BCA) UCL	339.5
Mean	477.7	95% KM (Percentile Bootstrap) UCL	269.4
Median	477.7	95% KM (Chebyshev) UCL	497.2
SD	386.3	97.5% KM (Chebyshev) UCL	672.1
k star	0.868	99% KM (Chebyshev) UCL	1016
Theta star	550.4		
Nu star	45.13	**Potential UCLs to Use**	
AppChi2	30.72	95% KM (t) UCL	251.4
95% Gamma Approximate UCL	701.8		
95% Adjusted Gamma UCL	720.2		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3	Minimum Detected	1.099
Maximum Detected	3700	Maximum Detected	8.216
Mean of Detected	901.4	Mean of Detected	3.903
SD of Detected	1601	SD of Detected	3.32
Minimum Non-Detect	0.97	Minimum Non-Detect	-0.0305
Maximum Non-Detect	400	Maximum Non-Detect	5.991
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.683	Shapiro Wilk Test Statistic	0.835
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	181.8	Mean	0.906
SD	734.7	SD	2.266
95% DL/2 (t) UCL	427.9	95% H-Stat (DL/2) UCL	147.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.724
		SD in Log Scale	6.005
		Mean in Original Scale	173.4
		SD in Original Scale	735.7
		95% Percentile Bootstrap UCL	457.8
		95% BCA Bootstrap UCL	631.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.232	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	3893		
nu star	2.316		
A-D Test Statistic	0.529	**Nonparametric Statistics**	
5% A-D Critical Value	0.759	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.759	Mean	175.8
5% K-S Critical Value	0.385	SD	720.9
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	158.1
		95% KM (t) UCL	445.8
Assuming Gamma Distribution		95% KM (z) UCL	435.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	422
Minimum	1E-09	95% KM (bootstrap t) UCL	45413
Maximum	3700	95% KM (BCA) UCL	901.9
Mean	173.4	95% KM (Percentile Bootstrap) UCL	602
Median	1E-09	95% KM (Chebyshev) UCL	864.8
SD	735.7	97.5% KM (Chebyshev) UCL	1163
k star	0.0628	99% KM (Chebyshev) UCL	1748
Theta star	2760		
Nu star	3.266	**Potential UCLs to Use**	
AppChi2	0.455	95% KM (t) UCL	445.8
95% Gamma Approximate UCL	1243		
95% Adjusted Gamma UCL	1427		

Note: DL/2 is not a recommended method.

Result (phenanthrene)

General Statistics

Number of Valid Data	26	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	18
		Percent Non-Detects	69.23%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	34	Minimum Detected	3.526
Maximum Detected	190000	Maximum Detected	12.15
Mean of Detected	24272	Mean of Detected	6.589
SD of Detected	66967	SD of Detected	2.571
Minimum Non-Detect	23	Minimum Non-Detect	3.135
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	21
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.77%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.426	Shapiro Wilk Test Statistic	0.867
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7505	Mean	4.613
SD	37224	SD	2.016
95% DL/2 (t) UCL	19975	95% H-Stat (DL/2) UCL	2772
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.436
		SD in Log Scale	4.116
		Mean in Original Scale	7470
		SD in Original Scale	37231
		95% Percentile Bootstrap UCL	22041
		95% BCA Bootstrap UCL	29416
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.214	**Data appear Lognormal at 5% Significance Level**	
Theta Star	113629		
nu star	3.418		
A-D Test Statistic	1.411	**Nonparametric Statistics**	
5% A-D Critical Value	0.833	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.833	Mean	7493
5% K-S Critical Value	0.323	SD	36503
Data not Gamma Distributed at 5% Significance Level		SE of Mean	7653
		95% KM (t) UCL	20566
Assuming Gamma Distribution		95% KM (z) UCL	20082
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	19904
Minimum	1E-09	95% KM (bootstrap t) UCL	1370798
Maximum	190000	95% KM (BCA) UCL	29340
Mean	24913	95% KM (Percentile Bootstrap) UCL	22114
Median	26103	95% KM (Chebyshev) UCL	40853
SD	35995	97.5% KM (Chebyshev) UCL	55287
k star	0.297	99% KM (Chebyshev) UCL	83642
Theta star	83945		
Nu star	15.43	**Potential UCLs to Use**	
AppChi2	7.563	99% KM (Chebyshev) UCL	83642
95% Gamma Approximate UCL	50834		
95% Adjusted Gamma UCL	53396		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	26	Number of Detected Data	12
Number of Distinct Detected Data	11	Number of Non-Detect Data	14
		Percent Non-Detects	53.85%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	33	Minimum Detected	3.497
Maximum Detected	26000	Maximum Detected	10.17
Mean of Detected	2685	Mean of Detected	6.101
SD of Detected	7363	SD of Detected	1.791
Minimum Non-Detect	22	Minimum Non-Detect	3.091
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	18
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.23%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.387	Shapiro Wilk Test Statistic	0.931
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1268	Mean	4.844
SD	5064	SD	1.768
95% DL/2 (t) UCL	2964	95% H-Stat (DL/2) UCL	1640
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.846
		SD in Log Scale	2.594
		Mean in Original Scale	1246
		SD in Original Scale	5069
		95% Percentile Bootstrap UCL	3212
		95% BCA Bootstrap UCL	4394
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.334	**Data appear Lognormal at 5% Significance Level**	
Theta Star	8041		
nu star	8.014		
A-D Test Statistic	1.359	**Nonparametric Statistics**	
5% A-D Critical Value	0.81	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.81	Mean	1259
5% K-S Critical Value	0.263	SD	4968
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1018
		95% KM (t) UCL	2997
Assuming Gamma Distribution		95% KM (z) UCL	2933
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2952
Minimum	33	95% KM (bootstrap t) UCL	17612
Maximum	26000	95% KM (BCA) UCL	3312
Mean	2586	95% KM (Percentile Bootstrap) UCL	3227
Median	865.1	95% KM (Chebyshev) UCL	5695
SD	5195	97.5% KM (Chebyshev) UCL	7614
k star	0.546	99% KM (Chebyshev) UCL	11384
Theta star	4733		
Nu star	28.41	**Potential UCLs to Use**	
AppChi2	17.25	97.5% KM (Chebyshev) UCL	7614
95% Gamma Approximate UCL	4259		
95% Adjusted Gamma UCL	4406		

Note: DL/2 is not a recommended method.

Result (vanadium)

General Statistics

Number of Valid Observations	26	Number of Distinct Observations	23

Raw Statistics		**Log-transformed Statistics**	
Minimum	21.3	Minimum of Log Data	3.059
Maximum	66.6	Maximum of Log Data	4.199
Mean	39.42	Mean of log Data	3.64
Median	38.5	SD of log Data	0.272
SD	10.52		
Coefficient of Variation	0.267		
Skewness	0.75		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.902	Shapiro Wilk Test Statistic	0.908
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	42.94	95% H-UCL	43.56
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	48.74
95% Adjusted-CLT UCL	43.14	97.5% Chebyshev (MVUE) UCL	52.76
95% Modified-t UCL	42.99	99% Chebyshev (MVUE) UCL	60.65
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	13.01	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3.031		
nu star	676.4		
Approximate Chi Square Value (.05)	617	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	42.81
Adjusted Chi Square Value	613.3	95% Jackknife UCL	42.94
		95% Standard Bootstrap UCL	42.7
Anderson-Darling Test Statistic	0.857	95% Bootstrap-t UCL	43.49
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	43.81
Kolmogorov-Smirnov Test Statistic	0.179	95% Percentile Bootstrap UCL	42.55
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	43.22
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	48.41
		97.5% Chebyshev(Mean, Sd) UCL	52.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	59.94
95% Approximate Gamma UCL	43.21		
95% Adjusted Gamma UCL	43.47		
Potential UCL to Use		Use 95% Student's-t UCL	42.94
		or 95% Modified-t UCL	42.99

Result (xylenes, total)

General Statistics

Number of Valid Data	26	Number of Detected Data	5
Number of Distinct Detected Data	4	Number of Non-Detect Data	21
		Percent Non-Detects	80.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	4.2	Minimum Detected	1.435
Maximum Detected	5900	Maximum Detected	8.683
Mean of Detected	1379	Mean of Detected	4.255
SD of Detected	2561	SD of Detected	3.331
Minimum Non-Detect	0.97	Minimum Non-Detect	-0.0305
Maximum Non-Detect	400	Maximum Non-Detect	5.991
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: There are only 4 Distinct Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.657	Shapiro Wilk Test Statistic	0.847
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	273.7	Mean	0.974
SD	1164	SD	2.364
95% DL/2 (t) UCL	663.4	95% H-Stat (DL/2) UCL	219.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-6.443
		SD in Log Scale	6.044
		Mean in Original Scale	265.2
		SD in Original Scale	1165
		95% Percentile Bootstrap UCL	719.1
		95% BCA Bootstrap UCL	1136
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.229	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	6010		
nu star	2.295		
A-D Test Statistic	0.514	**Nonparametric Statistics**	
5% A-D Critical Value	0.761	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.761	Mean	268.6
5% K-S Critical Value	0.385	SD	1141
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	250.3
		95% KM (t) UCL	696.1
Assuming Gamma Distribution		95% KM (z) UCL	680.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	658.6
Minimum	1E-09	95% KM (bootstrap t) UCL	82305
Maximum	5900	95% KM (BCA) UCL	986.6
Mean	265.2	95% KM (Percentile Bootstrap) UCL	949.4
Median	1E-09	95% KM (Chebyshev) UCL	1360
SD	1165	97.5% KM (Chebyshev) UCL	1832
k star	0.0622	99% KM (Chebyshev) UCL	2759
Theta star	4262		
Nu star	3.236	**Potential UCLs to Use**	
AppChi2	0.446	95% KM (t) UCL	696.1
95% Gamma Approximate UCL	1926		
95% Adjusted Gamma UCL	2211		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	26	Number of Distinct Observations	24

Raw Statistics		**Log-transformed Statistics**	
Minimum	55.4	Minimum of Log Data	4.015
Maximum	8250	Maximum of Log Data	9.018
Mean	449.3	Mean of log Data	5.017
Median	123.5	SD of log Data	0.892
SD	1592		
Coefficient of Variation	3.543		
Skewness	5.091		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.226	Shapiro Wilk Test Statistic	0.585
Shapiro Wilk Critical Value	0.92	Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	982.5	95% H-UCL	341.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	407.5
95% Adjusted-CLT UCL	1296	97.5% Chebyshev (MVUE) UCL	488.6
95% Modified-t UCL	1034	99% Chebyshev (MVUE) UCL	647.9
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.53	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	847		
nu star	27.58		
Approximate Chi Square Value (.05)	16.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0398	95% CLT UCL	962.8
Adjusted Chi Square Value	16.04	95% Jackknife UCL	982.5
		95% Standard Bootstrap UCL	960.4
Anderson-Darling Test Statistic	6.684	95% Bootstrap-t UCL	13021
Anderson-Darling 5% Critical Value	0.802	95% Hall's Bootstrap UCL	4660
Kolmogorov-Smirnov Test Statistic	0.449	95% Percentile Bootstrap UCL	1071
Kolmogorov-Smirnov 5% Critical Value	0.18	95% BCA Bootstrap UCL	1395
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1810
		97.5% Chebyshev(Mean, Sd) UCL	2399
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3555
95% Approximate Gamma UCL	746.3		
95% Adjusted Gamma UCL	772.5		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	1810

Result (1,2,4-trimethylbenzene)			
General Statistics			
Number of Valid Data	93	Number of Detected Data	30
Number of Distinct Detected Data	28	Number of Non-Detect Data	63
		Percent Non-Detects	67.74%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.625	Minimum Detected	0.486
Maximum Detected	46400	Maximum Detected	10.75
Mean of Detected	6302	Mean of Detected	4.873
SD of Detected	13390	SD of Detected	3.528
Minimum Non-Detect	0.97	Minimum Non-Detect	-0.0305
Maximum Non-Detect	1000	Maximum Non-Detect	6.908
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	84
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.32%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.538	Lilliefors Test Statistic	0.894
5% Lilliefors Critical Value	0.927	5% Lilliefors Critical Value	0.927
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2052	Mean	2.212
SD	8076	SD	3.015
95% DL/2 (t) UCL	3443	95% H-Stat (DL/2) UCL	1591
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.37
		SD in Log Scale	5.412
		Mean in Original Scale	2033
		SD in Original Scale	8080
		95% Percentile Bootstrap UCL	3439
		95% BCA Bootstrap UCL	4024
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.194	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	32433		
nu star	11.66		
A-D Test Statistic	1.924	**Nonparametric Statistics**	
5% A-D Critical Value	0.902	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.902	Mean	2035
5% K-S Critical Value	0.178	SD	8036
Data not Gamma Distributed at 5% Significance Level		SE of Mean	847.6
		95% KM (t) UCL	3443
Assuming Gamma Distribution		95% KM (z) UCL	3429
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3427
Minimum	1.625	95% KM (bootstrap t) UCL	4273
Maximum	46400	95% KM (BCA) UCL	3457
Mean	6467	95% KM (Percentile Bootstrap) UCL	3503
Median	5444	95% KM (Chebyshev) UCL	5729
SD	7752	97.5% KM (Chebyshev) UCL	7328
k star	0.489	99% KM (Chebyshev) UCL	10468
Theta star	13231		
Nu star	90.91	**Potential UCLs to Use**	
AppChi2	69.92	97.5% KM (Chebyshev) UCL	7328
95% Gamma Approximate UCL	8408		
95% Adjusted Gamma UCL	8442		
Note: DL/2 is not a recommended method.			

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	93	Number of Detected Data	16
Number of Distinct Detected Data	15	Number of Non-Detect Data	77
		Percent Non-Detects	82.80%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	17200	Maximum Detected	9.753
Mean of Detected	3361	Mean of Detected	5.945
SD of Detected	5738	SD of Detected	2.743
Minimum Non-Detect	0.97	Minimum Non-Detect	-0.0305
Maximum Non-Detect	1000	Maximum Non-Detect	6.908
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	86
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.636	Lilliefors Test Statistic	0.948
5% Lilliefors Critical Value	0.887	5% Lilliefors Critical Value	0.887
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	600.3	Mean	1.833
SD	2641	SD	2.631
95% DL/2 (t) UCL	1055	95% H-Stat (DL/2) UCL	333.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.841
		SD in Log Scale	5.204
		Mean in Original Scale	578.5
		SD in Original Scale	2645
		95% Percentile Bootstrap UCL	1073
		95% BCA Bootstrap UCL	1231
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.297	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	11307		
nu star	9.512		
A-D Test Statistic	0.431	**Nonparametric Statistics**	
5% A-D Critical Value	0.835	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.835	Mean	581.2
5% K-S Critical Value	0.233	SD	2630
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	281.7
		95% KM (t) UCL	1049
Assuming Gamma Distribution		95% KM (z) UCL	1045
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1028
Minimum	2.5	95% KM (bootstrap t) UCL	1938
Maximum	17200	95% KM (BCA) UCL	1093
Mean	3599	95% KM (Percentile Bootstrap) UCL	1107
Median	3154	95% KM (Chebyshev) UCL	1809
SD	2550	97.5% KM (Chebyshev) UCL	2340
k star	1.329	99% KM (Chebyshev) UCL	3384
Theta star	2709		
Nu star	247.1	**Potential UCLs to Use**	
AppChi2	211.7	95% KM (t) UCL	1049
95% Gamma Approximate UCL	4200		
95% Adjusted Gamma UCL	4211		

Note: DL/2 is not a recommended method.

Result (1-methylnaphthalene)

General Statistics

Number of Valid Data	49	Number of Detected Data	13
Number of Distinct Detected Data	13	Number of Non-Detect Data	36
		Percent Non-Detects	73.47%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	29	Minimum Detected	3.367
Maximum Detected	250000	Maximum Detected	12.43
Mean of Detected	40947	Mean of Detected	7.857
SD of Detected	81307	SD of Detected	3.073
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	39
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	79.59%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.571	Shapiro Wilk Test Statistic	0.946
5% Shapiro Wilk Critical Value	0.866	5% Shapiro Wilk Critical Value	0.866
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	10897	Mean	4.64
SD	44560	SD	2.603
95% DL/2 (t) UCL	21574	95% H-Stat (DL/2) UCL	7367
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.455
		SD in Log Scale	5.567
		Mean in Original Scale	10866
		SD in Original Scale	44568
		95% Percentile Bootstrap UCL	21774
		95% BCA Bootstrap UCL	27066
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.248	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	164945		
nu star	6.454		
A-D Test Statistic	0.497	**Nonparametric Statistics**	
5% A-D Critical Value	0.847	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.847	Mean	10887
5% K-S Critical Value	0.259	SD	44105
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	6558
		95% KM (t) UCL	21886
Assuming Gamma Distribution		95% KM (z) UCL	21674
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	21550
Minimum	1E-09	95% KM (bootstrap t) UCL	77192
Maximum	553969	95% KM (BCA) UCL	23775
Mean	67457	95% KM (Percentile Bootstrap) UCL	22027
Median	14000	95% KM (Chebyshev) UCL	39473
SD	116578	97.5% KM (Chebyshev) UCL	51842
k star	0.101	99% KM (Chebyshev) UCL	76139
Theta star	668964		
Nu star	9.882	**Potential UCLs to Use**	
AppChi2	3.868	95% KM (t) UCL	21886
95% Gamma Approximate UCL	172331		
95% Adjusted Gamma UCL	177561		

Note: DL/2 is not a recommended method.

Result (2-butanone)

General Statistics

Number of Valid Data	93	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	78
		Percent Non-Detects	83.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	15	Minimum Detected	2.708
Maximum Detected	100	Maximum Detected	4.605
Mean of Detected	39.6	Mean of Detected	3.541
SD of Detected	23.91	SD of Detected	0.521
Minimum Non-Detect	16	Minimum Non-Detect	2.773
Maximum Non-Detect	35000	Maximum Non-Detect	10.46
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.808	Lilliefors Test Statistic	0.937
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1135	Mean	4.403
SD	2975	SD	2.163
95% DL/2 (t) UCL	1647	95% H-Stat (DL/2) UCL	2861
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.805
		SD in Log Scale	0.617
		Mean in Original Scale	20.36
		SD in Original Scale	16.1
		95% Percentile Bootstrap UCL	23.22
		95% BCA Bootstrap UCL	23.66
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.071	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	12.9		
nu star	92.12		
A-D Test Statistic	0.725	**Nonparametric Statistics**	
5% A-D Critical Value	0.741	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.741	Mean	24.2
5% K-S Critical Value	0.223	SD	18.03
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	2.901
		95% KM (t) UCL	29.02
Assuming Gamma Distribution		95% KM (z) UCL	28.97
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	28.54
Minimum	15	95% KM (bootstrap t) UCL	29.96
Maximum	100	95% KM (BCA) UCL	33.8
Mean	38.15	95% KM (Percentile Bootstrap) UCL	31.91
Median	36.68	95% KM (Chebyshev) UCL	36.84
SD	9.759	97.5% KM (Chebyshev) UCL	42.31
k star	19.49	99% KM (Chebyshev) UCL	53.06
Theta star	1.957		
Nu star	3625	**Potential UCLs to Use**	
AppChi2	3486	95% KM (t) UCL	29.02
95% Gamma Approximate UCL	39.67		
95% Adjusted Gamma UCL	39.69		

Note: DL/2 is not a recommended method.

Result (2-methylnaphthalene)

General Statistics

Number of Valid Data	49	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	37
		Percent Non-Detects	75.51%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	40	Minimum Detected	3.689
Maximum Detected	320000	Maximum Detected	12.68
Mean of Detected	60823	Mean of Detected	8.35
SD of Detected	108320	SD of Detected	3.252
Minimum Non-Detect	20	Minimum Non-Detect	2.996
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	40
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	81.63%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.631	Shapiro Wilk Test Statistic	0.921
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	14932	Mean	4.697
SD	58190	SD	2.734
95% DL/2 (t) UCL	28874	95% H-Stat (DL/2) UCL	12484
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.25
		SD in Log Scale	5.858
		Mean in Original Scale	14900
		SD in Original Scale	58199
		95% Percentile Bootstrap UCL	30139
		95% BCA Bootstrap UCL	37080
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.254	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	239803		
nu star	6.087		
A-D Test Statistic	0.342	**Nonparametric Statistics**	
5% A-D Critical Value	0.839	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.839	Mean	14927
5% K-S Critical Value	0.267	SD	57595
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	8594
		95% KM (t) UCL	29341
Assuming Gamma Distribution		95% KM (z) UCL	29062
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	28867
Minimum	1E-09	95% KM (bootstrap t) UCL	80843
Maximum	1041151	95% KM (BCA) UCL	30667
Mean	134149	95% KM (Percentile Bootstrap) UCL	30336
Median	42027	95% KM (Chebyshev) UCL	52386
SD	220622	97.5% KM (Chebyshev) UCL	68595
k star	0.112	99% KM (Chebyshev) UCL	100433
Theta star	1197234		
Nu star	10.98	**Potential UCLs to Use**	
AppChi2	4.564	95% KM (t) UCL	29341
95% Gamma Approximate UCL	322781		
95% Adjusted Gamma UCL	331906		

Note: DL/2 is not a recommended method.

Result (acenaphthene)

General Statistics

Number of Valid Data	93	Number of Detected Data	29
Number of Distinct Detected Data	27	Number of Non-Detect Data	64
		Percent Non-Detects	68.82%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	48000	Maximum Detected	10.78
Mean of Detected	2187	Mean of Detected	4.502
SD of Detected	8869	SD of Detected	2.501
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2200	Maximum Non-Detect	7.696
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	88
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.62%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.258	Lilliefors Test Statistic	0.943
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	720.1	Mean	3.453
SD	4994	SD	1.858
95% DL/2 (t) UCL	1581	95% H-Stat (DL/2) UCL	239.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	2.707
		SD in Log Scale	2.186
		Mean in Original Scale	692
		SD in Original Scale	4996
		95% Percentile Bootstrap UCL	1718
		95% BCA Bootstrap UCL	2663
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.226	**Data appear Lognormal at 5% Significance Level**	
Theta Star	9680		
nu star	13.1		
A-D Test Statistic	2.738	**Nonparametric Statistics**	
5% A-D Critical Value	0.887	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.887	Mean	689.7
5% K-S Critical Value	0.179	SD	4970
Data not Gamma Distributed at 5% Significance Level		SE of Mean	524.5
		95% KM (t) UCL	1561
Assuming Gamma Distribution		95% KM (z) UCL	1552
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1551
Minimum	1E-09	95% KM (bootstrap t) UCL	7221
Maximum	48000	95% KM (BCA) UCL	1818
Mean	3830	95% KM (Percentile Bootstrap) UCL	1710
Median	302.4	95% KM (Chebyshev) UCL	2976
SD	8055	97.5% KM (Chebyshev) UCL	3965
k star	0.0957	99% KM (Chebyshev) UCL	5908
Theta star	40040		
Nu star	17.79	**Potential UCLs to Use**	
AppChi2	9.241	97.5% KM (Chebyshev) UCL	3965
95% Gamma Approximate UCL	7374		
95% Adjusted Gamma UCL	7453		

Note: DL/2 is not a recommended method.

Result (acenaphthylene)

General Statistics

Number of Valid Data	93	Number of Detected Data	18
Number of Distinct Detected Data	16	Number of Non-Detect Data	75
		Percent Non-Detects	80.65%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	956	Maximum Detected	6.863
Mean of Detected	179.9	Mean of Detected	3.712
SD of Detected	260.6	SD of Detected	2.058
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.735	Lilliefors Test Statistic	0.89
5% Lilliefors Critical Value	0.897	5% Lilliefors Critical Value	0.897
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	216.6	Mean	3.184
SD	1155	SD	1.67
95% DL/2 (t) UCL	415.5	95% H-Stat (DL/2) UCL	143.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.113
		SD in Log Scale	1.602
		Mean in Original Scale	43.05
		SD in Original Scale	131.1
		95% Percentile Bootstrap UCL	66.73
		95% BCA Bootstrap UCL	72.81
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.402	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	447.4		
nu star	14.48		
A-D Test Statistic	0.737	**Nonparametric Statistics**	
5% A-D Critical Value	0.813	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.813	Mean	41.57
5% K-S Critical Value	0.217	SD	134.5
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	14.8
		95% KM (t) UCL	66.16
Assuming Gamma Distribution		95% KM (z) UCL	65.91
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	65.62
Minimum	1E-09	95% KM (bootstrap t) UCL	84.35
Maximum	956	95% KM (BCA) UCL	68.14
Mean	142.2	95% KM (Percentile Bootstrap) UCL	67.59
Median	146.8	95% KM (Chebyshev) UCL	106.1
SD	130.9	97.5% KM (Chebyshev) UCL	134
k star	0.254	99% KM (Chebyshev) UCL	188.8
Theta star	558.9		
Nu star	47.34	**Potential UCLs to Use**	
AppChi2	32.55	95% KM (t) UCL	66.16
95% Gamma Approximate UCL	206.9		
95% Adjusted Gamma UCL	208.1		

Note: DL/2 is not a recommended method.

Result (acetone)

General Statistics

Number of Valid Data	93	Number of Detected Data	27
Number of Distinct Detected Data	18	Number of Non-Detect Data	66
		Percent Non-Detects	70.97%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	44	Minimum Detected	3.784
Maximum Detected	200	Maximum Detected	5.298
Mean of Detected	100.1	Mean of Detected	4.541
SD of Detected	36.83	SD of Detected	0.372
Minimum Non-Detect	40	Minimum Non-Detect	3.689
Maximum Non-Detect	26000	Maximum Non-Detect	10.17
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.948	Lilliefors Test Statistic	0.971
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1154	Mean	4.985
SD	2602	SD	1.96
95% DL/2 (t) UCL	1603	95% H-Stat (DL/2) UCL	3388
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.934
		SD in Log Scale	0.529
		Mean in Original Scale	58.95
		SD in Original Scale	34.59
		95% Percentile Bootstrap UCL	65.23
		95% BCA Bootstrap UCL	66.02
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	6.977	**Data appear Normal at 5% Significance Level**	
Theta Star	14.35		
nu star	376.8		
A-D Test Statistic	0.349	**Nonparametric Statistics**	
5% A-D Critical Value	0.745	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.745	Mean	67
5% K-S Critical Value	0.168	SD	35.61
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	4.449
		95% KM (t) UCL	74.4
Assuming Gamma Distribution		95% KM (z) UCL	74.32
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	73.35
Minimum	44	95% KM (bootstrap t) UCL	74.53
Maximum	200	95% KM (BCA) UCL	85.12
Mean	101	95% KM (Percentile Bootstrap) UCL	80.69
Median	102	95% KM (Chebyshev) UCL	86.4
SD	19.63	97.5% KM (Chebyshev) UCL	94.79
k star	25.57	99% KM (Chebyshev) UCL	111.3
Theta star	3.951		
Nu star	4756	**Potential UCLs to Use**	
AppChi2	4597	95% KM (t) UCL	74.4
95% Gamma Approximate UCL	104.5	95% KM (Percentile Bootstrap) UCL	80.69
95% Adjusted Gamma UCL	104.6		

Note: DL/2 is not a recommended method.

Result (anthracene)

General Statistics

Number of Valid Data	93	Number of Detected Data	22
Number of Distinct Detected Data	22	Number of Non-Detect Data	71
		Percent Non-Detects	76.34%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.375	Minimum Detected	1.216
Maximum Detected	2790	Maximum Detected	7.934
Mean of Detected	307.2	Mean of Detected	3.993
SD of Detected	636.2	SD of Detected	2.013
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.536	Lilliefors Test Statistic	0.952
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	253.9	Mean	3.306
SD	1188	SD	1.721
95% DL/2 (t) UCL	458.6	95% H-Stat (DL/2) UCL	169.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.039
		SD in Log Scale	1.822
		Mean in Original Scale	78.64
		SD in Original Scale	329.9
		95% Percentile Bootstrap UCL	141.5
		95% BCA Bootstrap UCL	167.3
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.36	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	852.4		
nu star	15.86		
A-D Test Statistic	1.023	**Nonparametric Statistics**	
5% A-D Critical Value	0.83	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.83	Mean	80.36
5% K-S Critical Value	0.199	SD	331.4
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	35.56
		95% KM (t) UCL	139.4
Assuming Gamma Distribution		95% KM (z) UCL	138.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	138.4
Minimum	3.375	95% KM (bootstrap t) UCL	240.9
Maximum	2790	95% KM (BCA) UCL	140.6
Mean	530.3	95% KM (Percentile Bootstrap) UCL	146.1
Median	378.3	95% KM (Chebyshev) UCL	235.4
SD	521.8	97.5% KM (Chebyshev) UCL	302.4
k star	0.858	99% KM (Chebyshev) UCL	434.2
Theta star	618.1		
Nu star	159.6	**Potential UCLs to Use**	
AppChi2	131.4	95% KM (t) UCL	139.4
95% Gamma Approximate UCL	644.2		
95% Adjusted Gamma UCL	646.2		

Note: DL/2 is not a recommended method.

Result (antimony)

General Statistics

Number of Valid Data	65	Number of Detected Data	19
Number of Distinct Detected Data	18	Number of Non-Detect Data	46
		Percent Non-Detects	70.77%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.974	Minimum Detected	-0.0266
Maximum Detected	13.4	Maximum Detected	2.595
Mean of Detected	4.168	Mean of Detected	1.153
SD of Detected	3.17	SD of Detected	0.789
Minimum Non-Detect	0.774	Minimum Non-Detect	-0.256
Maximum Non-Detect	6.67	Maximum Non-Detect	1.898
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	62
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.38%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.867	Lilliefors Test Statistic	0.945
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.863	Mean	0.0548
SD	2.349	SD	1.029
95% DL/2 (t) UCL	2.349	95% H-Stat (DL/2) UCL	1.857
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.351
		SD in Log Scale	1.09
		Mean in Original Scale	1.499
		SD in Original Scale	2.414
		95% Percentile Bootstrap UCL	2.014
		95% BCA Bootstrap UCL	2.137
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.693	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	2.462		
nu star	64.35		
A-D Test Statistic	0.305	**Nonparametric Statistics**	
5% A-D Critical Value	0.752	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.752	Mean	1.963
5% K-S Critical Value	0.201	SD	2.217
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.286
		95% KM (t) UCL	2.441
Assuming Gamma Distribution		95% KM (z) UCL	2.434
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.407
Minimum	0.974	95% KM (bootstrap t) UCL	2.607
Maximum	13.4	95% KM (BCA) UCL	2.544
Mean	4.186	95% KM (Percentile Bootstrap) UCL	2.502
Median	4.169	95% KM (Chebyshev) UCL	3.211
SD	1.682	97.5% KM (Chebyshev) UCL	3.75
k star	6.094	99% KM (Chebyshev) UCL	4.811
Theta star	0.687		
Nu star	792.2	**Potential UCLs to Use**	
AppChi2	727.9	95% KM (t) UCL	2.441
95% Gamma Approximate UCL	4.556		
95% Adjusted Gamma UCL	4.564		

Note: DL/2 is not a recommended method.

Result (arsenic)

General Statistics

Number of Valid Data	67	Number of Detected Data	53
Number of Distinct Detected Data	52	Number of Non-Detect Data	14
		Percent Non-Detects	20.90%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.824	Minimum Detected	-0.194
Maximum Detected	11.9	Maximum Detected	2.477
Mean of Detected	5.915	Mean of Detected	1.648
SD of Detected	2.595	SD of Detected	0.581
Minimum Non-Detect	1.25	Minimum Non-Detect	0.223
Maximum Non-Detect	3.81	Maximum Non-Detect	1.338
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	42
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	37.31%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.0641	Lilliefors Test Statistic	0.135
5% Lilliefors Critical Value	0.122	5% Lilliefors Critical Value	0.122
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	4.899	Mean	1.297
SD	3.051	SD	0.88
95% DL/2 (t) UCL	5.521	95% H-Stat (DL/2) UCL	6.345
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	4.892	Mean in Log Scale	1.435
SD	3.146	SD in Log Scale	0.666
95% MLE (t) UCL	5.533	Mean in Original Scale	5.073
95% MLE (Tiku) UCL	5.604	SD in Original Scale	2.835
		95% Percentile Bootstrap UCL	5.609
		95% BCA Bootstrap UCL	5.633
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	3.798	**Data appear Normal at 5% Significance Level**	
Theta Star	1.557		
nu star	402.6		
A-D Test Statistic	0.799	**Nonparametric Statistics**	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	4.896
5% K-S Critical Value	0.123	SD	3.033
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.375
		95% KM (t) UCL	5.522
Assuming Gamma Distribution		95% KM (z) UCL	5.514
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.521
Minimum	0.824	95% KM (bootstrap t) UCL	5.528
Maximum	11.9	95% KM (BCA) UCL	5.543
Mean	5.277	95% KM (Percentile Bootstrap) UCL	5.526
Median	5.07	95% KM (Chebyshev) UCL	6.532
SD	2.639	97.5% KM (Chebyshev) UCL	7.24
k star	3.345	99% KM (Chebyshev) UCL	8.63
Theta star	1.578		
Nu star	448.2	**Potential UCLs to Use**	
AppChi2	400.1	95% KM (t) UCL	5.522
95% Gamma Approximate UCL	5.912	95% KM (Percentile Bootstrap) UCL	5.526
95% Adjusted Gamma UCL	5.926		

Note: DL/2 is not a recommended method.

Result (barium)

General Statistics

Number of Valid Observations	67	Number of Distinct Observations	50

Raw Statistics		**Log-transformed Statistics**	
Minimum	87.1	Minimum of Log Data	4.467
Maximum	562	Maximum of Log Data	6.332
Mean	175.3	Mean of log Data	5.129
Median	167.5	SD of log Data	0.259
SD	59.07		
Coefficient of Variation	0.337		
Skewness	4.298		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.161	Lilliefors Test Statistic	0.0856
Lilliefors Critical Value	0.108	Lilliefors Critical Value	0.108
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	187.3	95% H-UCL	184.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	198.9
95% Adjusted-CLT UCL	191.2	97.5% Chebyshev (MVUE) UCL	209.5
95% Modified-t UCL	187.9	99% Chebyshev (MVUE) UCL	230.2
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	12.92	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	13.57		
nu star	1731		
Approximate Chi Square Value (.05)	1635	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0464	95% CLT UCL	187.1
Adjusted Chi Square Value	1633	95% Jackknife UCL	187.3
		95% Standard Bootstrap UCL	187.5
Anderson-Darling Test Statistic	1.359	95% Bootstrap-t UCL	193.7
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	244.4
Kolmogorov-Smirnov Test Statistic	0.102	95% Percentile Bootstrap UCL	187.8
Kolmogorov-Smirnov 5% Critical Value	0.109	95% BCA Bootstrap UCL	192.6
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	206.7
		97.5% Chebyshev(Mean, Sd) UCL	220.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	247.1
95% Approximate Gamma UCL	185.5		
95% Adjusted Gamma UCL	185.8		
Potential UCL to Use		Use 95% Approximate Gamma UCL	185.5

Result (benzene)

General Statistics

Number of Valid Data	93	Number of Detected Data	33
Number of Distinct Detected Data	32	Number of Non-Detect Data	60
		Percent Non-Detects	64.52%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1	Minimum Detected	0
Maximum Detected	9300	Maximum Detected	9.138
Mean of Detected	953	Mean of Detected	4.145
SD of Detected	1921	SD of Detected	2.886
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1563	Maximum Non-Detect	7.354
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	86
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.573	Lilliefors Test Statistic	0.914
5% Lilliefors Critical Value	0.931	5% Lilliefors Critical Value	0.931
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	358.9	Mean	1.847
SD	1220	SD	2.824
95% DL/2 (t) UCL	569.2	95% H-Stat (DL/2) UCL	636.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.632
		SD in Log Scale	4.444
		Mean in Original Scale	338.4
		SD in Original Scale	1222
		95% Percentile Bootstrap UCL	559.9
		95% BCA Bootstrap UCL	619
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.257	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3715		
nu star	16.93		
A-D Test Statistic	1.474	**Nonparametric Statistics**	
5% A-D Critical Value	0.873	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.873	Mean	340
5% K-S Critical Value	0.168	SD	1215
Data not Gamma Distributed at 5% Significance Level		SE of Mean	128
		95% KM (t) UCL	552.6
Assuming Gamma Distribution		95% KM (z) UCL	550.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	550.5
Minimum	1	95% KM (bootstrap t) UCL	761.1
Maximum	9300	95% KM (BCA) UCL	564
Mean	1027	95% KM (Percentile Bootstrap) UCL	562.4
Median	762.2	95% KM (Chebyshev) UCL	897.9
SD	1228	97.5% KM (Chebyshev) UCL	1139
k star	0.589	99% KM (Chebyshev) UCL	1613
Theta star	1743		
Nu star	109.6	**Potential UCLs to Use**	
AppChi2	86.39	97.5% KM (Chebyshev) UCL	1139
95% Gamma Approximate UCL	1302		
95% Adjusted Gamma UCL	1307		

Note: DL/2 is not a recommended method.

Result (benzo(a)anthracene)

General Statistics

Number of Valid Data	93	Number of Detected Data	25
Number of Distinct Detected Data	23	Number of Non-Detect Data	68
		Percent Non-Detects	73.12%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.25	Minimum Detected	1.179
Maximum Detected	1028	Maximum Detected	6.935
Mean of Detected	165.2	Mean of Detected	3.577
SD of Detected	261.7	SD of Detected	1.944
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.681	Lilliefors Test Statistic	0.893
5% Lilliefors Critical Value	0.918	5% Lilliefors Critical Value	0.918
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	225.2	Mean	3.247
SD	1156	SD	1.697
95% DL/2 (t) UCL	424.3	95% H-Stat (DL/2) UCL	160.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.423
		SD in Log Scale	1.521
		Mean in Original Scale	53.05
		SD in Original Scale	150.4
		95% Percentile Bootstrap UCL	77.87
		95% BCA Bootstrap UCL	88.64
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.401	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	411.4		
nu star	20.07		
A-D Test Statistic	1.357	**Nonparametric Statistics**	
5% A-D Critical Value	0.824	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.824	Mean	52.56
5% K-S Critical Value	0.186	SD	154.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	16.81
		95% KM (t) UCL	80.5
Assuming Gamma Distribution		95% KM (z) UCL	80.22
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	80.11
Minimum	3.25	95% KM (bootstrap t) UCL	96.91
Maximum	1028	95% KM (BCA) UCL	80.74
Mean	161.8	95% KM (Percentile Bootstrap) UCL	80.49
Median	162.2	95% KM (Chebyshev) UCL	125.8
SD	133.9	97.5% KM (Chebyshev) UCL	157.6
k star	1.318	99% KM (Chebyshev) UCL	219.8
Theta star	122.8		
Nu star	245.1	**Potential UCLs to Use**	
AppChi2	209.9	95% KM (Chebyshev) UCL	125.8
95% Gamma Approximate UCL	189		
95% Adjusted Gamma UCL	189.4		

Note: DL/2 is not a recommended method.

Result (benzo(a)pyrene)

General Statistics

Number of Valid Data	93	Number of Detected Data	21
Number of Distinct Detected Data	20	Number of Non-Detect Data	72
		Percent Non-Detects	77.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	830	Maximum Detected	6.721
Mean of Detected	177.3	Mean of Detected	4.216
SD of Detected	214.3	SD of Detected	1.631
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.797	Lilliefors Test Statistic	0.942
5% Lilliefors Critical Value	0.908	5% Lilliefors Critical Value	0.908
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	221.3	Mean	3.333
SD	1153	SD	1.647
95% DL/2 (t) UCL	420	95% H-Stat (DL/2) UCL	146.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.36
		SD in Log Scale	1.594
		Mean in Original Scale	47.86
		SD in Original Scale	122.5
		95% Percentile Bootstrap UCL	70.68
		95% BCA Bootstrap UCL	75.11
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.578	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	307		
nu star	24.26		
A-D Test Statistic	0.5	**Nonparametric Statistics**	
5% A-D Critical Value	0.793	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.793	Mean	49.38
5% K-S Critical Value	0.198	SD	125.3
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	13.77
		95% KM (t) UCL	72.25
Assuming Gamma Distribution		95% KM (z) UCL	72.02
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	71.87
Minimum	3.75	95% KM (bootstrap t) UCL	80.84
Maximum	830	95% KM (BCA) UCL	73.55
Mean	267.4	95% KM (Percentile Bootstrap) UCL	74.36
Median	254.3	95% KM (Chebyshev) UCL	109.4
SD	180.9	97.5% KM (Chebyshev) UCL	135.4
k star	1.445	99% KM (Chebyshev) UCL	186.4
Theta star	185		
Nu star	268.8	**Potential UCLs to Use**	
AppChi2	231.9	95% KM (t) UCL	72.25
95% Gamma Approximate UCL	310		
95% Adjusted Gamma UCL	310.7		

Note: DL/2 is not a recommended method.

Result (benzo(b)fluoranthene)

General Statistics

Number of Valid Data	93	Number of Detected Data	19
Number of Distinct Detected Data	15	Number of Non-Detect Data	74
		Percent Non-Detects	79.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	470	Maximum Detected	6.153
Mean of Detected	104.7	Mean of Detected	3.6
SD of Detected	135.7	SD of Detected	1.706
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.753	Lilliefors Test Statistic	0.923
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	206.1	Mean	3.199
SD	1151	SD	1.616
95% DL/2 (t) UCL	404.5	95% H-Stat (DL/2) UCL	140.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.099
		SD in Log Scale	1.418
		Mean in Original Scale	28.29
		SD in Original Scale	71.9
		95% Percentile Bootstrap UCL	41.19
		95% BCA Bootstrap UCL	44.76
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.532	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	196.9		
nu star	20.2		
A-D Test Statistic	0.548	**Nonparametric Statistics**	
5% A-D Critical Value	0.794	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.794	Mean	28.64
5% K-S Critical Value	0.209	SD	74.62
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	8.363
		95% KM (t) UCL	42.54
Assuming Gamma Distribution		95% KM (z) UCL	42.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	42.28
Minimum	2.5	95% KM (bootstrap t) UCL	51.77
Maximum	470	95% KM (BCA) UCL	42.6
Mean	99.35	95% KM (Percentile Bootstrap) UCL	43.6
Median	98.75	95% KM (Chebyshev) UCL	65.1
SD	60.6	97.5% KM (Chebyshev) UCL	80.87
k star	2.371	99% KM (Chebyshev) UCL	111.9
Theta star	41.9		
Nu star	441.1	**Potential UCLs to Use**	
AppChi2	393.4	95% KM (t) UCL	42.54
95% Gamma Approximate UCL	111.4		
95% Adjusted Gamma UCL	111.6		

Note: DL/2 is not a recommended method.

Result (benzo(ghi)perylene)

General Statistics

Number of Valid Data	93	Number of Detected Data	26
Number of Distinct Detected Data	24	Number of Non-Detect Data	67
		Percent Non-Detects	72.04%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3	Minimum Detected	1.099
Maximum Detected	2400	Maximum Detected	7.783
Mean of Detected	197.6	Mean of Detected	3.871
SD of Detected	469.9	SD of Detected	1.769
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.419	Lilliefors Test Statistic	0.963
5% Lilliefors Critical Value	0.92	5% Lilliefors Critical Value	0.92
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	223.3	Mean	3.268
SD	1170	SD	1.644
95% DL/2 (t) UCL	424.8	95% H-Stat (DL/2) UCL	143.6
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.39
		SD in Log Scale	1.618
		Mean in Original Scale	62.66
		SD in Original Scale	259.3
		95% Percentile Bootstrap UCL	113.2
		95% BCA Bootstrap UCL	145.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.428	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	461.4		
nu star	22.28		
A-D Test Statistic	0.916	**Nonparametric Statistics**	
5% A-D Critical Value	0.818	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.818	Mean	63.66
5% K-S Critical Value	0.182	SD	259.8
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	27.72
		95% KM (t) UCL	109.7
Assuming Gamma Distribution		95% KM (z) UCL	109.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	109.1
Minimum	3	95% KM (bootstrap t) UCL	197.4
Maximum	2400	95% KM (BCA) UCL	114.1
Mean	318.7	95% KM (Percentile Bootstrap) UCL	113.5
Median	199.9	95% KM (Chebyshev) UCL	184.5
SD	362.6	97.5% KM (Chebyshev) UCL	236.8
k star	0.787	99% KM (Chebyshev) UCL	339.5
Theta star	405		
Nu star	146.4	**Potential UCLs to Use**	
AppChi2	119.4	95% KM (t) UCL	109.7
95% Gamma Approximate UCL	390.6		
95% Adjusted Gamma UCL	391.9		

Note: DL/2 is not a recommended method.

Result (benzo(k)fluoranthene)

General Statistics

Number of Valid Data	93	Number of Detected Data	15
Number of Distinct Detected Data	14	Number of Non-Detect Data	78
		Percent Non-Detects	83.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.625	Minimum Detected	0.965
Maximum Detected	520	Maximum Detected	6.254
Mean of Detected	104.5	Mean of Detected	3.446
SD of Detected	151.7	SD of Detected	1.792
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.724	Lilliefors Test Statistic	0.94
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	201.7	Mean	3.159
SD	1152	SD	1.585
95% DL/2 (t) UCL	400.1	95% H-Stat (DL/2) UCL	122.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.819
		SD in Log Scale	1.409
		Mean in Original Scale	23.07
		SD in Original Scale	69.56
		95% Percentile Bootstrap UCL	36.38
		95% BCA Bootstrap UCL	41
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.464	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	225.5		
nu star	13.91		
A-D Test Statistic	0.42	**Nonparametric Statistics**	
5% A-D Critical Value	0.791	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.791	Mean	23.52
5% K-S Critical Value	0.233	SD	71.69
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	8.112
		95% KM (t) UCL	37
Assuming Gamma Distribution		95% KM (z) UCL	36.87
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	36.71
Minimum	1E-09	95% KM (bootstrap t) UCL	46.55
Maximum	520	95% KM (BCA) UCL	39.56
Mean	79	95% KM (Percentile Bootstrap) UCL	37.51
Median	77.74	95% KM (Chebyshev) UCL	58.88
SD	69.8	97.5% KM (Chebyshev) UCL	74.18
k star	0.352	99% KM (Chebyshev) UCL	104.2
Theta star	224.6		
Nu star	65.42	**Potential UCLs to Use**	
AppChi2	47.81	95% KM (t) UCL	37
95% Gamma Approximate UCL	108.1		
95% Adjusted Gamma UCL	108.6		

Note: DL/2 is not a recommended method.

Result (beryllium)

General Statistics

Number of Valid Data	67	Number of Detected Data	66
Number of Distinct Detected Data	61	Number of Non-Detect Data	1
		Percent Non-Detects	1.49%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.285	Minimum Detected	-1.255
Maximum Detected	1.513	Maximum Detected	0.414
Mean of Detected	0.815	Mean of Detected	-0.294
SD of Detected	0.34	SD of Detected	0.433
Minimum Non-Detect	0.276	Minimum Non-Detect	-1.287
Maximum Non-Detect	0.276	Maximum Non-Detect	-1.287

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.14	Lilliefors Test Statistic	0.0931
5% Lilliefors Critical Value	0.109	5% Lilliefors Critical Value	0.109
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.805	Mean	-0.319
SD	0.347	SD	0.476
95% DL/2 (t) UCL	0.876	95% H-Stat (DL/2) UCL	0.889
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.805	Mean in Log Scale	-0.311
SD	0.346	SD in Log Scale	0.452
95% MLE (t) UCL	0.875	Mean in Original Scale	0.807
95% MLE (Tiku) UCL	0.874	SD in Original Scale	0.345
		95% Percentile Bootstrap UCL	0.874
		95% BCA Bootstrap UCL	0.877
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	5.514	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.148		
nu star	727.8		
A-D Test Statistic	0.85	**Nonparametric Statistics**	
5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.753	Mean	0.807
5% K-S Critical Value	0.11	SD	0.341
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.042
		95% KM (t) UCL	0.877
Assuming Gamma Distribution		95% KM (z) UCL	0.876
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.877
Minimum	1E-09	95% KM (bootstrap t) UCL	0.884
Maximum	1.513	95% KM (BCA) UCL	0.869
Mean	0.803	95% KM (Percentile Bootstrap) UCL	0.875
Median	0.731	95% KM (Chebyshev) UCL	0.99
SD	0.352	97.5% KM (Chebyshev) UCL	1.069
k star	1.408	99% KM (Chebyshev) UCL	1.225
Theta star	0.57		
Nu star	188.6	**Potential UCLs to Use**	
AppChi2	157.9	95% KM (Chebyshev) UCL	0.99
95% Gamma Approximate UCL	0.959		
95% Adjusted Gamma UCL	0.963		

Note: DL/2 is not a recommended method.

Result (cadmium)

General Statistics

Number of Valid Data	67	Number of Detected Data	33
Number of Distinct Detected Data	33	Number of Non-Detect Data	34
		Percent Non-Detects	50.75%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.138	Minimum Detected	-1.984
Maximum Detected	1.66	Maximum Detected	0.507
Mean of Detected	0.539	Mean of Detected	-0.803
SD of Detected	0.345	SD of Detected	0.622
Minimum Non-Detect	0.268	Minimum Non-Detect	-1.319
Maximum Non-Detect	0.66	Maximum Non-Detect	-0.416
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	57
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	10
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	85.07%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.878	Lilliefors Test Statistic	0.974
5% Lilliefors Critical Value	0.931	5% Lilliefors Critical Value	0.931
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.4	Mean	-1.079
SD	0.279	SD	0.534
95% DL/2 (t) UCL	0.457	95% H-Stat (DL/2) UCL	0.423
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0429	Mean in Log Scale	-1.041
SD	0.588	SD in Log Scale	0.504
95% MLE (t) UCL	0.163	Mean in Original Scale	0.409
95% MLE (Tiku) UCL	0.411	SD in Original Scale	0.274
		95% Percentile Bootstrap UCL	0.467
		95% BCA Bootstrap UCL	0.471
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.62	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.206		
nu star	172.9		
A-D Test Statistic	0.368	**Nonparametric Statistics**	
5% A-D Critical Value	0.754	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.754	Mean	0.409
5% K-S Critical Value	0.154	SD	0.28
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0373
		95% KM (t) UCL	0.471
Assuming Gamma Distribution		95% KM (z) UCL	0.471
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.471
Minimum	0.138	95% KM (bootstrap t) UCL	0.482
Maximum	1.66	95% KM (BCA) UCL	0.473
Mean	0.541	95% KM (Percentile Bootstrap) UCL	0.474
Median	0.552	95% KM (Chebyshev) UCL	0.572
SD	0.245	97.5% KM (Chebyshev) UCL	0.642
k star	5.164	99% KM (Chebyshev) UCL	0.781
Theta star	0.105		
Nu star	692	**Potential UCLs to Use**	
AppChi2	631.9	95% KM (t) UCL	0.471
95% Gamma Approximate UCL	0.592		
95% Adjusted Gamma UCL	0.594		

Note: DL/2 is not a recommended method.

Result (chloroform)

General Statistics

Number of Valid Data	93	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	88
		Percent Non-Detects	94.62%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	11	Minimum Detected	2.398
Maximum Detected	1600	Maximum Detected	7.378
Mean of Detected	966.2	Mean of Detected	6.06
SD of Detected	708.7	SD of Detected	2.118
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1750	Maximum Non-Detect	7.467
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 5 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.863	Lilliefors Test Statistic	0.729
5% Lilliefors Critical Value	0.762	5% Lilliefors Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	104.7	Mean	1.346
SD	294.2	SD	2.491
95% DL/2 (t) UCL	155.4	95% H-Stat (DL/2) UCL	232.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.343
		SD in Log Scale	3.272
		Mean in Original Scale	52.86
		SD in Original Scale	264.1
		95% Percentile Bootstrap UCL	102
		95% BCA Bootstrap UCL	119.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.428	**Data appear Normal at 5% Significance Level**	
Theta Star	2256		
nu star	4.283		
A-D Test Statistic	0.661	**Nonparametric Statistics**	
5% A-D Critical Value	0.699	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.699	Mean	63.69
5% K-S Critical Value	0.367	SD	263.2
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	30.83
		95% KM (t) UCL	114.9
Assuming Gamma Distribution		95% KM (z) UCL	114.4
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	321.9
Minimum	11	95% KM (bootstrap t) UCL	103.5
Maximum	1600	95% KM (BCA) UCL	1501
Mean	966.2	95% KM (Percentile Bootstrap) UCL	1314
Median	966.2	95% KM (Chebyshev) UCL	198.1
SD	147.8	97.5% KM (Chebyshev) UCL	256.2
k star	11.23	99% KM (Chebyshev) UCL	370.4
Theta star	86.04		
Nu star	2089	**Potential UCLs to Use**	
AppChi2	1983	95% KM (t) UCL	114.9
95% Gamma Approximate UCL	1017	95% KM (Percentile Bootstrap) UCL	1314
95% Adjusted Gamma UCL	1018		

Note: DL/2 is not a recommended method.

Result (chromium)

General Statistics

Number of Valid Observations	67	Number of Distinct Observations	61

Raw Statistics		**Log-transformed Statistics**	
Minimum	13.7	Minimum of Log Data	2.617
Maximum	225	Maximum of Log Data	5.416
Mean	40.96	Mean of log Data	3.595
Median	37	SD of log Data	0.441
SD	28.07		
Coefficient of Variation	0.685		
Skewness	4.75		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.267	Lilliefors Test Statistic	0.132
Lilliefors Critical Value	0.108	Lilliefors Critical Value	0.108
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	46.69	95% H-UCL	44.32
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	49.9
95% Adjusted-CLT UCL	48.73	97.5% Chebyshev (MVUE) UCL	54.14
95% Modified-t UCL	47.02	99% Chebyshev (MVUE) UCL	62.48
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.23	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	9.684		
nu star	566.8		
Approximate Chi Square Value (.05)	512.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0464	95% CLT UCL	46.61
Adjusted Chi Square Value	511.5	95% Jackknife UCL	46.69
		95% Standard Bootstrap UCL	46.59
Anderson-Darling Test Statistic	2.539	95% Bootstrap-t UCL	51.89
Anderson-Darling 5% Critical Value	0.755	95% Hall's Bootstrap UCL	72.19
Kolmogorov-Smirnov Test Statistic	0.176	95% Percentile Bootstrap UCL	46.85
Kolmogorov-Smirnov 5% Critical Value	0.109	95% BCA Bootstrap UCL	49.08
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	55.91
		97.5% Chebyshev(Mean, Sd) UCL	62.38
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	75.09
95% Approximate Gamma UCL	45.3		
95% Adjusted Gamma UCL	45.4		
Potential UCL to Use		Use 95% Student's-t UCL	46.69
		or 95% Modified-t UCL	47.02

Result (chrysene)

General Statistics

Number of Valid Data	93	Number of Detected Data	40
Number of Distinct Detected Data	40	Number of Non-Detect Data	53
		Percent Non-Detects	56.99%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.875	Minimum Detected	1.056
Maximum Detected	4300	Maximum Detected	8.366
Mean of Detected	420.6	Mean of Detected	4.509
SD of Detected	861.6	SD of Detected	1.849
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.535	Lilliefors Test Statistic	0.967
5% Lilliefors Critical Value	0.94	5% Lilliefors Critical Value	0.94
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	344.9	Mean	3.72
SD	1272	SD	1.852
95% DL/2 (t) UCL	564.1	95% H-Stat (DL/2) UCL	319.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.158
		SD in Log Scale	1.882
		Mean in Original Scale	188.7
		SD in Original Scale	596.5
		95% Percentile Bootstrap UCL	302.1
		95% BCA Bootstrap UCL	332.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.41	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1026		
nu star	32.79		
A-D Test Statistic	1.564	**Nonparametric Statistics**	
5% A-D Critical Value	0.83	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.83	Mean	193
5% K-S Critical Value	0.149	SD	597.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	63.31
		95% KM (t) UCL	298.2
Assuming Gamma Distribution		95% KM (z) UCL	297.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	297.5
Minimum	2.875	95% KM (bootstrap t) UCL	402.6
Maximum	4300	95% KM (BCA) UCL	299.8
Mean	415.5	95% KM (Percentile Bootstrap) UCL	308.3
Median	403.6	95% KM (Chebyshev) UCL	469
SD	561.5	97.5% KM (Chebyshev) UCL	588.4
k star	0.865	99% KM (Chebyshev) UCL	822.9
Theta star	480.6		
Nu star	160.8	**Potential UCLs to Use**	
AppChi2	132.5	95% KM (Chebyshev) UCL	469
95% Gamma Approximate UCL	504.3		
95% Adjusted Gamma UCL	505.9		

Note: DL/2 is not a recommended method.

Result (cobalt)

General Statistics

Number of Valid Data	67	Number of Detected Data	66
Number of Distinct Detected Data	54	Number of Non-Detect Data	1
		Percent Non-Detects	1.49%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	6.29	Minimum Detected	1.839
Maximum Detected	20.88	Maximum Detected	3.039
Mean of Detected	13.62	Mean of Detected	2.569
SD of Detected	3.839	SD of Detected	0.303
Minimum Non-Detect	0.625	Minimum Non-Detect	-0.47
Maximum Non-Detect	0.625	Maximum Non-Detect	-0.47

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.073	Lilliefors Test Statistic	0.0903
5% Lilliefors Critical Value	0.109	5% Lilliefors Critical Value	0.109
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	13.42	Mean	2.513
SD	4.142	SD	0.546
95% DL/2 (t) UCL	14.26	95% H-Stat (DL/2) UCL	15.63
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	13.41	Mean in Log Scale	2.557
SD	4.154	SD in Log Scale	0.316
95% MLE (t) UCL	14.25	Mean in Original Scale	13.5
95% MLE (Tiku) UCL	14.26	SD in Original Scale	3.925
		95% Percentile Bootstrap UCL	14.29
		95% BCA Bootstrap UCL	14.33

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	11.33	**Data appear Normal at 5% Significance Level**	
Theta Star	1.202		
nu star	1495		
A-D Test Statistic	0.53	**Nonparametric Statistics**	
5% A-D Critical Value	0.751	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.751	Mean	13.51
5% K-S Critical Value	0.11	SD	3.884
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.478
		95% KM (t) UCL	14.31
Assuming Gamma Distribution		95% KM (z) UCL	14.29
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	14.3
Minimum	1.292	95% KM (bootstrap t) UCL	14.27
Maximum	20.88	95% KM (BCA) UCL	14.27
Mean	13.43	95% KM (Percentile Bootstrap) UCL	14.3
Median	13.5	95% KM (Chebyshev) UCL	15.59
SD	4.096	97.5% KM (Chebyshev) UCL	16.49
k star	7.667	99% KM (Chebyshev) UCL	18.27
Theta star	1.752		
Nu star	1027	**Potential UCLs to Use**	
AppChi2	954	95% KM (t) UCL	14.31
95% Gamma Approximate UCL	14.47	95% KM (Percentile Bootstrap) UCL	14.3
95% Adjusted Gamma UCL	14.49		

Note: DL/2 is not a recommended method.

Result (copper)

General Statistics

Number of Valid Data	67	Number of Detected Data	66
Number of Distinct Detected Data	63	Number of Non-Detect Data	1
		Percent Non-Detects	1.49%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	17	Minimum Detected	2.833
Maximum Detected	401	Maximum Detected	5.994
Mean of Detected	46.09	Mean of Detected	3.566
SD of Detected	56.89	SD of Detected	0.596
Minimum Non-Detect	28.7	Minimum Non-Detect	3.357
Maximum Non-Detect	28.7	Maximum Non-Detect	3.357

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.334	Lilliefors Test Statistic	0.155
5% Lilliefors Critical Value	0.109	5% Lilliefors Critical Value	0.109
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	45.62	Mean	3.552
SD	56.59	SD	0.602
95% DL/2 (t) UCL	57.15	95% H-Stat (DL/2) UCL	48.25
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	20.92	Mean in Log Scale	3.559
SD	78.32	SD in Log Scale	0.594
95% MLE (t) UCL	36.88	Mean in Original Scale	45.74
95% MLE (Tiku) UCL	39.24	SD in Original Scale	56.53
		95% Percentile Bootstrap UCL	58.38
		95% BCA Bootstrap UCL	63.77

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.956	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	23.56		
nu star	258.2		
A-D Test Statistic	5.668	**Nonparametric Statistics**	
5% A-D Critical Value	0.763	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.763	Mean	45.74
5% K-S Critical Value	0.111	SD	56.1
Data not Gamma Distributed at 5% Significance Level		SE of Mean	6.907
		95% KM (t) UCL	57.27
Assuming Gamma Distribution		95% KM (z) UCL	57.11
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	57.27
Minimum	17	95% KM (bootstrap t) UCL	71.93
Maximum	401	95% KM (BCA) UCL	58.24
Mean	45.71	95% KM (Percentile Bootstrap) UCL	58.09
Median	32.2	95% KM (Chebyshev) UCL	75.85
SD	56.54	97.5% KM (Chebyshev) UCL	88.88
k star	1.959	99% KM (Chebyshev) UCL	114.5
Theta star	23.34		
Nu star	262.5	**Potential UCLs to Use**	
AppChi2	226	95% KM (Chebyshev) UCL	75.85
95% Gamma Approximate UCL	53.1		
95% Adjusted Gamma UCL	53.27		

Note: DL/2 is not a recommended method.

Result (dibenzo(a,h)anthracene)

General Statistics

Number of Valid Data	93	Number of Detected Data	6
Number of Distinct Detected Data	5	Number of Non-Detect Data	87
		Percent Non-Detects	93.55%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.875	Minimum Detected	1.056
Maximum Detected	620	Maximum Detected	6.43
Mean of Detected	110.5	Mean of Detected	2.569
SD of Detected	249.7	SD of Detected	2.07
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.518	Lilliefors Test Statistic	0.779
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	199.6	Mean	3.081
SD	1152	SD	1.586
95% DL/2 (t) UCL	398.2	95% H-Stat (DL/2) UCL	125.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.222
		SD in Log Scale	1.141
		Mean in Original Scale	11.7
		SD in Original Scale	63.97
		95% Percentile Bootstrap UCL	24.83
		95% BCA Bootstrap UCL	37.69
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.271	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	407.8		
nu star	3.251		
A-D Test Statistic	1.029	**Nonparametric Statistics**	
5% A-D Critical Value	0.764	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.764	Mean	10.83
5% K-S Critical Value	0.356	SD	65.76
Data not Gamma Distributed at 5% Significance Level		SE of Mean	7.733
		95% KM (t) UCL	23.68
Assuming Gamma Distribution		95% KM (z) UCL	23.55
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	22.64
Minimum	1E-09	95% KM (bootstrap t) UCL	162.4
Maximum	620	95% KM (BCA) UCL	31.36
Mean	84.13	95% KM (Percentile Bootstrap) UCL	25.2
Median	99.59	95% KM (Chebyshev) UCL	44.54
SD	81.01	97.5% KM (Chebyshev) UCL	59.13
k star	0.15	99% KM (Chebyshev) UCL	87.78
Theta star	562.2		
Nu star	27.83	**Potential UCLs to Use**	
AppChi2	16.8	97.5% KM (Chebyshev) UCL	59.13
95% Gamma Approximate UCL	139.4		
95% Adjusted Gamma UCL	140.5		

Note: DL/2 is not a recommended method.

Result (ethylbenzene)			
General Statistics			
Number of Valid Data	93	Number of Detected Data	24
Number of Distinct Detected Data	24	Number of Non-Detect Data	69
		Percent Non-Detects	74.19%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.25	Minimum Detected	0.223
Maximum Detected	14500	Maximum Detected	9.582
Mean of Detected	2749	Mean of Detected	5.437
SD of Detected	4569	SD of Detected	2.939
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	625	Maximum Non-Detect	6.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	82
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	88.17%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.651	Lilliefors Test Statistic	0.941
5% Lilliefors Critical Value	0.916	5% Lilliefors Critical Value	0.916
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	719.7	Mean	1.678
SD	2582	SD	2.972
95% DL/2 (t) UCL	1165	95% H-Stat (DL/2) UCL	812.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.574
		SD in Log Scale	5.164
		Mean in Original Scale	709.7
		SD in Original Scale	2585
		95% Percentile Bootstrap UCL	1187
		95% BCA Bootstrap UCL	1315
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.274	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	10050		
nu star	13.13		
A-D Test Statistic	0.816	**Nonparametric Statistics**	
5% A-D Critical Value	0.859	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.859	Mean	710.7
5% K-S Critical Value	0.194	SD	2571
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	272.3
		95% KM (t) UCL	1163
Assuming Gamma Distribution		95% KM (z) UCL	1159
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1156
Minimum	1.25	95% KM (bootstrap t) UCL	1426
Maximum	14500	95% KM (BCA) UCL	1248
Mean	2707	95% KM (Percentile Bootstrap) UCL	1190
Median	2736	95% KM (Chebyshev) UCL	1898
SD	2288	97.5% KM (Chebyshev) UCL	2411
k star	0.888	99% KM (Chebyshev) UCL	3420
Theta star	3049		
Nu star	165.1	**Potential UCLs to Use**	
AppChi2	136.4	95% KM (t) UCL	1163
95% Gamma Approximate UCL	3276		
95% Adjusted Gamma UCL	3286		
Note: DL/2 is not a recommended method.			

Result (fluoranthene)

General Statistics

Number of Valid Data	93	Number of Detected Data	29
Number of Distinct Detected Data	25	Number of Non-Detect Data	64
		Percent Non-Detects	68.82%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	3300	Maximum Detected	8.102
Mean of Detected	269.8	Mean of Detected	3.967
SD of Detected	619.7	SD of Detected	2.072
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.439	Lilliefors Test Statistic	0.914
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	250.2	Mean	3.31
SD	1193	SD	1.771
95% DL/2 (t) UCL	455.8	95% H-Stat (DL/2) UCL	196.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	2.513
		SD in Log Scale	1.794
		Mean in Original Scale	91.61
		SD in Original Scale	362.6
		95% Percentile Bootstrap UCL	156.7
		95% BCA Bootstrap UCL	202.5
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.384	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	701.7		
nu star	22.3		
A-D Test Statistic	0.969	**Nonparametric Statistics**	
5% A-D Critical Value	0.833	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.833	Mean	91.47
5% K-S Critical Value	0.174	SD	363.8
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	38.72
		95% KM (t) UCL	155.8
Assuming Gamma Distribution		95% KM (z) UCL	155.2
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	155
Minimum	2.5	95% KM (bootstrap t) UCL	276
Maximum	3300	95% KM (BCA) UCL	168.1
Mean	341.1	95% KM (Percentile Bootstrap) UCL	163.3
Median	235.3	95% KM (Chebyshev) UCL	260.2
SD	418.3	97.5% KM (Chebyshev) UCL	333.3
k star	0.789	99% KM (Chebyshev) UCL	476.7
Theta star	432.4		
Nu star	146.7	**Potential UCLs to Use**	
AppChi2	119.7	95% KM (t) UCL	155.8
95% Gamma Approximate UCL	418		
95% Adjusted Gamma UCL	419.4		

Note: DL/2 is not a recommended method.

Result (fluorene)

General Statistics

Number of Valid Data	93	Number of Detected Data	36
Number of Distinct Detected Data	33	Number of Non-Detect Data	57
		Percent Non-Detects	61.29%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.125	Minimum Detected	1.139
Maximum Detected	52000	Maximum Detected	10.86
Mean of Detected	2709	Mean of Detected	5.026
SD of Detected	8793	SD of Detected	2.705
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	78
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	15
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.87%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.335	Lilliefors Test Statistic	0.938
5% Lilliefors Critical Value	0.935	5% Lilliefors Critical Value	0.935
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1068	Mean	3.73
SD	5580	SD	2.129
95% DL/2 (t) UCL	2030	95% H-Stat (DL/2) UCL	522.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.045
		SD in Log Scale	2.608
		Mean in Original Scale	1058
		SD in Original Scale	5582
		95% Percentile Bootstrap UCL	2135
		95% BCA Bootstrap UCL	3047
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.245	**Data appear Lognormal at 5% Significance Level**	
Theta Star	11052		
nu star	17.65		
A-D Test Statistic	1.907	**Nonparametric Statistics**	
5% A-D Critical Value	0.88	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.88	Mean	1054
5% K-S Critical Value	0.161	SD	5552
Data not Gamma Distributed at 5% Significance Level		SE of Mean	583.9
		95% KM (t) UCL	2025
Assuming Gamma Distribution		95% KM (z) UCL	2015
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2016
Minimum	1E-09	95% KM (bootstrap t) UCL	4726
Maximum	52000	95% KM (BCA) UCL	2234
Mean	2674	95% KM (Percentile Bootstrap) UCL	2157
Median	2585	95% KM (Chebyshev) UCL	3600
SD	5467	97.5% KM (Chebyshev) UCL	4701
k star	0.432	99% KM (Chebyshev) UCL	6864
Theta star	6189		
Nu star	80.37	**Potential UCLs to Use**	
AppChi2	60.71	97.5% KM (Chebyshev) UCL	4701
95% Gamma Approximate UCL	3540		
95% Adjusted Gamma UCL	3556		

Note: DL/2 is not a recommended method.

Result (indeno(1,2,3-cd)pyrene)

General Statistics

Number of Valid Data	93	Number of Detected Data	12
Number of Distinct Detected Data	12	Number of Non-Detect Data	81
		Percent Non-Detects	87.10%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	670	Maximum Detected	6.507
Mean of Detected	111.2	Mean of Detected	3.451
SD of Detected	191.7	SD of Detected	1.763
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	22000	Maximum Non-Detect	9.999
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.616	Lilliefors Test Statistic	0.955
5% Lilliefors Critical Value	0.859	5% Lilliefors Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	204.6	Mean	3.167
SD	1152	SD	1.604
95% DL/2 (t) UCL	403.1	95% H-Stat (DL/2) UCL	139.9
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.765
		SD in Log Scale	1.348
		Mean in Original Scale	20.89
		SD in Original Scale	75.27
		95% Percentile Bootstrap UCL	34.62
		95% BCA Bootstrap UCL	43.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.433	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	256.8		
nu star	10.4		
A-D Test Statistic	0.491	**Nonparametric Statistics**	
5% A-D Critical Value	0.785	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.785	Mean	20.85
5% K-S Critical Value	0.259	SD	77.6
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	8.786
		95% KM (t) UCL	35.45
Assuming Gamma Distribution		95% KM (z) UCL	35.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	34.95
Minimum	1E-09	95% KM (bootstrap t) UCL	56.24
Maximum	670	95% KM (BCA) UCL	38.81
Mean	75.5	95% KM (Percentile Bootstrap) UCL	37.93
Median	69.98	95% KM (Chebyshev) UCL	59.14
SD	81.71	97.5% KM (Chebyshev) UCL	75.71
k star	0.172	99% KM (Chebyshev) UCL	108.3
Theta star	439.6		
Nu star	31.94	**Potential UCLs to Use**	
AppChi2	20.03	95% KM (t) UCL	35.45
95% Gamma Approximate UCL	120.4		
95% Adjusted Gamma UCL	121.3		

Note: DL/2 is not a recommended method.

Result (isopropylbenzene)

General Statistics

Number of Valid Data	93	Number of Detected Data	19
Number of Distinct Detected Data	19	Number of Non-Detect Data	74
		Percent Non-Detects	79.57%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	4960	Maximum Detected	8.509
Mean of Detected	1194	Mean of Detected	5.283
SD of Detected	1537	SD of Detected	2.703
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1750	Maximum Non-Detect	7.467
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	88
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	94.62%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.789	Lilliefors Test Statistic	0.901
5% Lilliefors Critical Value	0.901	5% Lilliefors Critical Value	0.901
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	265.9	Mean	1.483
SD	834.5	SD	2.758
95% DL/2 (t) UCL	409.6	95% H-Stat (DL/2) UCL	389.9
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	3623	Mean in Log Scale	-1.796
SD	921.7	SD in Log Scale	4.612
95% MLE (t) UCL	3782	Mean in Original Scale	244.4
95% MLE (Tiku) UCL	4302	SD in Original Scale	834.5
		95% Percentile Bootstrap UCL	392.6
		95% BCA Bootstrap UCL	432.8
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.346	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	3448		
nu star	13.17		
A-D Test Statistic	0.405	**Nonparametric Statistics**	
5% A-D Critical Value	0.829	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.829	Mean	246.5
5% K-S Critical Value	0.213	SD	829.9
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	88.48
		95% KM (t) UCL	393.5
Assuming Gamma Distribution		95% KM (z) UCL	392.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	389.7
Minimum	1.5	95% KM (bootstrap t) UCL	454.5
Maximum	4960	95% KM (BCA) UCL	408.4
Mean	1146	95% KM (Percentile Bootstrap) UCL	400.3
Median	1193	95% KM (Chebyshev) UCL	632.2
SD	695.7	97.5% KM (Chebyshev) UCL	799.1
k star	1.425	99% KM (Chebyshev) UCL	1127
Theta star	803.9		
Nu star	265.1	**Potential UCLs to Use**	
AppChi2	228.4	95% KM (t) UCL	393.5
95% Gamma Approximate UCL	1330		
95% Adjusted Gamma UCL	1333		

Note: DL/2 is not a recommended method.

Result (lead)

General Statistics

Number of Valid Observations	67	Number of Distinct Observations	64

Raw Statistics		**Log-transformed Statistics**	
Minimum	7.42	Minimum of Log Data	2.004
Maximum	3810	Maximum of Log Data	8.245
Mean	160	Mean of log Data	3.555
Median	20.6	SD of log Data	1.38
SD	542.2		
Coefficient of Variation	3.388		
Skewness	5.551		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.415	Lilliefors Test Statistic	0.163
Lilliefors Critical Value	0.108	Lilliefors Critical Value	0.108
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	270.5	95% H-UCL	131.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	173.8
95% Adjusted-CLT UCL	317	97.5% Chebyshev (MVUE) UCL	210.7
95% Modified-t UCL	278	99% Chebyshev (MVUE) UCL	283.3
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.419	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	382		
nu star	56.14		
Approximate Chi Square Value (.05)	39.92	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0464	95% CLT UCL	269
Adjusted Chi Square Value	39.62	95% Jackknife UCL	270.5
		95% Standard Bootstrap UCL	266.7
Anderson-Darling Test Statistic	8.311	95% Bootstrap-t UCL	476.4
Anderson-Darling 5% Critical Value	0.834	95% Hall's Bootstrap UCL	355.8
Kolmogorov-Smirnov Test Statistic	0.239	95% Percentile Bootstrap UCL	274.4
Kolmogorov-Smirnov 5% Critical Value	0.116	95% BCA Bootstrap UCL	337.8
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	448.8
		97.5% Chebyshev(Mean, Sd) UCL	573.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	819.1
95% Approximate Gamma UCL	225.1		
95% Adjusted Gamma UCL	226.8		
Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	573.7

Result (mercury)

General Statistics

Number of Valid Data	67	Number of Detected Data	48
Number of Distinct Detected Data	36	Number of Non-Detect Data	19
		Percent Non-Detects	28.36%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.025	Minimum Detected	-3.689
Maximum Detected	132	Maximum Detected	4.883
Mean of Detected	2.996	Mean of Detected	-1.839
SD of Detected	19.02	SD of Detected	1.46
Minimum Non-Detect	0.0887	Minimum Non-Detect	-2.422
Maximum Non-Detect	0.175	Maximum Non-Detect	-1.743
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	50
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	74.63%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.156	Lilliefors Test Statistic	0.846
5% Lilliefors Critical Value	0.947	5% Lilliefors Critical Value	0.947
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.162	Mean	-2.157
SD	16.11	SD	1.339
95% DL/2 (t) UCL	5.444	95% H-Stat (DL/2) UCL	0.388
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.173
		SD in Log Scale	1.353
		Mean in Original Scale	2.161
		SD in Original Scale	16.11
		95% Percentile Bootstrap UCL	6.096
		95% BCA Bootstrap UCL	10.01
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.242	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	12.39		
nu star	23.21		
A-D Test Statistic	10.87	**Nonparametric Statistics**	
5% A-D Critical Value	0.887	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.887	Mean	2.162
5% K-S Critical Value	0.141	SD	15.98
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1.973
		95% KM (t) UCL	5.455
Assuming Gamma Distribution		95% KM (z) UCL	5.408
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	5.445
Minimum	0.025	95% KM (bootstrap t) UCL	158.4
Maximum	132	95% KM (BCA) UCL	6.127
Mean	3.236	95% KM (Percentile Bootstrap) UCL	6.093
Median	0.215	95% KM (Chebyshev) UCL	10.76
SD	16.06	97.5% KM (Chebyshev) UCL	14.49
k star	0.318	99% KM (Chebyshev) UCL	21.8
Theta star	10.17		
Nu star	42.64	**Potential UCLs to Use**	
AppChi2	28.67	95% KM (Chebyshev) UCL	10.76
95% Gamma Approximate UCL	4.813		
95% Adjusted Gamma UCL	4.855		

Note: DL/2 is not a recommended method.

Result (molybdenum)

General Statistics

Number of Valid Data	67	Number of Detected Data	27
Number of Distinct Detected Data	27	Number of Non-Detect Data	40
		Percent Non-Detects	59.70%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.101	Minimum Detected	-2.29
Maximum Detected	13.9	Maximum Detected	2.632
Mean of Detected	2.545	Mean of Detected	0.205
SD of Detected	3.518	SD of Detected	1.228
Minimum Non-Detect	0.0863	Minimum Non-Detect	-2.451
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	56
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	11
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	83.58%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.67	Lilliefors Test Statistic	0.976
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.213	Mean	-0.787
SD	2.475	SD	1.278
95% DL/2 (t) UCL	1.717	95% H-Stat (DL/2) UCL	1.443
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.298
		SD in Log Scale	1.62
		Mean in Original Scale	1.12
		SD in Original Scale	2.509
		95% Percentile Bootstrap UCL	1.66
		95% BCA Bootstrap UCL	1.823
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.746	**Data appear Lognormal at 5% Significance Level**	
Theta Star	3.41		
nu star	40.31		
A-D Test Statistic	0.971	**Nonparametric Statistics**	
5% A-D Critical Value	0.781	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.781	Mean	1.151
5% K-S Critical Value	0.174	SD	2.479
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.31
		95% KM (t) UCL	1.668
Assuming Gamma Distribution		95% KM (z) UCL	1.661
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.628
Minimum	0.101	95% KM (bootstrap t) UCL	1.996
Maximum	13.9	95% KM (BCA) UCL	1.837
Mean	2.573	95% KM (Percentile Bootstrap) UCL	1.707
Median	2.541	95% KM (Chebyshev) UCL	2.501
SD	2.212	97.5% KM (Chebyshev) UCL	3.085
k star	1.77	99% KM (Chebyshev) UCL	4.232
Theta star	1.454		
Nu star	237.2	**Potential UCLs to Use**	
AppChi2	202.5	95% KM (BCA) UCL	1.837
95% Gamma Approximate UCL	3.013		
95% Adjusted Gamma UCL	3.024		

Note: DL/2 is not a recommended method.

Result (naphthalene)

General Statistics

Number of Valid Data	93	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	73
		Percent Non-Detects	78.49%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	18000	Maximum Detected	9.798
Mean of Detected	5392	Mean of Detected	6.43
SD of Detected	6324	SD of Detected	3.182
Minimum Non-Detect	4.9	Minimum Non-Detect	1.589
Maximum Non-Detect	5100	Maximum Non-Detect	8.537
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	86
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.812	Lilliefors Test Statistic	0.829
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1203	Mean	2.862
SD	3632	SD	2.646
95% DL/2 (t) UCL	1829	95% H-Stat (DL/2) UCL	1019
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	13560	Mean in Log Scale	0.561
SD	4148	SD in Log Scale	4.051
95% MLE (t) UCL	14275	Mean in Original Scale	1162
95% MLE (Tiku) UCL	16141	SD in Original Scale	3635
		95% Percentile Bootstrap UCL	1838
		95% BCA Bootstrap UCL	1961
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.302	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	17848		
nu star	12.08		
A-D Test Statistic	1.08	**Nonparametric Statistics**	
5% A-D Critical Value	0.841	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.841	Mean	1165
5% K-S Critical Value	0.21	SD	3616
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	384.8
		95% KM (t) UCL	1804
Assuming Gamma Distribution		95% KM (z) UCL	1798
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1790
Minimum	3.75	95% KM (bootstrap t) UCL	2160
Maximum	64526	95% KM (BCA) UCL	1908
Mean	13380	95% KM (Percentile Bootstrap) UCL	1832
Median	9319	95% KM (Chebyshev) UCL	2842
SD	14970	97.5% KM (Chebyshev) UCL	3568
k star	0.628	99% KM (Chebyshev) UCL	4994
Theta star	21314		
Nu star	116.8	**Potential UCLs to Use**	
AppChi2	92.82	95% KM (t) UCL	1804
95% Gamma Approximate UCL	16833		
95% Adjusted Gamma UCL	16894		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)

General Statistics

Number of Valid Data	93	Number of Detected Data	15
Number of Distinct Detected Data	14	Number of Non-Detect Data	78
		Percent Non-Detects	83.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.8	Minimum Detected	1.03
Maximum Detected	5480	Maximum Detected	8.609
Mean of Detected	1292	Mean of Detected	5.17
SD of Detected	1831	SD of Detected	2.834
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1750	Maximum Non-Detect	7.467
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	89
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.737	Lilliefors Test Statistic	0.879
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	243.9	Mean	1.533
SD	859.6	SD	2.695
95% DL/2 (t) UCL	392	95% H-Stat (DL/2) UCL	438.6
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	4344	Mean in Log Scale	-3.367
SD	1479	SD in Log Scale	5.002
95% MLE (t) UCL	4599	Mean in Original Scale	208.7
95% MLE (Tiku) UCL	5551	SD in Original Scale	859.4
		95% Percentile Bootstrap UCL	361.5
		95% BCA Bootstrap UCL	422.9

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.316	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	4096		
nu star	9.467		
A-D Test Statistic	0.425	**Nonparametric Statistics**	
5% A-D Critical Value	0.827	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.827	Mean	212.2
5% K-S Critical Value	0.239	SD	854.4
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	91.76
		95% KM (t) UCL	364.6
Assuming Gamma Distribution		95% KM (z) UCL	363.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	360
Minimum	2.8	95% KM (bootstrap t) UCL	532.6
Maximum	6875	95% KM (BCA) UCL	379.6
Mean	1721	95% KM (Percentile Bootstrap) UCL	378.8
Median	1200	95% KM (Chebyshev) UCL	612.1
SD	1483	97.5% KM (Chebyshev) UCL	785.2
k star	1.062	99% KM (Chebyshev) UCL	1125
Theta star	1621		
Nu star	197.6	**Potential UCLs to Use**	
AppChi2	166	95% KM (t) UCL	364.6
95% Gamma Approximate UCL	2048		
95% Adjusted Gamma UCL	2054		

Note: DL/2 is not a recommended method.

Result (nickel)

General Statistics

Number of Valid Observations	67	Number of Distinct Observations	61

Raw Statistics		**Log-transformed Statistics**	
Minimum	10.4	Minimum of Log Data	2.342
Maximum	32.6	Maximum of Log Data	3.484
Mean	22.66	Mean of log Data	3.092
Median	22.6	SD of log Data	0.25
SD	5.21		
Coefficient of Variation	0.23		
Skewness	-0.222		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.0586	Lilliefors Test Statistic	0.102
Lilliefors Critical Value	0.108	Lilliefors Critical Value	0.108
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	23.73	95% H-UCL	23.96
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	25.77
95% Adjusted-CLT UCL	23.69	97.5% Chebyshev (MVUE) UCL	27.1
95% Modified-t UCL	23.72	99% Chebyshev (MVUE) UCL	29.71
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	16.68	**Data appear Normal at 5% Significance Level**	
Theta Star	1.359		
nu star	2235		
Approximate Chi Square Value (.05)	2126	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0464	95% CLT UCL	23.71
Adjusted Chi Square Value	2124	95% Jackknife UCL	23.73
		95% Standard Bootstrap UCL	23.7
Anderson-Darling Test Statistic	0.525	95% Bootstrap-t UCL	23.68
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	23.73
Kolmogorov-Smirnov Test Statistic	0.0852	95% Percentile Bootstrap UCL	23.76
Kolmogorov-Smirnov 5% Critical Value	0.109	95% BCA Bootstrap UCL	23.64
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	25.44
		97.5% Chebyshev(Mean, Sd) UCL	26.64
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	29
95% Approximate Gamma UCL	23.82		
95% Adjusted Gamma UCL	23.85		
Potential UCL to Use		Use 95% Student's-t UCL	23.73

Result (n-propylbenzene)

General Statistics

Number of Valid Data	93	Number of Detected Data	24
Number of Distinct Detected Data	24	Number of Non-Detect Data	69
		Percent Non-Detects	74.19%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.7	Minimum Detected	0.531
Maximum Detected	7440	Maximum Detected	8.915
Mean of Detected	1173	Mean of Detected	5.121
SD of Detected	1916	SD of Detected	2.592
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	625	Maximum Non-Detect	6.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	85
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.40%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.673	Lilliefors Test Statistic	0.939
5% Lilliefors Critical Value	0.916	5% Lilliefors Critical Value	0.916
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	311.9	Mean	1.568
SD	1087	SD	2.761
95% DL/2 (t) UCL	499.1	95% H-Stat (DL/2) UCL	359.7
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.928
		SD in Log Scale	4.473
		Mean in Original Scale	303.2
		SD in Original Scale	1088
		95% Percentile Bootstrap UCL	500.4
		95% BCA Bootstrap UCL	575.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.331	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	3549		
nu star	15.87		
A-D Test Statistic	0.386	**Nonparametric Statistics**	
5% A-D Critical Value	0.841	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.841	Mean	304.8
5% K-S Critical Value	0.192	SD	1082
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	114.6
		95% KM (t) UCL	495.3
Assuming Gamma Distribution		95% KM (z) UCL	493.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	491.7
Minimum	1E-09	95% KM (bootstrap t) UCL	654.7
Maximum	7440	95% KM (BCA) UCL	513.8
Mean	1028	95% KM (Percentile Bootstrap) UCL	493.2
Median	1117	95% KM (Chebyshev) UCL	804.4
SD	1049	97.5% KM (Chebyshev) UCL	1021
k star	0.268	99% KM (Chebyshev) UCL	1445
Theta star	3835		
Nu star	49.87	**Potential UCLs to Use**	
AppChi2	34.65	95% KM (t) UCL	495.3
95% Gamma Approximate UCL	1480		
95% Adjusted Gamma UCL	1488		

Note: DL/2 is not a recommended method.

Result (o-xylene)

General Statistics

Number of Valid Data	92	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	72
		Percent Non-Detects	78.26%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	16750	Maximum Detected	9.726
Mean of Detected	1735	Mean of Detected	4.218
SD of Detected	4084	SD of Detected	3.293
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1750	Maximum Non-Detect	7.467
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	88
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.65%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.489	Lilliefors Test Statistic	0.906
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	406.2	Mean	1.526
SD	1998	SD	2.745
95% DL/2 (t) UCL	752.3	95% H-Stat (DL/2) UCL	434.3
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.529
		SD in Log Scale	5.282
		Mean in Original Scale	377.4
		SD in Original Scale	2000
		95% Percentile Bootstrap UCL	764
		95% BCA Bootstrap UCL	982
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.223	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	7779		
nu star	8.922		
A-D Test Statistic	0.891	**Nonparametric Statistics**	
5% A-D Critical Value	0.878	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.878	Mean	379.3
5% K-S Critical Value	0.213	SD	1989
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	212.8
		95% KM (t) UCL	732.9
Assuming Gamma Distribution		95% KM (z) UCL	729.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	725.8
Minimum	1E-09	95% KM (bootstrap t) UCL	1945
Maximum	16750	95% KM (BCA) UCL	820.2
Mean	1377	95% KM (Percentile Bootstrap) UCL	756.2
Median	1137	95% KM (Chebyshev) UCL	1307
SD	2064	97.5% KM (Chebyshev) UCL	1708
k star	0.132	99% KM (Chebyshev) UCL	2496
Theta star	10428		
Nu star	24.29	**Potential UCLs to Use**	
AppChi2	14.07	95% KM (t) UCL	732.9
95% Gamma Approximate UCL	2377		
95% Adjusted Gamma UCL	2398		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	92	Number of Detected Data	26
Number of Distinct Detected Data	25	Number of Non-Detect Data	66
		Percent Non-Detects	71.74%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.25	Minimum Detected	0.223
Maximum Detected	77500	Maximum Detected	11.26
Mean of Detected	7445	Mean of Detected	4.637
SD of Detected	18729	SD of Detected	3.767
Minimum Non-Detect	0.97	Minimum Non-Detect	-0.0305
Maximum Non-Detect	1000	Maximum Non-Detect	6.908
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	84
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.30%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.465	Lilliefors Test Statistic	0.877
5% Lilliefors Critical Value	0.92	5% Lilliefors Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2128	Mean	2.083
SD	10374	SD	2.973
95% DL/2 (t) UCL	3926	95% H-Stat (DL/2) UCL	1433
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.836
		SD in Log Scale	5.238
		Mean in Original Scale	2104
		SD in Original Scale	10379
		95% Percentile Bootstrap UCL	4054
		95% BCA Bootstrap UCL	4861
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.181	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	41153		
nu star	9.407		
A-D Test Statistic	1.751	**Nonparametric Statistics**	
5% A-D Critical Value	0.905	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.905	Mean	2106
5% K-S Critical Value	0.191	SD	10322
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1097
		95% KM (t) UCL	3930
Assuming Gamma Distribution		95% KM (z) UCL	3911
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3904
Minimum	1E-09	95% KM (bootstrap t) UCL	10548
Maximum	77500	95% KM (BCA) UCL	4234
Mean	7195	95% KM (Percentile Bootstrap) UCL	4109
Median	7569	95% KM (Chebyshev) UCL	6890
SD	10067	97.5% KM (Chebyshev) UCL	8960
k star	0.253	99% KM (Chebyshev) UCL	13026
Theta star	28457		
Nu star	46.52	**Potential UCLs to Use**	
AppChi2	31.87	97.5% KM (Chebyshev) UCL	8960
95% Gamma Approximate UCL	10502		
95% Adjusted Gamma UCL	10566		

Note: DL/2 is not a recommended method.

Result (phenanthrene)

General Statistics

Number of Valid Data	93	Number of Detected Data	41
Number of Distinct Detected Data	40	Number of Non-Detect Data	52
		Percent Non-Detects	55.91%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.75	Minimum Detected	1.322
Maximum Detected	190000	Maximum Detected	12.15
Mean of Detected	6847	Mean of Detected	5.384
SD of Detected	29655	SD of Detected	2.773
Minimum Non-Detect	4.625	Minimum Non-Detect	1.531
Maximum Non-Detect	230	Maximum Non-Detect	5.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	77
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	82.80%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.243	Lilliefors Test Statistic	0.949
5% Lilliefors Critical Value	0.941	5% Lilliefors Critical Value	0.941
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3036	Mean	3.964
SD	19848	SD	2.37
95% DL/2 (t) UCL	6456	95% H-Stat (DL/2) UCL	1229
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.093
		SD in Log Scale	3.028
		Mean in Original Scale	3025
		SD in Original Scale	19850
		95% Percentile Bootstrap UCL	7018
		95% BCA Bootstrap UCL	9715
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.212	**Data appear Lognormal at 5% Significance Level**	
Theta Star	32240		
nu star	17.42		
A-D Test Statistic	3.234	**Nonparametric Statistics**	
5% A-D Critical Value	0.898	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.898	Mean	3024
5% K-S Critical Value	0.152	SD	19743
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2073
		95% KM (t) UCL	6468
Assuming Gamma Distribution		95% KM (z) UCL	6433
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6444
Minimum	1E-09	95% KM (bootstrap t) UCL	23779
Maximum	190000	95% KM (BCA) UCL	7233
Mean	6694	95% KM (Percentile Bootstrap) UCL	7037
Median	6270	95% KM (Chebyshev) UCL	12059
SD	19615	97.5% KM (Chebyshev) UCL	15968
k star	0.311	99% KM (Chebyshev) UCL	23647
Theta star	21551		
Nu star	57.78	**Potential UCLs to Use**	
AppChi2	41.3	97.5% KM (Chebyshev) UCL	15968
95% Gamma Approximate UCL	9364		
95% Adjusted Gamma UCL	9414		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	93	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	78
		Percent Non-Detects	83.87%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	4738	Maximum Detected	8.463
Mean of Detected	1395	Mean of Detected	5.513
SD of Detected	1666	SD of Detected	2.82
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	625	Maximum Non-Detect	6.438
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	86
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	7
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.47%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.808	Lilliefors Test Statistic	0.855
5% Lilliefors Critical Value	0.881	5% Lilliefors Critical Value	0.881
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	242.1	Mean	1.417
SD	826.8	SD	2.663
95% DL/2 (t) UCL	384.6	95% H-Stat (DL/2) UCL	270.5
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-3.022
		SD in Log Scale	5.014
		Mean in Original Scale	225.3
		SD in Original Scale	829.4
		95% Percentile Bootstrap UCL	373.1
		95% BCA Bootstrap UCL	408
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.351	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	3970		
nu star	10.54		
A-D Test Statistic	0.446	**Nonparametric Statistics**	
5% A-D Critical Value	0.818	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.818	Mean	226.9
5% K-S Critical Value	0.237	SD	824.6
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	88.52
		95% KM (t) UCL	374
Assuming Gamma Distribution		95% KM (z) UCL	372.5
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	369.4
Minimum	1.5	95% KM (bootstrap t) UCL	454.2
Maximum	4945	95% KM (BCA) UCL	398.7
Mean	1661	95% KM (Percentile Bootstrap) UCL	386.2
Median	1336	95% KM (Chebyshev) UCL	612.8
SD	1086	97.5% KM (Chebyshev) UCL	779.7
k star	1.414	99% KM (Chebyshev) UCL	1108
Theta star	1175		
Nu star	263	**Potential UCLs to Use**	
AppChi2	226.5	95% KM (t) UCL	374
95% Gamma Approximate UCL	1929		
95% Adjusted Gamma UCL	1934		

Note: DL/2 is not a recommended method.

Result (pyrene)

General Statistics

Number of Valid Data	93	Number of Detected Data	43
Number of Distinct Detected Data	41	Number of Non-Detect Data	50
		Percent Non-Detects	53.76%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	2.5	Minimum Detected	0.916
Maximum Detected	26000	Maximum Detected	10.17
Mean of Detected	1208	Mean of Detected	4.855
SD of Detected	4093	SD of Detected	2.186
Minimum Non-Detect	12.5	Minimum Non-Detect	2.526
Maximum Non-Detect	2300	Maximum Non-Detect	7.741
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	89
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.318	Lilliefors Test Statistic	0.982
5% Lilliefors Critical Value	0.943	5% Lilliefors Critical Value	0.943
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	600.7	Mean	3.794
SD	2828	SD	2.039
95% DL/2 (t) UCL	1088	95% H-Stat (DL/2) UCL	551.2
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	3.142
		SD in Log Scale	2.39
		Mean in Original Scale	564
		SD in Original Scale	2830
		95% Percentile Bootstrap UCL	1132
		95% BCA Bootstrap UCL	1690
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.301	**Data appear Lognormal at 5% Significance Level**	
Theta Star	4018		
nu star	25.86		
A-D Test Statistic	2.344	**Nonparametric Statistics**	
5% A-D Critical Value	0.859	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.859	Mean	567
5% K-S Critical Value	0.146	SD	2815
Data not Gamma Distributed at 5% Significance Level		SE of Mean	295.4
		95% KM (t) UCL	1058
Assuming Gamma Distribution		95% KM (z) UCL	1053
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1055
Minimum	2.5	95% KM (bootstrap t) UCL	2728
Maximum	26000	95% KM (BCA) UCL	1147
Mean	1248	95% KM (Percentile Bootstrap) UCL	1120
Median	771.9	95% KM (Chebyshev) UCL	1855
SD	2804	97.5% KM (Chebyshev) UCL	2412
k star	0.561	99% KM (Chebyshev) UCL	3506
Theta star	2226		
Nu star	104.3	**Potential UCLs to Use**	
AppChi2	81.72	97.5% KM (Chebyshev) UCL	2412
95% Gamma Approximate UCL	1592		
95% Adjusted Gamma UCL	1599		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	93	Number of Detected Data	21
Number of Distinct Detected Data	20	Number of Non-Detect Data	72
		Percent Non-Detects	77.42%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.375	Minimum Detected	0.318
Maximum Detected	2550	Maximum Detected	7.844
Mean of Detected	654.6	Mean of Detected	4.646
SD of Detected	818.3	SD of Detected	2.747
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1750	Maximum Non-Detect	7.467
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	89
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	4
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	95.70%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.787	Lilliefors Test Statistic	0.864
5% Lilliefors Critical Value	0.908	5% Lilliefors Critical Value	0.908
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	169.1	Mean	1.426
SD	475.1	SD	2.636
95% DL/2 (t) UCL	251	95% H-Stat (DL/2) UCL	251.6
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	475.2	Mean in Log Scale	-1.684
SD	741.8	SD in Log Scale	4.43
95% MLE (t) UCL	603	Mean in Original Scale	148.2
95% MLE (Tiku) UCL	1502	SD in Original Scale	470.3
		95% Percentile Bootstrap UCL	231
		95% BCA Bootstrap UCL	253.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.343	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1906		
nu star	14.42		
A-D Test Statistic	0.677	**Nonparametric Statistics**	
5% A-D Critical Value	0.833	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.833	Mean	150.1
5% K-S Critical Value	0.204	SD	467.9
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	49.8
		95% KM (t) UCL	232.9
Assuming Gamma Distribution		95% KM (z) UCL	232.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	231.3
Minimum	1.375	95% KM (bootstrap t) UCL	256
Maximum	2550	95% KM (BCA) UCL	238.7
Mean	705.1	95% KM (Percentile Bootstrap) UCL	235.3
Median	644	95% KM (Chebyshev) UCL	367.2
SD	410.6	97.5% KM (Chebyshev) UCL	461.2
k star	1.26	99% KM (Chebyshev) UCL	645.7
Theta star	559.7		
Nu star	234.3	**Potential UCLs to Use**	
AppChi2	199.9	95% KM (t) UCL	232.9
95% Gamma Approximate UCL	826.6		
95% Adjusted Gamma UCL	828.7		

Note: DL/2 is not a recommended method.

Result (tert-butyl alcohol (tba))

General Statistics

Number of Valid Data	93	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	85
		Percent Non-Detects	91.40%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	12	Minimum Detected	2.485
Maximum Detected	98	Maximum Detected	4.585
Mean of Detected	49.47	Mean of Detected	3.685
SD of Detected	31.02	SD of Detected	0.753
Minimum Non-Detect	9.7	Minimum Non-Detect	2.272
Maximum Non-Detect	17500	Maximum Non-Detect	9.77
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	93
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.947	Lilliefors Test Statistic	0.94
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	687	Mean	3.956
SD	1650	SD	2.124
95% DL/2 (t) UCL	971.3	95% H-Stat (DL/2) UCL	1106
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.933
		SD in Log Scale	0.898
		Mean in Original Scale	11.15
		SD in Original Scale	15.73
		95% Percentile Bootstrap UCL	13.89
		95% BCA Bootstrap UCL	14.57
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.626	**Data appear Normal at 5% Significance Level**	
Theta Star	30.42		
nu star	26.02		
A-D Test Statistic	0.214	**Nonparametric Statistics**	
5% A-D Critical Value	0.723	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.723	Mean	17.32
5% K-S Critical Value	0.297	SD	15.59
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.135
		95% KM (t) UCL	20.87
Assuming Gamma Distribution		95% KM (z) UCL	20.83
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	20.63
Minimum	1E-09	95% KM (bootstrap t) UCL	21.04
Maximum	98	95% KM (BCA) UCL	47.5
Mean	50.96	95% KM (Percentile Bootstrap) UCL	35.66
Median	56.2	95% KM (Chebyshev) UCL	26.62
SD	20.58	97.5% KM (Chebyshev) UCL	30.65
k star	1.499	99% KM (Chebyshev) UCL	38.56
Theta star	34		
Nu star	278.8	**Potential UCLs to Use**	
AppChi2	241.1	95% KM (t) UCL	20.87
95% Gamma Approximate UCL	58.92	95% KM (Percentile Bootstrap) UCL	35.66
95% Adjusted Gamma UCL	59.06		

Note: DL/2 is not a recommended method.

Result (thallium)

General Statistics

Number of Valid Data	67	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	61
		Percent Non-Detects	91.04%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	3.14	Minimum Detected	1.144
Maximum Detected	5.68	Maximum Detected	1.737
Mean of Detected	4.233	Mean of Detected	1.422
SD of Detected	0.945	SD of Detected	0.223
Minimum Non-Detect	0.774	Minimum Non-Detect	-0.256
Maximum Non-Detect	1.25	Maximum Non-Detect	0.223
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	61
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	6
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	91.04%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.955	Lilliefors Test Statistic	0.962
5% Lilliefors Critical Value	0.788	5% Lilliefors Critical Value	0.788
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.843	Mean	-0.506
SD	1.107	SD	0.643
95% DL/2 (t) UCL	1.068	95% H-Stat (DL/2) UCL	0.757
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.168
		SD in Log Scale	0.551
		Mean in Original Scale	1.404
		SD in Original Scale	1.023
		95% Percentile Bootstrap UCL	1.621
		95% BCA Bootstrap UCL	1.648
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	12.29	**Data appear Normal at 5% Significance Level**	
Theta Star	0.344		
nu star	147.5		
A-D Test Statistic	0.23	**Nonparametric Statistics**	
5% A-D Critical Value	0.697	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.697	Mean	3.238
5% K-S Critical Value	0.332	SD	0.405
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0542
		95% KM (t) UCL	3.328
Assuming Gamma Distribution		95% KM (z) UCL	3.327
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.39
Minimum	2.769	95% KM (bootstrap t) UCL	3.33
Maximum	5.68	95% KM (BCA) UCL	4.589
Mean	4.187	95% KM (Percentile Bootstrap) UCL	4.044
Median	4.244	95% KM (Chebyshev) UCL	3.474
SD	0.433	97.5% KM (Chebyshev) UCL	3.576
k star	84.54	99% KM (Chebyshev) UCL	3.777
Theta star	0.0495		
Nu star	11328	**Potential UCLs to Use**	
AppChi2	11082	95% KM (t) UCL	3.328
95% Gamma Approximate UCL	4.281	95% KM (Percentile Bootstrap) UCL	4.044
95% Adjusted Gamma UCL	4.283		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics			
Number of Valid Data	93	Number of Detected Data	16
Number of Distinct Detected Data	16	Number of Non-Detect Data	77
		Percent Non-Detects	82.80%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	5063	Maximum Detected	8.53
Mean of Detected	533.1	Mean of Detected	3.349
SD of Detected	1260	SD of Detected	2.938
Minimum Non-Detect	0.49	Minimum Non-Detect	-0.713
Maximum Non-Detect	1563	Maximum Non-Detect	7.354
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	92
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	98.92%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.476	Lilliefors Test Statistic	0.873
5% Lilliefors Critical Value	0.887	5% Lilliefors Critical Value	0.887
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	127.4	Mean	1.427
SD	551.8	SD	2.472
95% DL/2 (t) UCL	222.5	95% H-Stat (DL/2) UCL	209.1
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.998
		SD in Log Scale	4.521
		Mean in Original Scale	91.86
		SD in Original Scale	547.4
		95% Percentile Bootstrap UCL	192.1
		95% BCA Bootstrap UCL	266.2
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.24	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	2226		
nu star	7.664		
A-D Test Statistic	1.103	**Nonparametric Statistics**	
5% A-D Critical Value	0.861	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.861	Mean	93.77
5% K-S Critical Value	0.236	SD	544.6
Data not Gamma Distributed at 5% Significance Level		SE of Mean	58.38
		95% KM (t) UCL	190.8
Assuming Gamma Distribution		95% KM (z) UCL	189.8
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	188.1
Minimum	1E-09	95% KM (bootstrap t) UCL	458.5
Maximum	5063	95% KM (BCA) UCL	207.2
Mean	410.6	95% KM (Percentile Bootstrap) UCL	198.7
Median	219.1	95% KM (Chebyshev) UCL	348.2
SD	606.5	97.5% KM (Chebyshev) UCL	458.4
k star	0.116	99% KM (Chebyshev) UCL	674.6
Theta star	3526		
Nu star	21.66	**Potential UCLs to Use**	
AppChi2	12.09	97.5% KM (Chebyshev) UCL	458.4
95% Gamma Approximate UCL	736		
95% Adjusted Gamma UCL	743		
Note: DL/2 is not a recommended method.			

Result (vanadium)

General Statistics

Number of Valid Observations	67	Number of Distinct Observations	60

Raw Statistics		**Log-transformed Statistics**	
Minimum	21.3	Minimum of Log Data	3.059
Maximum	83.63	Maximum of Log Data	4.426
Mean	50.87	Mean of log Data	3.877
Median	47.6	SD of log Data	0.333
SD	16.08		
Coefficient of Variation	0.316		
Skewness	0.217		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.119	Lilliefors Test Statistic	0.123
Lilliefors Critical Value	0.108	Lilliefors Critical Value	0.108
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	54.15	95% H-UCL	54.85
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	60.24
95% Adjusted-CLT UCL	54.16	97.5% Chebyshev (MVUE) UCL	64.25
95% Modified-t UCL	54.16	99% Chebyshev (MVUE) UCL	72.11
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	9.304	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	5.468		
nu star	1247		
Approximate Chi Square Value (.05)	1166	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0464	95% CLT UCL	54.1
Adjusted Chi Square Value	1164	95% Jackknife UCL	54.15
		95% Standard Bootstrap UCL	53.97
Anderson-Darling Test Statistic	1.029	95% Bootstrap-t UCL	54.12
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	53.89
Kolmogorov-Smirnov Test Statistic	0.124	95% Percentile Bootstrap UCL	54.12
Kolmogorov-Smirnov 5% Critical Value	0.109	95% BCA Bootstrap UCL	54.08
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	59.43
		97.5% Chebyshev(Mean, Sd) UCL	63.14
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	70.41
95% Approximate Gamma UCL	54.4		
95% Adjusted Gamma UCL	54.48		
Potential UCL to Use		Use 95% Student's-t UCL	54.15
		or 95% Modified-t UCL	54.16

Result (xylenes, total)

General Statistics

Number of Valid Data	93	Number of Detected Data	26
Number of Distinct Detected Data	24	Number of Non-Detect Data	67
		Percent Non-Detects	72.04%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.25	Minimum Detected	0.223
Maximum Detected	71000	Maximum Detected	11.17
Mean of Detected	7850	Mean of Detected	4.847
SD of Detected	19252	SD of Detected	3.73
Minimum Non-Detect	0.97	Minimum Non-Detect	-0.0305
Maximum Non-Detect	1000	Maximum Non-Detect	6.908
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	84
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	9
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	90.32%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.462	Lilliefors Test Statistic	0.89
5% Lilliefors Critical Value	0.92	5% Lilliefors Critical Value	0.92
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2219	Mean	2.132
SD	10638	SD	2.998
95% DL/2 (t) UCL	4052	95% H-Stat (DL/2) UCL	1573
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.88
		SD in Log Scale	5.34
		Mean in Original Scale	2195
		SD in Original Scale	10642
		95% Percentile Bootstrap UCL	4230
		95% BCA Bootstrap UCL	5202
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.186	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	42196		
nu star	9.674		
A-D Test Statistic	1.593	**Nonparametric Statistics**	
5% A-D Critical Value	0.902	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.902	Mean	2196
5% K-S Critical Value	0.19	SD	10585
Data not Gamma Distributed at 5% Significance Level		SE of Mean	1119
		95% KM (t) UCL	4056
Assuming Gamma Distribution		95% KM (z) UCL	4038
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	4030
Minimum	1E-09	95% KM (bootstrap t) UCL	8268
Maximum	71000	95% KM (BCA) UCL	4183
Mean	7685	95% KM (Percentile Bootstrap) UCL	4223
Median	8100	95% KM (Chebyshev) UCL	7076
SD	10280	97.5% KM (Chebyshev) UCL	9187
k star	0.286	99% KM (Chebyshev) UCL	13334
Theta star	26900		
Nu star	53.14	**Potential UCLs to Use**	
AppChi2	37.39	97.5% KM (Chebyshev) UCL	9187
95% Gamma Approximate UCL	10921		
95% Adjusted Gamma UCL	10982		

Note: DL/2 is not a recommended method.

Result (zinc)

General Statistics

Number of Valid Observations	67	Number of Distinct Observations	64

Raw Statistics		**Log-transformed Statistics**	
Minimum	51	Minimum of Log Data	3.932
Maximum	8250	Maximum of Log Data	9.018
Mean	223.5	Mean of log Data	4.601
Median	85.3	SD of log Data	0.68
SD	996.6		
Coefficient of Variation	4.46		
Skewness	8.155		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Lilliefors Test Statistic	0.468	Lilliefors Test Statistic	0.175
Lilliefors Critical Value	0.108	Lilliefors Critical Value	0.108
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	426.6	95% H-UCL	148
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	174.4
95% Adjusted-CLT UCL	553.4	97.5% Chebyshev (MVUE) UCL	195.8
95% Modified-t UCL	446.8	99% Chebyshev (MVUE) UCL	237.9
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.718	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	311.2		
nu star	96.23		
Approximate Chi Square Value (.05)	74.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0464	95% CLT UCL	423.7
Adjusted Chi Square Value	74.18	95% Jackknife UCL	426.6
		95% Standard Bootstrap UCL	416.8
Anderson-Darling Test Statistic	14.5	95% Bootstrap-t UCL	3252
Anderson-Darling 5% Critical Value	0.793	95% Hall's Bootstrap UCL	1289
Kolmogorov-Smirnov Test Statistic	0.341	95% Percentile Bootstrap UCL	465.5
Kolmogorov-Smirnov 5% Critical Value	0.113	95% BCA Bootstrap UCL	594.2
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	754.2
		97.5% Chebyshev(Mean, Sd) UCL	983.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1435
95% Approximate Gamma UCL	288.3		
95% Adjusted Gamma UCL	289.9		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	754.2

	General UCL Statistics for Data Sets with Non-Detects		
User Selected Options			
From File	C:\Documents and Settings\sselden\Desktop\cenco\soil gas\Area 4.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Result (benzene)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	15
		Percent Non-Detects	57.69%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	490	Maximum Detected	6.194
Mean of Detected	56.62	Mean of Detected	2.481
SD of Detected	144.3	SD of Detected	1.615
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	5	Maximum Non-Detect	1.609
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	18
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	69.23%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.416	Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	24.32	Mean	0.712
SD	95.5	SD	1.878
95% DL/2 (t) UCL	56.31	95% H-Stat (DL/2) UCL	21.92
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.302
		SD in Log Scale	2.929
		Mean in Original Scale	24.09
		SD in Original Scale	95.55
		95% Percentile Bootstrap UCL	60.71
		95% BCA Bootstrap UCL	82.47
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.366	**Data appear Lognormal at 5% Significance Level**	
Theta Star	154.7		
nu star	8.05		
A-D Test Statistic	1.249	**Nonparametric Statistics**	
5% A-D Critical Value	0.797	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.797	Mean	24.77
5% K-S Critical Value	0.272	SD	93.53
Data not Gamma Distributed at 5% Significance Level		SE of Mean	19.24
		95% KM (t) UCL	57.63
Assuming Gamma Distribution		95% KM (z) UCL	56.41
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	56.16
Minimum	1E-09	95% KM (bootstrap t) UCL	364.5
Maximum	558.7	95% KM (BCA) UCL	63.53
Mean	111.1	95% KM (Percentile Bootstrap) UCL	62.07
Median	17.5	95% KM (Chebyshev) UCL	108.6
SD	170	97.5% KM (Chebyshev) UCL	144.9
k star	0.146	99% KM (Chebyshev) UCL	216.2
Theta star	758.9		
Nu star	7.61	**Potential UCLs to Use**	
AppChi2	2.511	97.5% KM (Chebyshev) UCL	144.9
95% Gamma Approximate UCL	336.6		
95% Adjusted Gamma UCL	364		
Note: DL/2 is not a recommended method.			

Result (ethylbenzene)

General Statistics

Number of Valid Data	26	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	20
		Percent Non-Detects	76.92%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.2	Minimum Detected	0.182
Maximum Detected	60	Maximum Detected	4.094
Mean of Detected	12.17	Mean of Detected	1.313
SD of Detected	23.51	SD of Detected	1.485
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	5	Maximum Non-Detect	1.609
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	24
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.31%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.557	Shapiro Wilk Test Statistic	0.803
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	3.269	Mean	-0.168
SD	11.63	SD	1.106
95% DL/2 (t) UCL	7.167	95% H-Stat (DL/2) UCL	1.899
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.812
		SD in Log Scale	3.04
		Mean in Original Scale	2.863
		SD in Original Scale	11.73
		95% Percentile Bootstrap UCL	7.391
		95% BCA Bootstrap UCL	9.833
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.377	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	32.31		
nu star	4.519		
A-D Test Statistic	0.935	**Nonparametric Statistics**	
5% A-D Critical Value	0.734	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.734	Mean	3.734
5% K-S Critical Value	0.348	SD	11.3
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	2.427
		95% KM (t) UCL	7.879
Assuming Gamma Distribution		95% KM (z) UCL	7.726
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.525
Minimum	1E-09	95% KM (bootstrap t) UCL	99.21
Maximum	1114	95% KM (BCA) UCL	10.32
Mean	257.2	95% KM (Percentile Bootstrap) UCL	8.269
Median	89.03	95% KM (Chebyshev) UCL	14.31
SD	331.7	97.5% KM (Chebyshev) UCL	18.89
k star	0.22	99% KM (Chebyshev) UCL	27.88
Theta star	1170		
Nu star	11.43	**Potential UCLs to Use**	
AppChi2	4.851	95% KM (t) UCL	7.879
95% Gamma Approximate UCL	605.7		
95% Adjusted Gamma UCL	642.9		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	26	Number of Detected Data	15
Number of Distinct Detected Data	14	Number of Non-Detect Data	11
		Percent Non-Detects	42.31%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	96	Maximum Detected	4.564
Mean of Detected	11.54	Mean of Detected	1.459
SD of Detected	24.46	SD of Detected	1.215
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.461	Shapiro Wilk Test Statistic	0.858
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.869	Mean	0.549
SD	19.13	SD	1.415
95% DL/2 (t) UCL	13.28	95% H-Stat (DL/2) UCL	7.239
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.109
		SD in Log Scale	1.953
		Mean in Original Scale	6.765
		SD in Original Scale	19.17
		95% Percentile Bootstrap UCL	13.61
		95% BCA Bootstrap UCL	17.34

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.543	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	21.26		
nu star	16.28		
A-D Test Statistic	1.772	**Nonparametric Statistics**	
5% A-D Critical Value	0.784	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.784	Mean	7.123
5% K-S Critical Value	0.232	SD	18.67
Data not Gamma Distributed at 5% Significance Level		SE of Mean	3.791
		95% KM (t) UCL	13.6
Assuming Gamma Distribution		95% KM (z) UCL	13.36
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	13.39
Minimum	1E-09	95% KM (bootstrap t) UCL	48.92
Maximum	96	95% KM (BCA) UCL	14.7
Mean	8.723	95% KM (Percentile Bootstrap) UCL	13.78
Median	2.5	95% KM (Chebyshev) UCL	23.65
SD	19.07	97.5% KM (Chebyshev) UCL	30.8
k star	0.164	99% KM (Chebyshev) UCL	44.84
Theta star	53.25		
Nu star	8.517	**Potential UCLs to Use**	
AppChi2	3.038	97.5% KM (Chebyshev) UCL	30.8
95% Gamma Approximate UCL	24.45		
95% Adjusted Gamma UCL	26.29		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics

Number of Valid Data	26	Number of Detected Data	9
Number of Distinct Detected Data	6	Number of Non-Detect Data	17
		Percent Non-Detects	65.38%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	54	Maximum Detected	3.989
Mean of Detected	7.167	Mean of Detected	0.674
SD of Detected	17.56	SD of Detected	1.252
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	5	Maximum Non-Detect	1.609
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	1
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.15%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.4	Shapiro Wilk Test Statistic	0.497
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.962	Mean	-0.096
SD	10.43	SD	1.006
95% DL/2 (t) UCL	6.455	95% H-Stat (DL/2) UCL	2.462
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.347
		SD in Log Scale	1.922
		Mean in Original Scale	2.582
		SD in Original Scale	10.5
		95% Percentile Bootstrap UCL	6.693
		95% BCA Bootstrap UCL	8.789
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.402	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	17.83		
nu star	7.233		
A-D Test Statistic	2.602	**Nonparametric Statistics**	
5% A-D Critical Value	0.772	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.772	Mean	3.206
5% K-S Critical Value	0.294	SD	10.16
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.113
		95% KM (t) UCL	6.816
Assuming Gamma Distribution		95% KM (z) UCL	6.682
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	6.677
Minimum	1E-09	95% KM (bootstrap t) UCL	230.3
Maximum	152.2	95% KM (BCA) UCL	7.309
Mean	30.23	95% KM (Percentile Bootstrap) UCL	7.276
Median	5.506	95% KM (Chebyshev) UCL	12.42
SD	42.82	97.5% KM (Chebyshev) UCL	16.4
k star	0.172	99% KM (Chebyshev) UCL	24.23
Theta star	176		
Nu star	8.935	**Potential UCLs to Use**	
AppChi2	3.288	95% KM (BCA) UCL	7.309
95% Gamma Approximate UCL	82.17		
95% Adjusted Gamma UCL	88.15		

Note: DL/2 is not a recommended method.

Result (xylenes, total)			
General Statistics			
Number of Valid Data	26	Number of Detected Data	15
Number of Distinct Detected Data	15	Number of Non-Detect Data	11
		Percent Non-Detects	42.31%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.1	Minimum Detected	0.0953
Maximum Detected	112	Maximum Detected	4.718
Mean of Detected	12.79	Mean of Detected	1.51
SD of Detected	28.38	SD of Detected	1.241
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.443	Shapiro Wilk Test Statistic	0.871
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.592	Mean	0.578
SD	22.12	SD	1.447
95% DL/2 (t) UCL	15	95% H-Stat (DL/2) UCL	8.069
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.125
		SD in Log Scale	2.001
		Mean in Original Scale	7.487
		SD in Original Scale	22.16
		95% Percentile Bootstrap UCL	15.49
		95% BCA Bootstrap UCL	20.34
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.521	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	24.56		
nu star	15.62		
A-D Test Statistic	1.73	**Nonparametric Statistics**	
5% A-D Critical Value	0.786	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.786	Mean	7.846
5% K-S Critical Value	0.232	SD	21.61
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.388
		95% KM (t) UCL	15.34
Assuming Gamma Distribution		95% KM (z) UCL	15.06
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	15.12
Minimum	1E-09	95% KM (bootstrap t) UCL	59.31
Maximum	112	95% KM (BCA) UCL	17.22
Mean	9.582	95% KM (Percentile Bootstrap) UCL	16.26
Median	2.75	95% KM (Chebyshev) UCL	26.97
SD	22.06	97.5% KM (Chebyshev) UCL	35.25
k star	0.162	99% KM (Chebyshev) UCL	51.5
Theta star	59.23		
Nu star	8.412	**Potential UCLs to Use**	
AppChi2	2.976	97.5% KM (Chebyshev) UCL	35.25
95% Gamma Approximate UCL	27.09		
95% Adjusted Gamma UCL	29.14		
Note: DL/2 is not a recommended method.			

	General UCL Statistics for Data Sets with Non-Detects		
User Selected Options			
From File	WorkSheet.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Result (1,1-dichloroethane)			
General Statistics			
Number of Valid Data	80	Number of Detected Data	16
Number of Distinct Detected Data	15	Number of Non-Detect Data	64
		Percent Non-Detects	80.00%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.37	Minimum Detected	-0.994
Maximum Detected	8.5	Maximum Detected	2.14
Mean of Detected	2.567	Mean of Detected	0.457
SD of Detected	2.539	SD of Detected	1.068
Minimum Non-Detect	0.27	Minimum Non-Detect	-1.309
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.8	Lilliefors Test Statistic	0.918
5% Lilliefors Critical Value	0.887	5% Lilliefors Critical Value	0.887
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.614	Mean	0.205
SD	19	SD	1.36
95% DL/2 (t) UCL	9.151	95% H-Stat (DL/2) UCL	4.533
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.142
		SD in Log Scale	1.35
		Mean in Original Scale	0.8
		SD in Original Scale	1.456
		95% Percentile Bootstrap UCL	1.074
		95% BCA Bootstrap UCL	1.13
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.991	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	2.589		
nu star	31.73		
A-D Test Statistic	0.479	**Nonparametric Statistics**	
5% A-D Critical Value	0.76	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.76	Mean	0.975
5% K-S Critical Value	0.22	SD	1.463
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.189
		95% KM (t) UCL	1.289
Assuming Gamma Distribution		95% KM (z) UCL	1.286
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.272
Minimum	1E-09	95% KM (bootstrap t) UCL	1.411
Maximum	8.5	95% KM (BCA) UCL	1.337
Mean	2.662	95% KM (Percentile Bootstrap) UCL	1.333
Median	2.532	95% KM (Chebyshev) UCL	1.799
SD	2.15	97.5% KM (Chebyshev) UCL	2.155
k star	0.262	99% KM (Chebyshev) UCL	2.855
Theta star	10.15		
Nu star	41.94	**Potential UCLs to Use**	
AppChi2	28.1	95% KM (t) UCL	1.289
95% Gamma Approximate UCL	3.973		
95% Adjusted Gamma UCL	4.003		
Note: DL/2 is not a recommended method.			

Result (1,1-dichloroethene)

General Statistics

Number of Valid Data	80	Number of Detected Data	20
Number of Distinct Detected Data	18	Number of Non-Detect Data	60
		Percent Non-Detects	75.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.44	Minimum Detected	-0.821
Maximum Detected	14	Maximum Detected	2.639
Mean of Detected	5.307	Mean of Detected	1.027
SD of Detected	4.93	SD of Detected	1.311
Minimum Non-Detect	0.42	Minimum Non-Detect	-0.868
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.853	Lilliefors Test Statistic	0.867
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	14	Mean	1.059
SD	47.42	SD	1.489
95% DL/2 (t) UCL	22.82	95% H-Stat (DL/2) UCL	13.93
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.489
		SD in Log Scale	1.52
		Mean in Original Scale	1.844
		SD in Original Scale	3.215
		95% Percentile Bootstrap UCL	2.44
		95% BCA Bootstrap UCL	2.569
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.806	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	6.58		
nu star	32.26		
A-D Test Statistic	0.881	**Nonparametric Statistics**	
5% A-D Critical Value	0.772	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.772	Mean	2.191
5% K-S Critical Value	0.2	SD	3.369
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.456
		95% KM (t) UCL	2.949
Assuming Gamma Distribution		95% KM (z) UCL	2.941
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.937
Minimum	1E-09	95% KM (bootstrap t) UCL	3.05
Maximum	14	95% KM (BCA) UCL	2.973
Mean	5.055	95% KM (Percentile Bootstrap) UCL	2.973
Median	4.56	95% KM (Chebyshev) UCL	4.177
SD	4.14	97.5% KM (Chebyshev) UCL	5.037
k star	0.301	99% KM (Chebyshev) UCL	6.725
Theta star	16.8		
Nu star	48.15	**Potential UCLs to Use**	
AppChi2	33.23	95% KM (BCA) UCL	2.973
95% Gamma Approximate UCL	7.326		
95% Adjusted Gamma UCL	7.377		

Note: DL/2 is not a recommended method.

Result (1,2,4-trimethylbenzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	30
Number of Distinct Detected Data	29	Number of Non-Detect Data	50
		Percent Non-Detects	62.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.23	Minimum Detected	-1.47
Maximum Detected	270	Maximum Detected	5.598
Mean of Detected	55.43	Mean of Detected	2.045
SD of Detected	76.06	SD of Detected	2.624
Minimum Non-Detect	0.23	Minimum Non-Detect	-1.47
Maximum Non-Detect	8	Maximum Non-Detect	2.079
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	64
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	80.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.76	Lilliefors Test Statistic	0.862
5% Lilliefors Critical Value	0.927	5% Lilliefors Critical Value	0.927
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	21.38	Mean	0.604
SD	53.18	SD	2.047
95% DL/2 (t) UCL	31.28	95% H-Stat (DL/2) UCL	23.08
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.896
		SD in Log Scale	3.402
		Mean in Original Scale	21.1
		SD in Original Scale	53.3
		95% Percentile Bootstrap UCL	31.49
		95% BCA Bootstrap UCL	34.16
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.331	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	167.7		
nu star	19.83		
A-D Test Statistic	1.172	**Nonparametric Statistics**	
5% A-D Critical Value	0.844	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.844	Mean	21.01
5% K-S Critical Value	0.173	SD	52.99
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	6.026
		95% KM (t) UCL	31.04
Assuming Gamma Distribution		95% KM (z) UCL	30.92
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	30.93
Minimum	1E-09	95% KM (bootstrap t) UCL	34.61
Maximum	270	95% KM (BCA) UCL	31.91
Mean	52.41	95% KM (Percentile Bootstrap) UCL	31.74
Median	56	95% KM (Chebyshev) UCL	47.27
SD	49.73	97.5% KM (Chebyshev) UCL	58.64
k star	0.335	99% KM (Chebyshev) UCL	80.97
Theta star	156.7		
Nu star	53.53	**Potential UCLs to Use**	
AppChi2	37.72	95% KM (t) UCL	31.04
95% Gamma Approximate UCL	74.38		
95% Adjusted Gamma UCL	74.86		

Note: DL/2 is not a recommended method.

Result (1,2-dichloroethane)

General Statistics

Number of Valid Data	80	Number of Detected Data	27
Number of Distinct Detected Data	24	Number of Non-Detect Data	53
		Percent Non-Detects	66.25%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.29	Minimum Detected	-1.238
Maximum Detected	3.9	Maximum Detected	1.361
Mean of Detected	0.929	Mean of Detected	-0.33
SD of Detected	0.796	SD of Detected	0.693
Minimum Non-Detect	0.28	Minimum Non-Detect	-1.273
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.744	Lilliefors Test Statistic	0.923
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.254	Mean	0.072
SD	19.03	SD	1.276
95% DL/2 (t) UCL	8.796	95% H-Stat (DL/2) UCL	4.024
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.679
		SD in Log Scale	0.726
		Mean in Original Scale	0.663
		SD in Original Scale	0.573
		95% Percentile Bootstrap UCL	0.771
		95% BCA Bootstrap UCL	0.798
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.889	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.492		
nu star	102		
A-D Test Statistic	1.062	**Nonparametric Statistics**	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	0.716
5% K-S Critical Value	0.17	SD	0.599
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0904
		95% KM (t) UCL	0.866
Assuming Gamma Distribution		95% KM (z) UCL	0.864
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.862
Minimum	1E-09	95% KM (bootstrap t) UCL	0.897
Maximum	3.9	95% KM (BCA) UCL	0.877
Mean	0.946	95% KM (Percentile Bootstrap) UCL	0.868
Median	0.953	95% KM (Chebyshev) UCL	1.11
SD	0.662	97.5% KM (Chebyshev) UCL	1.28
k star	0.433	99% KM (Chebyshev) UCL	1.615
Theta star	2.186		
Nu star	69.21	**Potential UCLs to Use**	
AppChi2	51.06	95% KM (t) UCL	0.866
95% Gamma Approximate UCL	1.282	95% KM (% Bootstrap) UCL	0.868
95% Adjusted Gamma UCL	1.289		

Note: DL/2 is not a recommended method.

Result (1,3,5-trimethylbenzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	20
Number of Distinct Detected Data	18	Number of Non-Detect Data	60
		Percent Non-Detects	75.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.35	Minimum Detected	-1.05
Maximum Detected	110	Maximum Detected	4.7
Mean of Detected	36.96	Mean of Detected	2.466
SD of Detected	38.95	SD of Detected	2.062
Minimum Non-Detect	0.26	Minimum Non-Detect	-1.347
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.843	Lilliefors Test Statistic	0.86
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.43	Mean	0.554
SD	28.43	SD	1.8
95% DL/2 (t) UCL	17.72	95% H-Stat (DL/2) UCL	11.79
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.445
		SD in Log Scale	3.245
		Mean in Original Scale	9.559
		SD in Original Scale	24.87
		95% Percentile Bootstrap UCL	14.42
		95% BCA Bootstrap UCL	15.05
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.499	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	74.09		
nu star	19.95		
A-D Test Statistic	0.526	**Nonparametric Statistics**	
5% A-D Critical Value	0.798	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.798	Mean	9.813
5% K-S Critical Value	0.204	SD	24.97
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	2.902
		95% KM (t) UCL	14.64
Assuming Gamma Distribution		95% KM (z) UCL	14.59
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	14.53
Minimum	0.35	95% KM (bootstrap t) UCL	16.12
Maximum	110	95% KM (BCA) UCL	14.61
Mean	34.82	95% KM (Percentile Bootstrap) UCL	14.91
Median	36.01	95% KM (Chebyshev) UCL	22.46
SD	20.74	97.5% KM (Chebyshev) UCL	27.94
k star	1.647	99% KM (Chebyshev) UCL	38.69
Theta star	21.14		
Nu star	263.5	**Potential UCLs to Use**	
AppChi2	226.9	95% KM (t) UCL	14.64
95% Gamma Approximate UCL	40.43		
95% Adjusted Gamma UCL	40.54		

Note: DL/2 is not a recommended method.

Result (1,4-dioxane)

General Statistics

Number of Valid Data	14	Number of Detected Data	12
Number of Distinct Detected Data	10	Number of Non-Detect Data	2
		Percent Non-Detects	14.29%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.64	Minimum Detected	-0.446
Maximum Detected	7.05	Maximum Detected	1.953
Mean of Detected	1.993	Mean of Detected	0.403
SD of Detected	1.907	SD of Detected	0.725
Minimum Non-Detect	0.48	Minimum Non-Detect	-0.734
Maximum Non-Detect	0.51	Maximum Non-Detect	-0.673
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	2
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	12
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	14.29%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.695	Shapiro Wilk Test Statistic	0.898
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.744	Mean	0.146
SD	1.865	SD	0.934
95% DL/2 (t) UCL	2.627	95% H-Stat (DL/2) UCL	2.794
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.604	Mean in Log Scale	0.163
SD	1.977	SD in Log Scale	0.903
95% MLE (t) UCL	2.54	Mean in Original Scale	1.748
95% MLE (Tiku) UCL	2.509	SD in Original Scale	1.861
		95% Percentile Bootstrap UCL	2.611
		95% BCA Bootstrap UCL	2.996
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.476	**Data appear Lognormal at 5% Significance Level**	
Theta Star	1.35		
nu star	35.42		
A-D Test Statistic	0.857	**Nonparametric Statistics**	
5% A-D Critical Value	0.742	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.742	Mean	1.8
5% K-S Critical Value	0.249	SD	1.755
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.49
		95% KM (t) UCL	2.668
Assuming Gamma Distribution		95% KM (z) UCL	2.606
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.655
Minimum	1E-09	95% KM (bootstrap t) UCL	4.426
Maximum	7.05	95% KM (BCA) UCL	2.789
Mean	1.709	95% KM (Percentile Bootstrap) UCL	2.704
Median	1.05	95% KM (Chebyshev) UCL	3.936
SD	1.898	97.5% KM (Chebyshev) UCL	4.86
k star	0.227	99% KM (Chebyshev) UCL	6.675
Theta star	7.517		
Nu star	6.365	**Potential UCLs to Use**	
AppChi2	1.829	95% KM (Chebyshev) UCL	3.936
95% Gamma Approximate UCL	5.946		
95% Adjusted Gamma UCL	7.128		

Note: DL/2 is not a recommended method.

Result (benzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	46
Number of Distinct Detected Data	44	Number of Non-Detect Data	34
		Percent Non-Detects	42.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.35	Minimum Detected	-1.05
Maximum Detected	8100	Maximum Detected	9
Mean of Detected	724.4	Mean of Detected	3.437
SD of Detected	1855	SD of Detected	3.018
Minimum Non-Detect	0.28	Minimum Non-Detect	-1.273
Maximum Non-Detect	2	Maximum Non-Detect	0.693
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	46
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	34
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	57.50%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.446	Lilliefors Test Statistic	0.933
5% Lilliefors Critical Value	0.945	5% Lilliefors Critical Value	0.945
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	416.9	Mean	1.878
SD	1446	SD	2.948
95% DL/2 (t) UCL	685.9	95% H-Stat (DL/2) UCL	848.8
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	1.187
		SD in Log Scale	3.835
		Mean in Original Scale	416.9
		SD in Original Scale	1446
		95% Percentile Bootstrap UCL	708.6
		95% BCA Bootstrap UCL	809.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.228	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	3171		
nu star	21.01		
A-D Test Statistic	2.199	**Nonparametric Statistics**	
5% A-D Critical Value	0.893	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.893	Mean	416.8
5% K-S Critical Value	0.144	SD	1437
Data not Gamma Distributed at 5% Significance Level		SE of Mean	162.4
		95% KM (t) UCL	687.1
Assuming Gamma Distribution		95% KM (z) UCL	683.9
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	685.8
Minimum	1E-09	95% KM (bootstrap t) UCL	913.3
Maximum	8100	95% KM (BCA) UCL	716.7
Mean	732	95% KM (Percentile Bootstrap) UCL	694.4
Median	33.5	95% KM (Chebyshev) UCL	1125
SD	1626	97.5% KM (Chebyshev) UCL	1431
k star	0.103	99% KM (Chebyshev) UCL	2033
Theta star	7093		
Nu star	16.51	**Potential UCLs to Use**	
AppChi2	8.325	97.5% KM (Chebyshev) UCL	1431
95% Gamma Approximate UCL	1452		
95% Adjusted Gamma UCL	1471		

Note: DL/2 is not a recommended method.

Result (br_naphthalene)

General Statistics

Number of Valid Data	53	Number of Detected Data	17
Number of Distinct Detected Data	17	Number of Non-Detect Data	36
		Percent Non-Detects	67.92%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.42	Minimum Detected	-0.868
Maximum Detected	240	Maximum Detected	5.481
Mean of Detected	47.82	Mean of Detected	2.033
SD of Detected	70.93	SD of Detected	2.373
Minimum Non-Detect	0.41	Minimum Non-Detect	-0.892
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	53
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.732	Lilliefors Test Statistic	0.864
5% Lilliefors Critical Value	0.892	5% Lilliefors Critical Value	0.892
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	21.37	Mean	0.95
SD	55.1	SD	1.908
95% DL/2 (t) UCL	34.04	95% H-Stat (DL/2) UCL	37.16
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.227
		SD in Log Scale	3.307
		Mean in Original Scale	15.7
		SD in Original Scale	45.23
		95% Percentile Bootstrap UCL	26.48
		95% BCA Bootstrap UCL	29.26
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.339	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	141		
nu star	11.53		
A-D Test Statistic	0.903	**Nonparametric Statistics**	
5% A-D Critical Value	0.828	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.828	Mean	16.04
5% K-S Critical Value	0.225	SD	45.15
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	6.455
		95% KM (t) UCL	26.85
Assuming Gamma Distribution		95% KM (z) UCL	26.66
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	26.6
Minimum	1E-09	95% KM (bootstrap t) UCL	34.92
Maximum	240	95% KM (BCA) UCL	27.57
Mean	40.81	95% KM (Percentile Bootstrap) UCL	27.3
Median	6.292	95% KM (Chebyshev) UCL	44.18
SD	61.77	97.5% KM (Chebyshev) UCL	56.35
k star	0.109	99% KM (Chebyshev) UCL	80.26
Theta star	375.3		
Nu star	11.53	**Potential UCLs to Use**	
AppChi2	4.917	95% KM (t) UCL	26.85
95% Gamma Approximate UCL	95.67		
95% Adjusted Gamma UCL	98.09		

Note: DL/2 is not a recommended method.

Result (c-1,2-dichloroethene)

General Statistics

Number of Valid Data	80	Number of Detected Data	54
Number of Distinct Detected Data	46	Number of Non-Detect Data	26
		Percent Non-Detects	32.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.93	Minimum Detected	-0.0726
Maximum Detected	47	Maximum Detected	3.85
Mean of Detected	12.08	Mean of Detected	1.931
SD of Detected	12.43	SD of Detected	1.113
Minimum Non-Detect	0.32	Minimum Non-Detect	-1.139
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.202	Lilliefors Test Statistic	0.0892
5% Lilliefors Critical Value	0.121	5% Lilliefors Critical Value	0.121
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.83	Mean	1.566
SD	20.68	SD	1.462
95% DL/2 (t) UCL	16.68	95% H-Stat (DL/2) UCL	18.13
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	1.399
		SD in Log Scale	1.297
		Mean in Original Scale	8.795
		SD in Original Scale	11.3
		95% Percentile Bootstrap UCL	10.8
		95% BCA Bootstrap UCL	11.12
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.982	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	12.3		
nu star	106.1		
A-D Test Statistic	1.262	**Nonparametric Statistics**	
5% A-D Critical Value	0.779	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.779	Mean	9.102
5% K-S Critical Value	0.124	SD	11.44
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	1.329
		95% KM (t) UCL	11.31
Assuming Gamma Distribution		95% KM (z) UCL	11.29
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.29
Minimum	1E-09	95% KM (bootstrap t) UCL	11.67
Maximum	47	95% KM (BCA) UCL	11.38
Mean	10.42	95% KM (Percentile Bootstrap) UCL	11.32
Median	5.944	95% KM (Chebyshev) UCL	14.9
SD	11.42	97.5% KM (Chebyshev) UCL	17.4
k star	0.262	99% KM (Chebyshev) UCL	22.33
Theta star	39.72		
Nu star	41.96	**Potential UCLs to Use**	
AppChi2	28.11	95% KM (BCA) UCL	11.38
95% Gamma Approximate UCL	15.55		
95% Adjusted Gamma UCL	15.66		

Note: DL/2 is not a recommended method.

Result (diisopropyl ether (dipe))

General Statistics

Number of Valid Data	80	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	72
		Percent Non-Detects	90.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.28	Minimum Detected	-1.273
Maximum Detected	1.6	Maximum Detected	0.47
Mean of Detected	0.762	Mean of Detected	-0.439
SD of Detected	0.448	SD of Detected	0.639
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.904	Lilliefors Test Statistic	0.903
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.91	Mean	0.718
SD	47.57	SD	1.617
95% DL/2 (t) UCL	21.76	95% H-Stat (DL/2) UCL	14.49
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.589
		SD in Log Scale	1.13
		Mean in Original Scale	0.375
		SD in Original Scale	0.487
		95% Percentile Bootstrap UCL	0.469
		95% BCA Bootstrap UCL	0.494
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.052	**Data appear Normal at 5% Significance Level**	
Theta Star	0.371		
nu star	32.84		
A-D Test Statistic	0.41	**Nonparametric Statistics**	
5% A-D Critical Value	0.721	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.721	Mean	0.483
5% K-S Critical Value	0.296	SD	0.361
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0886
		95% KM (t) UCL	0.63
Assuming Gamma Distribution		95% KM (z) UCL	0.629
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.62
Minimum	1E-09	95% KM (bootstrap t) UCL	0.684
Maximum	2.413	95% KM (BCA) UCL	0.852
Mean	1.318	95% KM (Percentile Bootstrap) UCL	0.795
Median	1.389	95% KM (Chebyshev) UCL	0.869
SD	0.642	97.5% KM (Chebyshev) UCL	1.036
k star	1.238	99% KM (Chebyshev) UCL	1.365
Theta star	1.064		
Nu star	198.1	**Potential UCLs to Use**	
AppChi2	166.6	95% KM (t) UCL	0.63
95% Gamma Approximate UCL	1.567	95% KM (Percentile Bootstrap) UCL	0.795
95% Adjusted Gamma UCL	1.572		

Note: DL/2 is not a recommended method.

Result (ethylbenzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	38
Number of Distinct Detected Data	38	Number of Non-Detect Data	42
		Percent Non-Detects	52.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.25	Minimum Detected	-1.386
Maximum Detected	465	Maximum Detected	6.142
Mean of Detected	69.56	Mean of Detected	2.103
SD of Detected	125.9	SD of Detected	2.423
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	8	Maximum Non-Detect	2.079
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	61
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	19
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	76.25%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.611	Lilliefors Test Statistic	0.913
5% Lilliefors Critical Value	0.938	5% Lilliefors Critical Value	0.938
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	33.54	Mean	0.86
SD	92.8	SD	2.116
95% DL/2 (t) UCL	50.8	95% H-Stat (DL/2) UCL	35.81
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	0.00215
		SD in Log Scale	3.03
		Mean in Original Scale	33.4
		SD in Original Scale	92.85
		95% Percentile Bootstrap UCL	51.87
		95% BCA Bootstrap UCL	55.66
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.311	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	223.3		
nu star	23.67		
A-D Test Statistic	1.636	**Nonparametric Statistics**	
5% A-D Critical Value	0.853	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.853	Mean	33.33
5% K-S Critical Value	0.155	SD	92.29
Data not Gamma Distributed at 5% Significance Level		SE of Mean	10.46
		95% KM (t) UCL	50.73
Assuming Gamma Distribution		95% KM (z) UCL	50.53
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	50.59
Minimum	1E-09	95% KM (bootstrap t) UCL	59.61
Maximum	465	95% KM (BCA) UCL	51.24
Mean	66.45	95% KM (Percentile Bootstrap) UCL	51.63
Median	60.91	95% KM (Chebyshev) UCL	78.91
SD	88.11	97.5% KM (Chebyshev) UCL	98.63
k star	0.447	99% KM (Chebyshev) UCL	137.4
Theta star	148.7		
Nu star	71.49	**Potential UCLs to Use**	
AppChi2	53.02	97.5% KM (Chebyshev) UCL	98.63
95% Gamma Approximate UCL	89.59		
95% Adjusted Gamma UCL	90.08		

Note: DL/2 is not a recommended method.

Result (iron (ii))

General Statistics

Number of Valid Data	12	Number of Detected Data	9
Number of Distinct Detected Data	3	Number of Non-Detect Data	3
		Percent Non-Detects	25.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.1	Minimum Detected	-2.303
Maximum Detected	2	Maximum Detected	0.693
Mean of Detected	0.756	Mean of Detected	-1.15
SD of Detected	0.934	SD of Detected	1.411
Minimum Non-Detect	0.1	Minimum Non-Detect	-2.303
Maximum Non-Detect	0.1	Maximum Non-Detect	-2.303

Warning: There are only 3 Distinct Detected Values in this data set

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.

Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.

It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.644	Shapiro Wilk Test Statistic	0.723
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.579	Mean	-1.611
SD	0.858	SD	1.465
95% DL/2 (t) UCL	1.024	95% H-Stat (DL/2) UCL	3.154
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.419	Mean in Log Scale	-1.956
SD	0.998	SD in Log Scale	1.912
95% MLE (t) UCL	0.936	Mean in Original Scale	0.57
95% MLE (Tiku) UCL	0.943	SD in Original Scale	0.864
		95% Percentile Bootstrap UCL	1.029
		95% BCA Bootstrap UCL	1.046
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.538	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.405		
nu star	9.68		
A-D Test Statistic	1.365	**Nonparametric Statistics**	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	0.592
5% K-S Critical Value	0.29	SD	0.814
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.249
		95% KM (t) UCL	1.039
Assuming Gamma Distribution		95% KM (z) UCL	1.002
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	N/A
Minimum	1E-09	95% KM (bootstrap t) UCL	N/A
Maximum	2	95% KM (BCA) UCL	N/A
Mean	0.567	95% KM (Percentile Bootstrap) UCL	N/A
Median	0.1	95% KM (Chebyshev) UCL	1.678
SD	0.867	97.5% KM (Chebyshev) UCL	2.148
k star	0.19	99% KM (Chebyshev) UCL	3.071
Theta star	2.988		
Nu star	4.556	**Potential UCLs to Use**	
AppChi2	0.953	97.5% KM (Chebyshev) UCL	2.148
95% Gamma Approximate UCL	2.712		
95% Adjusted Gamma UCL	3.535		

Warning: Recommended UCL exceeds the maximum observation

Note: DL/2 is not a recommended method.

Result (isopropylbenzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	32
Number of Distinct Detected Data	30	Number of Non-Detect Data	48
		Percent Non-Detects	60.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.29	Minimum Detected	-1.238
Maximum Detected	66	Maximum Detected	4.19
Mean of Detected	13.24	Mean of Detected	1.66
SD of Detected	18.13	SD of Detected	1.481
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.702	Lilliefors Test Statistic	0.966
5% Lilliefors Critical Value	0.93	5% Lilliefors Critical Value	0.93
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	9.543	Mean	0.681
SD	22.09	SD	1.625
95% DL/2 (t) UCL	13.65	95% H-Stat (DL/2) UCL	9.381
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.279
		SD in Log Scale	2.184
		Mean in Original Scale	5.599
		SD in Original Scale	12.99
		95% Percentile Bootstrap UCL	8.045
		95% BCA Bootstrap UCL	8.685
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.619	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	21.38		
nu star	39.63		
A-D Test Statistic	0.823	**Nonparametric Statistics**	
5% A-D Critical Value	0.796	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.796	Mean	5.839
5% K-S Critical Value	0.163	SD	13.09
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	1.518
		95% KM (t) UCL	8.365
Assuming Gamma Distribution		95% KM (z) UCL	8.336
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	8.334
Minimum	0.29	95% KM (bootstrap t) UCL	9.493
Maximum	66	95% KM (BCA) UCL	8.644
Mean	13.11	95% KM (Percentile Bootstrap) UCL	8.551
Median	12.98	95% KM (Chebyshev) UCL	12.45
SD	11.36	97.5% KM (Chebyshev) UCL	15.32
k star	1.45	99% KM (Chebyshev) UCL	20.94
Theta star	9.045		
Nu star	232	**Potential UCLs to Use**	
AppChi2	197.7	95% KM (t) UCL	8.365
95% Gamma Approximate UCL	15.39		
95% Adjusted Gamma UCL	15.43		

Note: DL/2 is not a recommended method.

Result (methane)

General Statistics

Number of Valid Data	12	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	2
		Percent Non-Detects	16.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0015	Minimum Detected	-6.502
Maximum Detected	1.5	Maximum Detected	0.405
Mean of Detected	0.368	Mean of Detected	-2.391
SD of Detected	0.509	SD of Detected	2.186
Minimum Non-Detect	0.05	Minimum Non-Detect	-2.996
Maximum Non-Detect	0.05	Maximum Non-Detect	-2.996

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.762	Shapiro Wilk Test Statistic	0.952
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.31	Mean	-2.607
SD	0.479	SD	2.041
95% DL/2 (t) UCL	0.559	95% H-Stat (DL/2) UCL	27.02
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0183	Mean in Log Scale	-2.742
SD	0.757	SD in Log Scale	2.159
95% MLE (t) UCL	0.411	Mean in Original Scale	0.309
95% MLE (Tiku) UCL	0.503	SD in Original Scale	0.481
		95% Percentile Bootstrap UCL	0.536
		95% BCA Bootstrap UCL	0.622
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.39	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.941		
nu star	7.809		
A-D Test Statistic	0.235	**Nonparametric Statistics**	
5% A-D Critical Value	0.784	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.784	Mean	0.309
5% K-S Critical Value	0.282	SD	0.46
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.14
		95% KM (t) UCL	0.56
Assuming Gamma Distribution		95% KM (z) UCL	0.539
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.558
Minimum	1E-09	95% KM (bootstrap t) UCL	0.877
Maximum	1.5	95% KM (BCA) UCL	0.565
Mean	0.313	95% KM (Percentile Bootstrap) UCL	0.533
Median	0.0821	95% KM (Chebyshev) UCL	0.919
SD	0.478	97.5% KM (Chebyshev) UCL	1.183
k star	0.247	99% KM (Chebyshev) UCL	1.702
Theta star	1.265		
Nu star	5.934	**Potential UCLs to Use**	
AppChi2	1.606	95% KM (Chebyshev) UCL	0.919
95% Gamma Approximate UCL	1.156		
95% Adjusted Gamma UCL	1.441		

Note: DL/2 is not a recommended method.

Result (methylene chloride)

General Statistics

Number of Valid Data	80	Number of Detected Data	7
Number of Distinct Detected Data	6	Number of Non-Detect Data	73
		Percent Non-Detects	91.25%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	2.6	Maximum Detected	0.956
Mean of Detected	1.821	Mean of Detected	0.585
SD of Detected	0.365	SD of Detected	0.179
Minimum Non-Detect	0.95	Minimum Non-Detect	-0.0513
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.768	Lilliefors Test Statistic	0.827
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	13.52	Mean	1.021
SD	47.68	SD	1.295
95% DL/2 (t) UCL	22.4	95% H-Stat (DL/2) UCL	9.867
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.207
		SD in Log Scale	0.335
		Mean in Original Scale	1.3
		SD in Original Scale	0.447
		95% Percentile Bootstrap UCL	1.383
		95% BCA Bootstrap UCL	1.384
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	19.49	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.0935		
nu star	272.8		
A-D Test Statistic	0.688	**Nonparametric Statistics**	
5% A-D Critical Value	0.707	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.707	Mean	1.618
5% K-S Critical Value	0.311	SD	0.257
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0637
		95% KM (t) UCL	1.724
Assuming Gamma Distribution		95% KM (z) UCL	1.723
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.711
Minimum	1.074	95% KM (bootstrap t) UCL	1.837
Maximum	2.662	95% KM (BCA) UCL	1.871
Mean	2.159	95% KM (Percentile Bootstrap) UCL	1.796
Median	2.266	95% KM (Chebyshev) UCL	1.896
SD	0.365	97.5% KM (Chebyshev) UCL	2.016
k star	29.89	99% KM (Chebyshev) UCL	2.252
Theta star	0.0722		
Nu star	4783	**Potential UCLs to Use**	
AppChi2	4623	95% KM (t) UCL	1.724
95% Gamma Approximate UCL	2.234		
95% Adjusted Gamma UCL	2.235		

Note: DL/2 is not a recommended method.

Result (methyl-t-butyl ether (mtbe))			
General Statistics			
Number of Valid Data	80	Number of Detected Data	11
Number of Distinct Detected Data	11	Number of Non-Detect Data	69
		Percent Non-Detects	86.25%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.32	Minimum Detected	-1.139
Maximum Detected	26	Maximum Detected	3.258
Mean of Detected	8.282	Mean of Detected	1.298
SD of Detected	8.688	SD of Detected	1.589
Minimum Non-Detect	0.32	Minimum Non-Detect	-1.139
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.863	Lilliefors Test Statistic	0.907
5% Lilliefors Critical Value	0.85	5% Lilliefors Critical Value	0.85
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	13.41	Mean	0.929
SD	47.48	SD	1.532
95% DL/2 (t) UCL	22.24	95% H-Stat (DL/2) UCL	12.73
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.809
		SD in Log Scale	2.135
		Mean in Original Scale	1.436
		SD in Original Scale	4.175
		95% Percentile Bootstrap UCL	2.255
		95% BCA Bootstrap UCL	2.537
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.595	**Data appear Normal at 5% Significance Level**	
Theta Star	13.91		
nu star	13.1		
A-D Test Statistic	0.318	**Nonparametric Statistics**	
5% A-D Critical Value	0.764	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.764	Mean	1.803
5% K-S Critical Value	0.265	SD	4.304
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.582
		95% KM (t) UCL	2.772
Assuming Gamma Distribution		95% KM (z) UCL	2.761
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.725
Minimum	1E-09	95% KM (bootstrap t) UCL	3.055
Maximum	43.44	95% KM (BCA) UCL	3.259
Mean	13.43	95% KM (Percentile Bootstrap) UCL	3.102
Median	11.8	95% KM (Chebyshev) UCL	4.341
SD	12.22	97.5% KM (Chebyshev) UCL	5.439
k star	0.239	99% KM (Chebyshev) UCL	7.596
Theta star	56.11		
Nu star	38.31	**Potential UCLs to Use**	
AppChi2	25.13	95% KM (t) UCL	2.772
95% Gamma Approximate UCL	20.48	95% KM (Percentile Bootstrap) UCL	3.102
95% Adjusted Gamma UCL	20.64		
Note: DL/2 is not a recommended method.			

Result (naphthalene)

General Statistics

Number of Valid Data	80	Number of Detected Data	21
Number of Distinct Detected Data	21	Number of Non-Detect Data	59
		Percent Non-Detects	73.75%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.41	Minimum Detected	-0.892
Maximum Detected	240	Maximum Detected	5.481
Mean of Detected	42.73	Mean of Detected	1.968
SD of Detected	62.51	SD of Detected	2.35
Minimum Non-Detect	0.41	Minimum Non-Detect	-0.892
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.731	Lilliefors Test Statistic	0.854
5% Lilliefors Critical Value	0.908	5% Lilliefors Critical Value	0.908
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.14	Mean	1.061
SD	51.87	SD	1.72
95% DL/2 (t) UCL	28.8	95% H-Stat (DL/2) UCL	22.94
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.18
		SD in Log Scale	3.033
		Mean in Original Scale	11.76
		SD in Original Scale	36.56
		95% Percentile Bootstrap UCL	18.97
		95% BCA Bootstrap UCL	21.68
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.351	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	121.7		
nu star	14.75		
A-D Test Statistic	1.165	**Nonparametric Statistics**	
5% A-D Critical Value	0.831	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.831	Mean	11.95
5% K-S Critical Value	0.204	SD	36.75
Data not Gamma Distributed at 5% Significance Level		SE of Mean	4.265
		95% KM (t) UCL	19.05
Assuming Gamma Distribution		95% KM (z) UCL	18.97
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	18.92
Minimum	0.41	95% KM (bootstrap t) UCL	23.29
Maximum	240	95% KM (BCA) UCL	19.32
Mean	42.03	95% KM (Percentile Bootstrap) UCL	19.48
Median	31.12	95% KM (Chebyshev) UCL	30.54
SD	35.36	97.5% KM (Chebyshev) UCL	38.59
k star	1.047	99% KM (Chebyshev) UCL	54.39
Theta star	40.16		
Nu star	167.4	**Potential UCLs to Use**	
AppChi2	138.5	97.5% KM (Chebyshev) UCL	38.59
95% Gamma Approximate UCL	50.81		
95% Adjusted Gamma UCL	50.98		

Note: DL/2 is not a recommended method.

Result (n-butylbenzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	9
Number of Distinct Detected Data	8	Number of Non-Detect Data	71
		Percent Non-Detects	88.75%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	1.4	Minimum Detected	0.336
Maximum Detected	8.4	Maximum Detected	2.128
Mean of Detected	3.1	Mean of Detected	0.931
SD of Detected	2.394	SD of Detected	0.624
Minimum Non-Detect	0.37	Minimum Non-Detect	-0.994
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.735	Lilliefors Test Statistic	0.849
5% Lilliefors Critical Value	0.829	5% Lilliefors Critical Value	0.829
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	13.09	Mean	0.949
SD	47.53	SD	1.397
95% DL/2 (t) UCL	21.94	95% H-Stat (DL/2) UCL	11.01
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	0.0321
		SD in Log Scale	0.748
		Mean in Original Scale	1.374
		SD in Original Scale	1.252
		95% Percentile Bootstrap UCL	1.611
		95% BCA Bootstrap UCL	1.672
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.843	**Data Follow Appr. Gamma Distribution at 5% Significance Level**	
Theta Star	1.682		
nu star	33.18		
A-D Test Statistic	0.816	**Nonparametric Statistics**	
5% A-D Critical Value	0.728	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.728	Mean	1.804
5% K-S Critical Value	0.282	SD	1.033
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.167
		95% KM (t) UCL	2.082
Assuming Gamma Distribution		95% KM (z) UCL	2.079
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.038
Minimum	1E-09	95% KM (bootstrap t) UCL	2.202
Maximum	9.084	95% KM (BCA) UCL	2.32
Mean	4.71	95% KM (Percentile Bootstrap) UCL	2.172
Median	4.985	95% KM (Chebyshev) UCL	2.532
SD	2.578	97.5% KM (Chebyshev) UCL	2.847
k star	0.591	99% KM (Chebyshev) UCL	3.465
Theta star	7.964		
Nu star	94.62	**Potential UCLs to Use**	
AppChi2	73.18	95% KM (t) UCL	2.082
95% Gamma Approximate UCL	6.089		
95% Adjusted Gamma UCL	6.118		

Note: DL/2 is not a recommended method.

Result (n-propylbenzene)			
General Statistics			
Number of Valid Data	80	Number of Detected Data	31
Number of Distinct Detected Data	29	Number of Non-Detect Data	49
		Percent Non-Detects	61.25%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.27	Minimum Detected	-1.309
Maximum Detected	59	Maximum Detected	4.078
Mean of Detected	13.07	Mean of Detected	1.555
SD of Detected	16.92	SD of Detected	1.618
Minimum Non-Detect	0.27	Minimum Non-Detect	-1.309
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.748	Lilliefors Test Statistic	0.949
5% Lilliefors Critical Value	0.929	5% Lilliefors Critical Value	0.929
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	8.112	Mean	0.56
SD	19.05	SD	1.594
95% DL/2 (t) UCL	11.66	95% H-Stat (DL/2) UCL	8.666
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.543
		SD in Log Scale	2.323
		Mean in Original Scale	5.308
		SD in Original Scale	12.14
		95% Percentile Bootstrap UCL	7.636
		95% BCA Bootstrap UCL	7.95
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.57	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	22.91		
nu star	35.36		
A-D Test Statistic	0.68	**Nonparametric Statistics**	
5% A-D Critical Value	0.8	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.8	Mean	5.473
5% K-S Critical Value	0.166	SD	12.17
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.402
		95% KM (t) UCL	7.807
Assuming Gamma Distribution		95% KM (z) UCL	7.78
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	7.76
Minimum	0.27	95% KM (bootstrap t) UCL	8.425
Maximum	59	95% KM (BCA) UCL	7.836
Mean	12.11	95% KM (Percentile Bootstrap) UCL	7.931
Median	11.07	95% KM (Chebyshev) UCL	11.59
SD	10.89	97.5% KM (Chebyshev) UCL	14.23
k star	1.228	99% KM (Chebyshev) UCL	19.43
Theta star	9.861		
Nu star	196.5	**Potential UCLs to Use**	
AppChi2	165	95% KM (t) UCL	7.807
95% Gamma Approximate UCL	14.41		
95% Adjusted Gamma UCL	14.46		
Note: DL/2 is not a recommended method.			

Result (o-xylene)

General Statistics

Number of Valid Data	80	Number of Detected Data	20
Number of Distinct Detected Data	20	Number of Non-Detect Data	60
		Percent Non-Detects	75.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.3	Minimum Detected	-1.204
Maximum Detected	640	Maximum Detected	6.461
Mean of Detected	68.41	Mean of Detected	2.22
SD of Detected	151.5	SD of Detected	2.222
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	77
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.25%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.509	Lilliefors Test Statistic	0.954
5% Lilliefors Critical Value	0.905	5% Lilliefors Critical Value	0.905
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	19.06	Mean	0.449
SD	80.42	SD	1.701
95% DL/2 (t) UCL	34.02	95% H-Stat (DL/2) UCL	8.601
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-2.062
		SD in Log Scale	3.531
		Mean in Original Scale	17.3
		SD in Original Scale	80.03
		95% Percentile Bootstrap UCL	33.59
		95% BCA Bootstrap UCL	42.47
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.32	**Data appear Lognormal at 5% Significance Level**	
Theta Star	213.8		
nu star	12.8		
A-D Test Statistic	1.096	**Nonparametric Statistics**	
5% A-D Critical Value	0.837	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.837	Mean	17.45
5% K-S Critical Value	0.209	SD	79.52
Data not Gamma Distributed at 5% Significance Level		SE of Mean	9.125
		95% KM (t) UCL	32.63
Assuming Gamma Distribution		95% KM (z) UCL	32.45
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	32.3
Minimum	1E-09	95% KM (bootstrap t) UCL	58.75
Maximum	640	95% KM (BCA) UCL	34.7
Mean	64.43	95% KM (Percentile Bootstrap) UCL	33.9
Median	68.99	95% KM (Chebyshev) UCL	57.22
SD	79.44	97.5% KM (Chebyshev) UCL	74.43
k star	0.262	99% KM (Chebyshev) UCL	108.2
Theta star	246.2		
Nu star	41.88	**Potential UCLs to Use**	
AppChi2	28.04	97.5% KM (Chebyshev) UCL	74.43
95% Gamma Approximate UCL	96.22		
95% Adjusted Gamma UCL	96.93		

Note: DL/2 is not a recommended method.

Result (p/m-xylene)

General Statistics

Number of Valid Data	80	Number of Detected Data	27
Number of Distinct Detected Data	25	Number of Non-Detect Data	53
		Percent Non-Detects	66.25%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.7	Minimum Detected	-0.357
Maximum Detected	2000	Maximum Detected	7.601
Mean of Detected	323.6	Mean of Detected	3.662
SD of Detected	542	SD of Detected	2.612
Minimum Non-Detect	0.6	Minimum Non-Detect	-0.511
Maximum Non-Detect	8	Maximum Non-Detect	2.079
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	62
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	18
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	77.50%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.648	Lilliefors Test Statistic	0.922
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	109.9	Mean	1.142
SD	346.8	SD	2.385
95% DL/2 (t) UCL	174.4	95% H-Stat (DL/2) UCL	70.41
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.038
		SD in Log Scale	4.403
		Mean in Original Scale	109.5
		SD in Original Scale	346.9
		95% Percentile Bootstrap UCL	174.9
		95% BCA Bootstrap UCL	196.6
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.311	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1041		
nu star	16.78		
A-D Test Statistic	0.826	**Nonparametric Statistics**	
5% A-D Critical Value	0.848	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.848	Mean	109.7
5% K-S Critical Value	0.182	SD	344.6
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	39.26
		95% KM (t) UCL	175.1
Assuming Gamma Distribution		95% KM (z) UCL	174.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	174.2
Minimum	1E-09	95% KM (bootstrap t) UCL	217.8
Maximum	2000	95% KM (BCA) UCL	175.3
Mean	291.1	95% KM (Percentile Bootstrap) UCL	181.6
Median	301	95% KM (Chebyshev) UCL	280.9
SD	330.6	97.5% KM (Chebyshev) UCL	355
k star	0.262	99% KM (Chebyshev) UCL	500.4
Theta star	1113		
Nu star	41.85	**Potential UCLs to Use**	
AppChi2	28.02	95% KM (t) UCL	175.1
95% Gamma Approximate UCL	434.8		
95% Adjusted Gamma UCL	438		

Note: DL/2 is not a recommended method.

Result (p-isopropyltoluene)

General Statistics

Number of Valid Data	80	Number of Detected Data	14
Number of Distinct Detected Data	14	Number of Non-Detect Data	66
		Percent Non-Detects	82.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.34	Minimum Detected	-1.079
Maximum Detected	18	Maximum Detected	2.89
Mean of Detected	5.889	Mean of Detected	1.051
SD of Detected	6.145	SD of Detected	1.38
Minimum Non-Detect	0.28	Minimum Non-Detect	-1.273
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.825	Lilliefors Test Statistic	0.923
5% Lilliefors Critical Value	0.874	5% Lilliefors Critical Value	0.874
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.686	Mean	0.178
SD	19.05	SD	1.377
95% DL/2 (t) UCL	9.23	95% H-Stat (DL/2) UCL	4.519
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.873
		SD in Log Scale	2.127
		Mean in Original Scale	1.239
		SD in Original Scale	3.314
		95% Percentile Bootstrap UCL	1.867
		95% BCA Bootstrap UCL	2.098
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.691	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	8.519		
nu star	19.36		
A-D Test Statistic	0.527	**Nonparametric Statistics**	
5% A-D Critical Value	0.768	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.768	Mean	1.446
5% K-S Critical Value	0.237	SD	3.312
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.397
		95% KM (t) UCL	2.108
Assuming Gamma Distribution		95% KM (z) UCL	2.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.045
Minimum	1E-09	95% KM (bootstrap t) UCL	2.528
Maximum	18.83	95% KM (BCA) UCL	2.478
Mean	6.299	95% KM (Percentile Bootstrap) UCL	2.25
Median	4.879	95% KM (Chebyshev) UCL	3.179
SD	5.771	97.5% KM (Chebyshev) UCL	3.928
k star	0.203	99% KM (Chebyshev) UCL	5.4
Theta star	31.09		
Nu star	32.42	**Potential UCLs to Use**	
AppChi2	20.41	95% KM (t) UCL	2.108
95% Gamma Approximate UCL	10.01		
95% Adjusted Gamma UCL	10.09		

Note: DL/2 is not a recommended method.

Result (sec-butylbenzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	27
Number of Distinct Detected Data	21	Number of Non-Detect Data	53
		Percent Non-Detects	66.25%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.27	Minimum Detected	-1.309
Maximum Detected	10	Maximum Detected	2.303
Mean of Detected	2.588	Mean of Detected	0.485
SD of Detected	2.581	SD of Detected	1.004
Minimum Non-Detect	0.25	Minimum Non-Detect	-1.386
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.794	Lilliefors Test Statistic	0.952
5% Lilliefors Critical Value	0.923	5% Lilliefors Critical Value	0.923
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	11.85	Mean	0.727
SD	47.35	SD	1.422
95% DL/2 (t) UCL	20.66	95% H-Stat (DL/2) UCL	9.86
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.174
		SD in Log Scale	1.08
		Mean in Original Scale	1.476
		SD in Original Scale	1.812
		95% Percentile Bootstrap UCL	1.841
		95% BCA Bootstrap UCL	1.832
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.103	**Data appear Lognormal at 5% Significance Level**	
Theta Star	2.347		
nu star	59.55		
A-D Test Statistic	0.909	**Nonparametric Statistics**	
5% A-D Critical Value	0.769	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.769	Mean	1.574
5% K-S Critical Value	0.172	SD	1.891
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.266
		95% KM (t) UCL	2.016
Assuming Gamma Distribution		95% KM (z) UCL	2.011
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	2.012
Minimum	1E-09	95% KM (bootstrap t) UCL	2.115
Maximum	10	95% KM (BCA) UCL	2.041
Mean	2.527	95% KM (Percentile Bootstrap) UCL	2.02
Median	1.81	95% KM (Chebyshev) UCL	2.732
SD	2.261	97.5% KM (Chebyshev) UCL	3.233
k star	0.227	99% KM (Chebyshev) UCL	4.217
Theta star	11.12		
Nu star	36.34	**Potential UCLs to Use**	
AppChi2	23.55	95% KM (BCA) UCL	2.041
95% Gamma Approximate UCL	3.901		
95% Adjusted Gamma UCL	3.932		

Note: DL/2 is not a recommended method.

Result (sulfate)

General Statistics

Number of Valid Observations	13	Number of Distinct Observations	13

Raw Statistics		**Log-transformed Statistics**	
Minimum	30	Minimum of Log Data	3.401
Maximum	430	Maximum of Log Data	6.064
Mean	203.1	Mean of log Data	4.978
Median	160	SD of log Data	0.941
SD	148.1		
Coefficient of Variation	0.729		
Skewness	0.463		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.895	Shapiro Wilk Test Statistic	0.911
Shapiro Wilk Critical Value	0.866	Shapiro Wilk Critical Value	0.866
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	276.3	95% H-UCL	477.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	479.8
95% Adjusted-CLT UCL	276.3	97.5% Chebyshev (MVUE) UCL	594
95% Modified-t UCL	277.1	99% Chebyshev (MVUE) UCL	818.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.311	**Data appear Normal at 5% Significance Level**	
Theta Star	155		
nu star	34.08		
Approximate Chi Square Value (.05)	21.72	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0301	95% CLT UCL	270.6
Adjusted Chi Square Value	20.33	95% Jackknife UCL	276.3
		95% Standard Bootstrap UCL	265.9
Anderson-Darling Test Statistic	0.328	95% Bootstrap-t UCL	288.6
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	267.6
Kolmogorov-Smirnov Test Statistic	0.128	95% Percentile Bootstrap UCL	269.3
Kolmogorov-Smirnov 5% Critical Value	0.241	95% BCA Bootstrap UCL	269.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	382.1
		97.5% Chebyshev(Mean, Sd) UCL	459.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	611.7
95% Approximate Gamma UCL	318.5		
95% Adjusted Gamma UCL	340.4		
Potential UCL to Use		Use 95% Student's-t UCL	276.3

Result (t-1,2-dichloroethene)

General Statistics

Number of Valid Data	80	Number of Detected Data	22
Number of Distinct Detected Data	18	Number of Non-Detect Data	58
		Percent Non-Detects	72.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.3	Minimum Detected	-1.204
Maximum Detected	6.5	Maximum Detected	1.872
Mean of Detected	1.769	Mean of Detected	-0.00757
SD of Detected	2.02	SD of Detected	1.069
Minimum Non-Detect	0.27	Minimum Non-Detect	-1.309
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.727	Lilliefors Test Statistic	0.868
5% Lilliefors Critical Value	0.911	5% Lilliefors Critical Value	0.911
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	5.615	Mean	0.197
SD	19	SD	1.36
95% DL/2 (t) UCL	9.151	95% H-Stat (DL/2) UCL	4.959
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.925
		SD in Log Scale	1.141
		Mean in Original Scale	0.792
		SD in Original Scale	1.248
		95% Percentile Bootstrap UCL	1.04
		95% BCA Bootstrap UCL	1.066
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.893	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	1.981		
nu star	39.28		
A-D Test Statistic	1.613	**Nonparametric Statistics**	
5% A-D Critical Value	0.771	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.771	Mean	0.866
5% K-S Critical Value	0.191	SD	1.279
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.16
		95% KM (t) UCL	1.133
Assuming Gamma Distribution		95% KM (z) UCL	1.13
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.127
Minimum	1E-09	95% KM (bootstrap t) UCL	1.237
Maximum	6.5	95% KM (BCA) UCL	1.168
Mean	1.708	95% KM (Percentile Bootstrap) UCL	1.139
Median	1.086	95% KM (Chebyshev) UCL	1.565
SD	1.63	97.5% KM (Chebyshev) UCL	1.867
k star	0.203	99% KM (Chebyshev) UCL	2.462
Theta star	8.41		
Nu star	32.5	**Potential UCLs to Use**	
AppChi2	20.47	95% KM (BCA) UCL	1.168
95% Gamma Approximate UCL	2.713		
95% Adjusted Gamma UCL	2.736		

Note: DL/2 is not a recommended method.

Result (tert-butyl alcohol (tba))

General Statistics

Number of Valid Data	80	Number of Detected Data	41
Number of Distinct Detected Data	34	Number of Non-Detect Data	39
		Percent Non-Detects	48.75%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	7.5	Minimum Detected	2.015
Maximum Detected	340	Maximum Detected	5.829
Mean of Detected	68.71	Mean of Detected	3.871
SD of Detected	62.67	SD of Detected	0.889
Minimum Non-Detect	4.9	Minimum Non-Detect	1.589
Maximum Non-Detect	5000	Maximum Non-Detect	8.517
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.796	Lilliefors Test Statistic	0.977
5% Lilliefors Critical Value	0.941	5% Lilliefors Critical Value	0.941
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	150.9	Mean	3.713
SD	473	SD	1.306
95% DL/2 (t) UCL	238.9	95% H-Stat (DL/2) UCL	173.4
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	3.335
		SD in Log Scale	0.984
		Mean in Original Scale	45.01
		SD in Original Scale	51.6
		95% Percentile Bootstrap UCL	54.63
		95% BCA Bootstrap UCL	56.84
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.441	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	47.69		
nu star	118.1		
A-D Test Statistic	0.325	**Nonparametric Statistics**	
5% A-D Critical Value	0.766	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.766	Mean	46.54
5% K-S Critical Value	0.14	SD	52.9
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	6.355
		95% KM (t) UCL	57.12
Assuming Gamma Distribution		95% KM (z) UCL	56.99
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	56.92
Minimum	7.5	95% KM (bootstrap t) UCL	60.71
Maximum	340	95% KM (BCA) UCL	58.45
Mean	70.13	95% KM (Percentile Bootstrap) UCL	57.92
Median	69.02	95% KM (Chebyshev) UCL	74.24
SD	45.73	97.5% KM (Chebyshev) UCL	86.23
k star	2.628	99% KM (Chebyshev) UCL	109.8
Theta star	26.69		
Nu star	420.4	**Potential UCLs to Use**	
AppChi2	373.9	95% KM (t) UCL	57.12
95% Gamma Approximate UCL	78.86		
95% Adjusted Gamma UCL	79.03		

Note: DL/2 is not a recommended method.

Result (tert-butylbenzene)

General Statistics

Number of Valid Data	80	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	73
		Percent Non-Detects	91.25%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.23	Minimum Detected	-1.47
Maximum Detected	0.84	Maximum Detected	-0.174
Mean of Detected	0.497	Mean of Detected	-0.818
SD of Detected	0.255	SD of Detected	0.531
Minimum Non-Detect	0.22	Minimum Non-Detect	-1.514
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.862	Lilliefors Test Statistic	0.886
5% Lilliefors Critical Value	0.803	5% Lilliefors Critical Value	0.803
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.83	Mean	0.705
SD	47.58	SD	1.624
95% DL/2 (t) UCL	21.69	95% H-Stat (DL/2) UCL	14.05
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.825
		SD in Log Scale	0.982
		Mean in Original Scale	0.257
		SD in Original Scale	0.284
		95% Percentile Bootstrap UCL	0.313
		95% BCA Bootstrap UCL	0.32
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.595	**Data appear Normal at 5% Significance Level**	
Theta Star	0.192		
nu star	36.32		
A-D Test Statistic	0.493	**Nonparametric Statistics**	
5% A-D Critical Value	0.71	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.71	Mean	0.34
5% K-S Critical Value	0.313	SD	0.2
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0525
		95% KM (t) UCL	0.427
Assuming Gamma Distribution		95% KM (z) UCL	0.426
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.415
Minimum	1E-09	95% KM (bootstrap t) UCL	0.452
Maximum	1.383	95% KM (BCA) UCL	0.68
Mean	0.812	95% KM (Percentile Bootstrap) UCL	0.468
Median	0.858	95% KM (Chebyshev) UCL	0.569
SD	0.355	97.5% KM (Chebyshev) UCL	0.668
k star	1.41	99% KM (Chebyshev) UCL	0.862
Theta star	0.576		
Nu star	225.6	**Potential UCLs to Use**	
AppChi2	191.8	95% KM (t) UCL	0.427
95% Gamma Approximate UCL	0.954	95% KM (Percentile Bootstrap) UCL	0.468
95% Adjusted Gamma UCL	0.957		

Note: DL/2 is not a recommended method.

Result (tetrachloroethene)

General Statistics

Number of Valid Data	80	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	72
		Percent Non-Detects	90.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.37	Minimum Detected	-0.994
Maximum Detected	38	Maximum Detected	3.638
Mean of Detected	16.85	Mean of Detected	2.052
SD of Detected	12.65	SD of Detected	1.864
Minimum Non-Detect	0.32	Minimum Non-Detect	-1.139
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough tp draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.947	Lilliefors Test Statistic	0.728
5% Lilliefors Critical Value	0.818	5% Lilliefors Critical Value	0.818
Data appear Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.983	Mean	0.332
SD	19.64	SD	1.527
95% DL/2 (t) UCL	10.64	95% H-Stat (DL/2) UCL	6.096
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.226
		SD in Log Scale	2.929
		Mean in Original Scale	1.84
		SD in Original Scale	6.3
		95% Percentile Bootstrap UCL	3.085
		95% BCA Bootstrap UCL	3.524
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.566	**Data appear Normal at 5% Significance Level**	
Theta Star	29.78		
nu star	9.054		
A-D Test Statistic	0.869	**Nonparametric Statistics**	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	2.143
5% K-S Critical Value	0.304	SD	6.389
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.789
		95% KM (t) UCL	3.456
Assuming Gamma Distribution		95% KM (z) UCL	3.441
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.336
Minimum	0.37	95% KM (bootstrap t) UCL	3.752
Maximum	94.46	95% KM (BCA) UCL	19.25
Mean	32.7	95% KM (Percentile Bootstrap) UCL	13.55
Median	29.34	95% KM (Chebyshev) UCL	5.583
SD	25.01	97.5% KM (Chebyshev) UCL	7.072
k star	1.231	99% KM (Chebyshev) UCL	9.996
Theta star	26.57		
Nu star	196.9	**Potential UCLs to Use**	
AppChi2	165.4	95% KM (t) UCL	3.456
95% Gamma Approximate UCL	38.92	95% KM (Percentile Bootstrap) UCL	13.55
95% Adjusted Gamma UCL	39.05		

Note: DL/2 is not a recommended method.

Result (toluene)

General Statistics			
Number of Valid Data	80	Number of Detected Data	28
Number of Distinct Detected Data	23	Number of Non-Detect Data	52
		Percent Non-Detects	65.00%
Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.37	Minimum Detected	-0.994
Maximum Detected	1900	Maximum Detected	7.55
Mean of Detected	103.8	Mean of Detected	1.315
SD of Detected	367.1	SD of Detected	2.318
Minimum Non-Detect	0.36	Minimum Non-Detect	-1.022
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	77
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	3
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	96.25%
UCL Statistics			
Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.32	Lilliefors Test Statistic	0.827
5% Lilliefors Critical Value	0.924	5% Lilliefors Critical Value	0.924
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	38.18	Mean	0.385
SD	220.3	SD	1.689
95% DL/2 (t) UCL	79.17	95% H-Stat (DL/2) UCL	8.144
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1292	Mean in Log Scale	-0.7
SD	716.8	SD in Log Scale	2.591
95% MLE (t) UCL	1426	Mean in Original Scale	36.8
95% MLE (Tiku) UCL	1962	SD in Original Scale	220.3
		95% Percentile Bootstrap UCL	79.98
		95% BCA Bootstrap UCL	121.9
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.219	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	474.7		
nu star	12.24		
A-D Test Statistic	4.296	**Nonparametric Statistics**	
5% A-D Critical Value	0.889	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.889	Mean	36.75
5% K-S Critical Value	0.183	SD	218.9
Data not Gamma Distributed at 5% Significance Level		SE of Mean	24.92
		95% KM (t) UCL	78.24
Assuming Gamma Distribution		95% KM (z) UCL	77.75
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	77.73
Minimum	1E-09	95% KM (bootstrap t) UCL	258
Maximum	1900	95% KM (BCA) UCL	86.12
Mean	105.2	95% KM (Percentile Bootstrap) UCL	82.52
Median	108.1	95% KM (Chebyshev) UCL	145.4
SD	218.2	97.5% KM (Chebyshev) UCL	192.4
k star	0.254	99% KM (Chebyshev) UCL	284.7
Theta star	413.7		
Nu star	40.69	**Potential UCLs to Use**	
AppChi2	27.07	97.5% KM (Chebyshev) UCL	192.4
95% Gamma Approximate UCL	158.1		
95% Adjusted Gamma UCL	159.3		
Note: DL/2 is not a recommended method.			

Result (total alkalinity as caco3)

General Statistics

Number of Valid Observations	12	Number of Distinct Observations	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	500	Minimum of Log Data	6.215
Maximum	820	Maximum of Log Data	6.709
Mean	664.2	Mean of log Data	6.488
Median	640	SD of log Data	0.156
SD	102.3		
Coefficient of Variation	0.154		
Skewness	0.0843		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.959	Shapiro Wilk Test Statistic	0.961
Shapiro Wilk Critical Value	0.859	Shapiro Wilk Critical Value	0.859
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	717.2	95% H-UCL	724
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	794.8
95% Adjusted-CLT UCL	713.5	97.5% Chebyshev (MVUE) UCL	851.3
95% Modified-t UCL	717.3	99% Chebyshev (MVUE) UCL	962.3
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	34.18	**Data appear Normal at 5% Significance Level**	
Theta Star	19.43		
nu star	820.3		
Approximate Chi Square Value (.05)	754.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.029	95% CLT UCL	712.7
Adjusted Chi Square Value	745.3	95% Jackknife UCL	717.2
		95% Standard Bootstrap UCL	711.5
Anderson-Darling Test Statistic	0.244	95% Bootstrap-t UCL	718.4
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	710.3
Kolmogorov-Smirnov Test Statistic	0.143	95% Percentile Bootstrap UCL	710.8
Kolmogorov-Smirnov 5% Critical Value	0.245	95% BCA Bootstrap UCL	710
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	792.9
		97.5% Chebyshev(Mean, Sd) UCL	848.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	958
95% Approximate Gamma UCL	721.8		
95% Adjusted Gamma UCL	731.1		
Potential UCL to Use		Use 95% Student's-t UCL	717.2

Result (tph as gasoline)

General Statistics

Number of Valid Data	80	Number of Detected Data	70
Number of Distinct Detected Data	54	Number of Non-Detect Data	10
		Percent Non-Detects	12.50%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	29	Minimum Detected	3.367
Maximum Detected	28000	Maximum Detected	10.24
Mean of Detected	2508	Mean of Detected	6.129
SD of Detected	5541	SD of Detected	1.859
Minimum Non-Detect	30	Minimum Non-Detect	3.401
Maximum Non-Detect	50	Maximum Non-Detect	3.912
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	20
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	60
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	25.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.358	Lilliefors Test Statistic	0.0834
5% Lilliefors Critical Value	0.106	5% Lilliefors Critical Value	0.106
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2197	Mean	5.746
SD	5244	SD	2.016
95% DL/2 (t) UCL	3173	95% H-Stat (DL/2) UCL	4245
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1033	Mean in Log Scale	5.695
SD	6287	SD in Log Scale	2.113
95% MLE (t) UCL	2203	Mean in Original Scale	2197
95% MLE (Tiku) UCL	2209	SD in Original Scale	5244
		95% Percentile Bootstrap UCL	3255
		95% BCA Bootstrap UCL	3477
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.382	**Data appear Lognormal at 5% Significance Level**	
Theta Star	6562		
nu star	53.5		
A-D Test Statistic	4.029	**Nonparametric Statistics**	
5% A-D Critical Value	0.844	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.844	Mean	2198
5% K-S Critical Value	0.114	SD	5210
Data not Gamma Distributed at 5% Significance Level		SE of Mean	586.7
		95% KM (t) UCL	3175
Assuming Gamma Distribution		95% KM (z) UCL	3163
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3174
Minimum	1E-09	95% KM (bootstrap t) UCL	3684
Maximum	28000	95% KM (BCA) UCL	3363
Mean	2194	95% KM (Percentile Bootstrap) UCL	3195
Median	235	95% KM (Chebyshev) UCL	4756
SD	5245	97.5% KM (Chebyshev) UCL	5863
k star	0.158	99% KM (Chebyshev) UCL	8036
Theta star	13896		
Nu star	25.26	**Potential UCLs to Use**	
AppChi2	14.81	97.5% KM (Chebyshev) UCL	5863
95% Gamma Approximate UCL	3742		
95% Adjusted Gamma UCL	3780		

Note: DL/2 is not a recommended method.

Result (trichloroethene)

General Statistics

Number of Valid Data	80	Number of Detected Data	29
Number of Distinct Detected Data	25	Number of Non-Detect Data	51
		Percent Non-Detects	63.75%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.27	Minimum Detected	-1.309
Maximum Detected	79.5	Maximum Detected	4.376
Mean of Detected	19.42	Mean of Detected	1.306
SD of Detected	26.02	SD of Detected	2.168
Minimum Non-Detect	0.26	Minimum Non-Detect	-1.347
Maximum Non-Detect	200	Maximum Non-Detect	5.298
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.748	Lilliefors Test Statistic	0.827
5% Lilliefors Critical Value	0.926	5% Lilliefors Critical Value	0.926
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.07	Mean	0.669
SD	24.93	SD	1.854
95% DL/2 (t) UCL	16.71	95% H-Stat (DL/2) UCL	16.86
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.585
		SD in Log Scale	2.404
		Mean in Original Scale	7.441
		SD in Original Scale	17.98
		95% Percentile Bootstrap UCL	10.71
		95% BCA Bootstrap UCL	11.29
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.379	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	51.25		
nu star	21.98		
A-D Test Statistic	2.059	**Nonparametric Statistics**	
5% A-D Critical Value	0.835	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.835	Mean	7.649
5% K-S Critical Value	0.174	SD	18.2
Data not Gamma Distributed at 5% Significance Level		SE of Mean	2.115
		95% KM (t) UCL	11.17
Assuming Gamma Distribution		95% KM (z) UCL	11.13
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	11.13
Minimum	0.27	95% KM (bootstrap t) UCL	12.32
Maximum	79.5	95% KM (BCA) UCL	11.23
Mean	19.35	95% KM (Percentile Bootstrap) UCL	11.36
Median	19.56	95% KM (Chebyshev) UCL	16.87
SD	15.54	97.5% KM (Chebyshev) UCL	20.85
k star	0.933	99% KM (Chebyshev) UCL	28.69
Theta star	20.73		
Nu star	149.3	**Potential UCLs to Use**	
AppChi2	122.1	97.5% KM (Chebyshev) UCL	20.85
95% Gamma Approximate UCL	23.66		
95% Adjusted Gamma UCL	23.75		

Note: DL/2 is not a recommended method.

Result (vinyl chloride)

General Statistics

Number of Valid Data	80	Number of Detected Data	24
Number of Distinct Detected Data	21	Number of Non-Detect Data	56
		Percent Non-Detects	70.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.41	Minimum Detected	-0.892
Maximum Detected	3.75	Maximum Detected	1.322
Mean of Detected	1.36	Mean of Detected	0.134
SD of Detected	0.864	SD of Detected	0.594
Minimum Non-Detect	0.3	Minimum Non-Detect	-1.204
Maximum Non-Detect	500	Maximum Non-Detect	6.215
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	80
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.866	Lilliefors Test Statistic	0.974
5% Lilliefors Critical Value	0.916	5% Lilliefors Critical Value	0.916
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	12.66	Mean	0.719
SD	47.61	SD	1.478
95% DL/2 (t) UCL	21.52	95% H-Stat (DL/2) UCL	12.21
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-0.212
		SD in Log Scale	0.737
		Mean in Original Scale	1.051
		SD in Original Scale	0.814
		95% Percentile Bootstrap UCL	1.207
		95% BCA Bootstrap UCL	1.209
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	2.688	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.506		
nu star	129		
A-D Test Statistic	0.455	**Nonparametric Statistics**	
5% A-D Critical Value	0.751	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.751	Mean	1.118
5% K-S Critical Value	0.179	SD	0.834
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.15
		95% KM (t) UCL	1.367
Assuming Gamma Distribution		95% KM (z) UCL	1.364
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	1.357
Minimum	1E-09	95% KM (bootstrap t) UCL	1.41
Maximum	3.75	95% KM (BCA) UCL	1.438
Mean	1.473	95% KM (Percentile Bootstrap) UCL	1.382
Median	1.483	95% KM (Chebyshev) UCL	1.77
SD	0.808	97.5% KM (Chebyshev) UCL	2.052
k star	0.829	99% KM (Chebyshev) UCL	2.607
Theta star	1.778		
Nu star	132.6	**Potential UCLs to Use**	
AppChi2	107	95% KM (t) UCL	1.367
95% Gamma Approximate UCL	1.826		
95% Adjusted Gamma UCL	1.833		

Note: DL/2 is not a recommended method.

Result (xylenes, total)

General Statistics

Number of Valid Data	80	Number of Detected Data	25
Number of Distinct Detected Data	25	Number of Non-Detect Data	55
		Percent Non-Detects	68.75%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.94	Minimum Detected	-0.0619
Maximum Detected	2600	Maximum Detected	7.863
Mean of Detected	412.9	Mean of Detected	4.077
SD of Detected	687.7	SD of Detected	2.499
Minimum Non-Detect	0.9	Minimum Non-Detect	-0.105
Maximum Non-Detect	16	Maximum Non-Detect	2.773
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	63
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	17
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	78.75%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic	0.654	Lilliefors Test Statistic	0.935
5% Lilliefors Critical Value	0.918	5% Lilliefors Critical Value	0.918
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	130.3	Mean	1.609
SD	424.8	SD	2.226
95% DL/2 (t) UCL	209.4	95% H-Stat (DL/2) UCL	78.24
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-0.242
		SD in Log Scale	3.991
		Mean in Original Scale	129.9
		SD in Original Scale	424.9
		95% Percentile Bootstrap UCL	210.6
		95% BCA Bootstrap UCL	232.7
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.331	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	1247		
nu star	16.56		
A-D Test Statistic	0.606	**Nonparametric Statistics**	
5% A-D Critical Value	0.841	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.841	Mean	130
5% K-S Critical Value	0.188	SD	422.2
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	48.18
		95% KM (t) UCL	210.2
Assuming Gamma Distribution		95% KM (z) UCL	209.3
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	209
Minimum	1E-09	95% KM (bootstrap t) UCL	276.2
Maximum	2600	95% KM (BCA) UCL	217.9
Mean	387.1	95% KM (Percentile Bootstrap) UCL	212.5
Median	403	95% KM (Chebyshev) UCL	340
SD	406.4	97.5% KM (Chebyshev) UCL	430.9
k star	0.299	99% KM (Chebyshev) UCL	609.4
Theta star	1295		
Nu star	47.83	**Potential UCLs to Use**	
AppChi2	32.96	95% KM (t) UCL	210.2
95% Gamma Approximate UCL	561.8		
95% Adjusted Gamma UCL	565.7		

Note: DL/2 is not a recommended method.

ARCADIS

Appendix E

Johnson & Ettinger Vapor Intrusion Models and Results

Table E-1
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2.0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
	Soil Gas Concentration Data			
71432	7.32E+01			Benzene
100414	1.54E+02			Ethylbenzene
95476	1.99E+02			o-Xylene
108383	5.62E+02			m-Xylene
108883	3.53E+02			Toluene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (^oC)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^v (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	250

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

DTSC / HERD
Last Update: 11/1/03
DTSC Indoor Air Guidance
Unclassified Soil Screening Model

Table E-2
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14

Notes:
°C = degrees Celsius
°K = degrees Kelvin
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-3
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	7.32E+01	7,977	5.29E-03	2.17E-01	9.58E-03	7.32E+01	9.58E-03	5.00E+03	3.61E+07	1.12E-03	8.19E-02	2.9E-05	3.0E-02
Ethylbenzene	1.54E+02	9,994	7.43E-03	3.05E-01	8.16E-03	1.54E+02	8.16E-03	5.00E+03	7.38E+08	1.02E-03	1.58E-01	2.5E-06	2.0E+00
o-Xylene	1.99E+02	10,245	4.88E-03	2.00E-01	9.47E-03	1.99E+02	9.47E-03	5.00E+03	4.41E+07	1.11E-03	2.21E-01	NA	1.0E-01
m-Xylene	5.62E+02	10,090	6.91E-03	2.84E-01	7.62E-03	5.62E+02	7.62E-03	5.00E+03	3.17E+09	9.82E-04	5.52E-01	NA	1.0E-01
Toluene	3.53E+02	9,001	6.29E-03	2.58E-01	9.47E-03	3.53E+02	9.47E-03	5.00E+03	4.41E+07	1.11E-03	3.93E-01	NA	3.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-4
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	5.8E-07	1.87E-03
Ethylbenzene	9.6E-08	5.39E-05
o-Xylene	NA	1.52E-03
m-Xylene	NA	3.78E-03
Toluene	NA	8.98E-04

Notes:
NA = not applicable, not available, not analyzed

Table E-5
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2.0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
	Soil Gas Concentration Data			
71432	7.32E+01			Benzene
100414	1.54E+02			Ethylbenzene
95476	1.99E+02			o-Xylene
108383	5.62E+02			m-Xylene
108883	3.53E+02			Toluene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (^oC)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^v (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

Table E-6
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14

Notes:
°C = degrees Celsius
°K = degrees Kelvin
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-7
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	7.32E+01	7,977	5.29E-03	2.17E-01	9.58E-03	7.32E+01	9.58E-03	5.00E+03	3.61E+07	1.12E-03	8.19E-02	2.9E-05	3.0E-02
Ethylbenzene	1.54E+02	9,994	7.43E-03	3.05E-01	8.16E-03	1.54E+02	8.16E-03	5.00E+03	7.38E+08	1.02E-03	1.58E-01	2.5E-06	2.0E+00
o-Xylene	1.99E+02	10,245	4.88E-03	2.00E-01	9.47E-03	1.99E+02	9.47E-03	5.00E+03	4.41E+07	1.11E-03	2.21E-01	NA	1.0E-01
m-Xylene	5.62E+02	10,090	6.91E-03	2.84E-01	7.62E-03	5.62E+02	7.62E-03	5.00E+03	3.17E+09	9.82E-04	5.52E-01	NA	1.0E-01
Toluene	3.53E+02	9,001	6.29E-03	2.58E-01	9.47E-03	3.53E+02	9.47E-03	5.00E+03	4.41E+07	1.11E-03	3.93E-01	NA	3.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-8
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 1
Residential Scenario
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	9.8E-07	2.62E-03
Ethylbenzene	1.6E-07	7.55E-05
o-Xylene	NA	2.12E-03
m-Xylene	NA	5.30E-03
Toluene	NA	1.26E-03

Notes:
NA = not applicable, not available, not analyzed

Table E-9
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2.0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
	Soil Gas Concentration Data			
71432	1.90E+01			Benzene
100414	4.24E+00			Ethylbenzene
95476	1.39E+00			o-Xylene
108383	2.66E+00			m-Xylene
108883	3.45E+00			Toluene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (^oC)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^v (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	250

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

Table E-10
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14

Notes:
°C = degrees Celsius
°K = degrees Kelvin
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-11
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	1.90E+01	7,977	5.29E-03	2.17E-01	9.58E-03	1.90E+01	9.58E-03	5.00E+03	3.61E+07	1.12E-03	2.13E-02	2.9E-05	3.0E-02
Ethylbenzene	4.24E+00	9,994	7.43E-03	3.05E-01	8.16E-03	4.24E+00	8.16E-03	5.00E+03	7.38E+08	1.02E-03	4.34E-03	2.5E-06	2.0E+00
o-Xylene	1.39E+00	10,245	4.88E-03	2.00E-01	9.47E-03	1.39E+00	9.47E-03	5.00E+03	4.41E+07	1.11E-03	1.55E-03	NA	1.0E-01
m-Xylene	2.66E+00	10,090	6.91E-03	2.84E-01	7.62E-03	2.66E+00	7.62E-03	5.00E+03	3.17E+09	9.82E-04	2.61E-03	NA	1.0E-01
Toluene	3.45E+00	9,001	6.29E-03	2.58E-01	9.47E-03	3.45E+00	9.47E-03	5.00E+03	4.41E+07	1.11E-03	3.84E-03	NA	3.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-12
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	1.5E-07	4.86E-04
Ethylbenzene	2.7E-09	1.49E-06
o-Xylene	NA	1.06E-05
m-Xylene	NA	1.79E-05
Toluene	NA	8.78E-06

Notes:
NA = not applicable, not available, not analyzed

Table E-13
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2.0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
	Soil Gas Concentration Data			
71432	1.90E+01			Benzene
100414	4.24E+00			Ethylbenzene
95476	1.39E+00			o-Xylene
108383	2.66E+00			m-Xylene
108883	3.45E+00			Toluene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (^oC)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^v (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

Table E-14
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14

Notes:
°C = degrees Celsius
°K = degrees Kelvin
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-15
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	1.90E+01	7,977	5.29E-03	2.17E-01	9.58E-03	1.90E+01	9.58E-03	5.00E+03	3.61E+07	1.12E-03	2.13E-02	2.9E-05	3.0E-02
Ethylbenzene	4.24E+00	9,994	7.43E-03	3.05E-01	8.16E-03	4.24E+00	8.16E-03	5.00E+03	7.38E+08	1.02E-03	4.34E-03	2.5E-06	2.0E+00
o-Xylene	1.39E+00	10,245	4.88E-03	2.00E-01	9.47E-03	1.39E+00	9.47E-03	5.00E+03	4.41E+07	1.11E-03	1.55E-03	NA	1.0E-01
m-Xylene	2.66E+00	10,090	6.91E-03	2.84E-01	7.62E-03	2.66E+00	7.62E-03	5.00E+03	3.17E+09	9.82E-04	2.61E-03	NA	1.0E-01
Toluene	3.45E+00	9,001	6.29E-03	2.58E-01	9.47E-03	3.45E+00	9.47E-03	5.00E+03	4.41E+07	1.11E-03	3.84E-03	NA	3.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-16
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 2
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	2.5E-07	6.81E-04
Ethylbenzene	4.5E-09	2.08E-06
o-Xylene	NA	1.48E-05
m-Xylene	NA	2.50E-05
Toluene	NA	1.23E-05

Table E-17
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2 0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.56E+01			Benzene
156592	4.10E+00			cis-1,2-Dichloroethylene
100414	4.90E+01			Ethylbenzene
95476	2.22E+01			o-Xylene
108383	1.42E+02			m-Xylene
127184	3.60E+00			Tetrachloroethylene
108883	6.89E+01			Toluene
79016	1.20E+00			Trichloroethylene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (^oC)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	250

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

Table E-18
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	0.0E+00	3.5E-02	96.94
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	5.9E-06	3.5E-02	165.83
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14
Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	2.0E-06	6.0E-01	131.39

Notes:
°C = degrees Celsius
°K = degrees Kelvin
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-19
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	2.56E+01	7,977	5.29E-03	2.17E-01	9.58E-03	2.56E+01	9.58E-03	5.00E+03	3.61E+07	1.12E-03	2.87E-02	2.9E-05	3.0E-02
cis-1,2-Dichloroethylene	4.10E+00	7,592	3.90E-03	1.60E-01	8.01E-03	4.10E+00	8.01E-03	5.00E+03	1.09E+09	1.01E-03	4.15E-03	NA	3.5E-02
Ethylbenzene	4.90E+01	9,994	7.43E-03	3.05E-01	8.16E-03	4.90E+01	8.16E-03	5.00E+03	7.38E+08	1.02E-03	5.01E-02	2.5E-06	2.0E+00
o-Xylene	2.22E+01	10,245	4.88E-03	2.00E-01	9.47E-03	2.22E+01	9.47E-03	5.00E+03	4.41E+07	1.11E-03	2.47E-02	NA	1.0E-01
m-Xylene	1.42E+02	10,090	6.91E-03	2.84E-01	7.62E-03	1.42E+02	7.62E-03	5.00E+03	3.17E+09	9.82E-04	1.40E-01	NA	1.0E-01
Tetrachloroethylene	3.60E+00	9,410	1.74E-02	7.14E-01	7.84E-03	3.60E+00	7.84E-03	5.00E+03	1.73E+09	9.99E-04	3.60E-03	5.9E-06	3.5E-02
Toluene	6.89E+01	9,001	6.29E-03	2.58E-01	9.47E-03	6.89E+01	9.47E-03	5.00E+03	4.41E+07	1.11E-03	7.67E-02	NA	3.0E-01
Trichloroethylene	1.20E+00	8,382	9.80E-03	4.02E-01	8.60E-03	1.20E+00	8.60E-03	5.00E+03	2.62E+08	1.05E-03	1.27E-03	2.0E-06	6.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-20
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	2.0E-07	6.54E-04
cis-1,2-Dichloroethylene	NA	8.12E-05
Ethylbenzene	3.1E-08	1.72E-05
o-Xylene	NA	1.69E-04
m-Xylene	NA	9.58E-04
Tetrachloroethylene	5.2E-09	7.04E-05
Toluene	NA	1.75E-04
Trichloroethylene	6.2E-10	1.44E-06

Notes:
NA = not applicable, not available, not analyzed

Table E-21
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2 0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.56E+01			Benzene
156592	4.10E+00			cis-1,2-Dichloroethylene
100414	4.90E+01			Ethylbenzene
95476	2.22E+01			o-Xylene
108383	1.42E+02			m-Xylene
127184	3.60E+00			Tetrachloroethylene
108883	6.89E+01			Toluene
79016	1.20E+00			Trichloroethylene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (°C)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

Table E-22
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	0.0E+00	3.5E-02	96.94
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	5.9E-06	3.5E-02	165.83
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14
Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	2.0E-06	6.0E-01	131.39

Notes:
°C = degrees Celsius
°K = degrees Kelvin
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-23
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	2.56E+01	7,977	5.29E-03	2.17E-01	9.58E-03	2.56E+01	9.58E-03	5.00E+03	3.61E+07	1.12E-03	2.87E-02	2.9E-05	3.0E-02
cis-1,2-Dichloroethylene	4.10E+00	7,592	3.90E-03	1.60E-01	8.01E-03	4.10E+00	8.01E-03	5.00E+03	1.09E+09	1.01E-03	4.15E-03	NA	3.5E-02
Ethylbenzene	4.90E+01	9,994	7.43E-03	3.05E-01	8.16E-03	4.90E+01	8.16E-03	5.00E+03	7.38E+08	1.02E-03	5.01E-02	2.5E-06	2.0E+00
o-Xylene	2.22E+01	10,245	4.88E-03	2.00E-01	9.47E-03	2.22E+01	9.47E-03	5.00E+03	4.41E+07	1.11E-03	2.47E-02	NA	1.0E-01
m-Xylene	1.42E+02	10,090	6.91E-03	2.84E-01	7.62E-03	1.42E+02	7.62E-03	5.00E+03	3.17E+09	9.82E-04	1.40E-01	NA	1.0E-01
Tetrachloroethylene	3.60E+00	9,410	1.74E-02	7.14E-01	7.84E-03	3.60E+00	7.84E-03	5.00E+03	1.73E+09	9.99E-04	3.60E-03	5.9E-06	3.5E-02
Toluene	6.89E+01	9,001	6.29E-03	2.58E-01	9.47E-03	6.89E+01	9.47E-03	5.00E+03	4.41E+07	1.11E-03	7.67E-02	NA	3.0E-01
Trichloroethylene	1.20E+00	8,382	9.80E-03	4.02E-01	8.60E-03	1.20E+00	8.60E-03	5.00E+03	2.62E+08	1.05E-03	1.27E-03	2.0E-06	6.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-24
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 3
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	3.4E-07	9.16E-04
cis-1,2-Dichloroethylene	NA	1.14E-04
Ethylbenzene	5.1E-08	2.40E-05
o-Xylene	NA	2.37E-04
m-Xylene	NA	1.34E-03
Tetrachloroethylene	8.7E-09	9.85E-05
Toluene	NA	2.45E-04
Trichloroethylene	1.0E-09	2.02E-06

Notes:
NA = not applicable, not available, not analyzed

Table E-25
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2.0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	1.45E+02			Benzene
100414	7.88E+00			Ethylbenzene
95476	1.60E+01			o-Xylene
108383	3.08E+01			m-Xylene
108883	7.31E+00			Toluene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (^oC)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^v (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	250

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

Table E-26
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14

Notes:
°C = degrees Celsius
°K = degrees Kelvin
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-27
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	1.45E+02	7,977	5.29E-03	2.17E-01	9.58E-03	1.45E+02	9.58E-03	5.00E+03	3.61E+07	1.12E-03	1.62E-01	2.9E-05	3.0E-02
Ethylbenzene	7.88E+00	9,994	7.43E-03	3.05E-01	8.16E-03	7.88E+00	8.16E-03	5.00E+03	7.38E+08	1.02E-03	8.06E-03	2.5E-06	2.0E+00
o-Xylene	1.60E+01	10,245	4.88E-03	2.00E-01	9.47E-03	1.60E+01	9.47E-03	5.00E+03	4.41E+07	1.11E-03	1.78E-02	NA	1.0E-01
m-Xylene	3.08E+01	10,090	6.91E-03	2.84E-01	7.62E-03	3.08E+01	7.62E-03	5.00E+03	3.17E+09	9.82E-04	3.03E-02	NA	1.0E-01
Toluene	7.31E+00	9,001	6.29E-03	2.58E-01	9.47E-03	7.31E+00	9.47E-03	5.00E+03	4.41E+07	1.11E-03	8.14E-03	NA	3.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-28
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Industrial Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	1.2E-06	3.71E-03
Ethylbenzene	4.9E-09	2.76E-06
o-Xylene	NA	1.22E-04
m-Xylene	NA	2.07E-04
Toluene	NA	1.86E-05

Notes:
NA = not applicable, not available, not analyzed

Table E-29
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Data Entry Sheet

SG-SCREEN
EPA Version 2.0; 04/03

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 1/21/05)

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (mg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
	Soil Gas Concentration Data			
71432	1.45E+02			Benzene
100414	7.88E+00			Ethylbenzene
95476	1.60E+01			o-Xylene
108383	3.08E+01			m-Xylene
108883	7.31E+00			Toluene

MORE ê

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth #N/A L_s (cm)	ENTER Average soil #N/A T_S (^oC)	ENTER Vadose zone SCS soil type #N/A soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24	SIC		

MORE ê

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, r_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, q_w^v (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
SIC	1 38	0.481	0.15	5

MORE ê

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	30	30	350

END

Notes
°C = degrees Celsius
CAS No. = Chemical Abstract Services number
conc. = concentration
cm = centimeter(s)
cm^2 = square centimeter(s)
cm^3/cm^3 = cubic centimeter(s) per cubic centimeter
g/cm^3 = gram(s) per cubic centimeter
L/m = liter(s) per meter
mg/m^3 = milligram(s) per cubic meter
ppmv = parts per million by volume
yr/yrs = year/years

Table E-30
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Chemical Properties

Chemical Name	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $DH_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	2.9E-05	3.0E-02	78.11
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	2.0E+00	106.17
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17
m-Xylene	7.00E-02	7.80E-06	7.32E-03	25	8,523	412.27	617.05	0.0E+00	1.0E-01	106.17
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14

Notes:
°C = degrees Celsius
°K = degrees Kelvin
atm-m^3/mol = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2/s = square centimeter(s) per second
conc. = concentration
g/mol = gram(s) per mol
mg/m^3 = milligram(s) per cubic meter
$(\mu g/m^3)^{-1}$ = the inverse of micrograms per cubic meter

Table E-31
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

InterCalculations

Chemical Name	Soil gas conc. (mg/m^3)	Enthalpy of vaporization at ave. soil temperature, $DH_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vadose zone effective diffusion coefficient, D^{eff}_{V} (cm^2/s)	Source vapor conc., C_{source} (mg/m^3)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, a (unitless)	Infinite source bldg. conc., $C_{building}$ (mg/m^3)	Unit risk factor, URF $(mg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
Benzene	1.45E+02	7,977	5.29E-03	2.17E-01	9.58E-03	1.45E+02	9.58E-03	5.00E+03	3.61E+07	1.12E-03	1.62E-01	2.9E-05	3.0E-02
Ethylbenzene	7.88E+00	9,994	7.43E-03	3.05E-01	8.16E-03	7.88E+00	8.16E-03	5.00E+03	7.38E+08	1.02E-03	8.06E-03	2.5E-06	2.0E+00
o-Xylene	1.60E+01	10,245	4.88E-03	2.00E-01	9.47E-03	1.60E+01	9.47E-03	5.00E+03	4.41E+07	1.11E-03	1.78E-02	NA	1.0E-01
m-Xylene	3.08E+01	10,090	6.91E-03	2.84E-01	7.62E-03	3.08E+01	7.62E-03	5.00E+03	3.17E+09	9.82E-04	3.03E-02	NA	1.0E-01
Toluene	7.31E+00	9,001	6.29E-03	2.58E-01	9.47E-03	7.31E+00	9.47E-03	5.00E+03	4.41E+07	1.11E-03	8.14E-03	NA	3.0E-01

Notes:
$atm\text{-}m^3/mol$ = atmospheres in cubic meters per mol
cal/mol = calories per mol
cm^2 = square centimeter(s)
cm^2/s = square centimeter(s) per second
conc. = concentration
mg/m^3 = milligram(s) per cubic meter
$(mg/m^3)^{-1}$ = the inverse of milligrams per cubic meter
NA = not applicable, not available, not analyzed

Table E-32
Estimates of Human Health Risk due to Vapors in Indoor Air
Cal-Modified USEPA Spreadsheet for the Johnson and Ettinger Model
Area 4
Residential Scenario

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Incremental Risk Calculations

Chemical Name	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	1.9E-06	5.19E-03
Ethylbenzene	8.3E-09	3.87E-06
o-Xylene	NA	1.71E-04
m-Xylene	NA	2.90E-04
Toluene	NA	2.60E-05

Notes:
NA = not applicable, not available, not analyzed

Table E-33
Summary of Estimates of Human Health Risk due to Vapors in Indoor Air

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Constituent	Exposure Point Concentrations Soil Gas at 5 feet (EPCs) [a] ($\mu g/m^3$)				Preliminary Risk Evaluation [b] Residential Scenario								Preliminary Risk Evaluation [b] Industrial Scenario							
	Area 1	Area 2	Area 3	Area 4	Area 1		Area 2		Area 3		Area 4		Area 1		Area 2		Area 3		Area 4	
					ELCR	HQ	ELCR	HQ	ELCR	HQ	ELCR	HQ	ELCR	HQ	ELCR	HQ	ELCR	HQ	ELCR	HQ
Benzene	7 32E+04	1.90E+04	2.56E+04	1.45E+05	1.E-06	3.E-03	3.E-07	7.E-04	3.E-07	9.E-04	2.E-06	5.E-03	6.E-07	2.E-03	2.E-07	5.E-04	2.E-07	7.E-04	1.E-06	4.E-03
cis-1,2-Dichloroethene	–	–	4.10E+03 m	–	–	–	–	–	NA	1.E-04	–	–	–	–	–	–	NA	8.E-05	–	–
Ethylbenzene	1 54E+05	4.24E+03	4.90E+04	7.88E+03	2.E-07	8.E-05	4.E-09	2.E-06	5.E-08	2.E-05	8.E-09	4.E-06	1.E-07	5.E-05	3.E-09	1.E-06	3.E-08	2.E-05	5.E-09	3.E-06
o-Xylene	1 99E+05	1.39E+03	2.22E+04	1.60E+04 m	NA	2.E-03	NA	1.E-05	NA	2.E-04	NA	2.E-04	NA	2.E-03	NA	1.E-05	NA	2.E-04	NA	1.E-04
p/m-Xylene	5.62E+05	2.66E+03	1.42E+05	3.08E+04	NA	5.E-03	NA	3.E-05	NA	1.E-03	NA	3.E-04	NA	4.E-03	NA	2.E-05	NA	1.E-03	NA	2.E-04
Tetrachloroethene	–	–	3.60E+03 m	–	–	–	–	–	9.E-09	1.E-04	–	–	–	–	–	–	5.E-09	7.E-05	–	–
Toluene	3 53E+05	3.45E+03	6.89E+04	7.31E+03	NA	1.E-03	–	–	NA	2.E-04	–	–	–	–	–	–	NA	2.E-04	–	–
Trichloroethene	–	–	1.20E+03 m	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Xylenes [c]	7 56E+05	3.08E+03	1.86E+05	3.53E+04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total					1.E-06	0.01	3.E-07	0.0007	4.E-07	0.003	2.E-06	0.006	7.E-07	0.007	2.E-07	0.0005	2.E-07	0.002	1.E-06	0.004

References:

USEPA. 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils. Office of Solid Waste and Emergency Response (OSWER). Washington, D.C. November.

USEPA. 2003. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response. June.

CalEPA. 2005. Spreadsheet for the Johnson and Ettinger Model - Soil Gas Screen. Version 2.0. Last modified 01/21/2005.

Notes:

— Not Applicable.

$\mu g/m^3$ micrograms per cubic meter.

[a] Soil gas EPCs were the lower of the maximum concentration and the upper confidence level on the mean (UCL).
EPCs based on maximum concentrations are denoted with an "m".

[b] Risk from vapors in indoor air were estimated using CalEPA's modified spreadsheets of USEPA's Spreadsheet for the Johnson and Ettinger Vapor Intrusion Model (ClaEPA, 2005), as directed by the user's guide (USEPA, 2003), consistent with methods in the vapor intrusion guidance (USEPA, 2002).
The spreadsheet was modified to accommodate multiple chemicals.
All model inputs were default except for chemical concentration and soil type which was set at silty clay per site characteristics.
Models run outputs are presented in Appendix E.

[c] Total Xylenes was not assessed to avoid double counting as o, p/m xylenes were assessed.

ARCADIS

Appendix F

Receptor-Specific ELCR and Noncancer HI Calculations Related to Soil Exposure

ARCADIS

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Table F-1
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2,2-Tetrachloroethane	1.20E-02	m	1.38E+04	V	5.7E-10	–	4.1E-09	4.7E-09	<0.1%	1.5E-06	–	NA	1.5E-06	<0.1%
1,1,2-Trichloroethane	7.70E-03	m	6.36E+03	V	9.7E-11	–	1.6E-09	1.7E-09	<0.1%	9.4E-07	–	NA	9.4E-07	<0.1%
1,2,3-Trichlorobenzene	9.00E-03	m	1.93E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
1,2,4-Trimethy benzene	2.16E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	2.4E-03	2.4E-03	4.7%
1,2-Dichloropropane	2.10E-03	m	3.52E+03	V	1.3E-11	–	4.9E-10	5.0E-10	<0.1%	NA	NA	3.4E-05	3.4E-05	<0.1%
1,3,5-Trimethy benzene	7.49E-01		1.15E+04	V	NA	NA	NA	NA	–	7.3E-06	–	2.5E-03	2.5E-03	4.8%
2-Chlorotoluene	2.80E-03	m	1.30E+04	V	NA	NA	NA	NA	–	6.8E-08	–	NA	6.8E-08	<0.1%
4-Chlorotoluene	2.10E-03	m	7.18E+03	V	NA	NA	NA	NA	–	1.5E-08	–	NA	1.5E-08	<0.1%
4-Methyl-2-Pentanone	1.20E-02	m	1.14E+04	V	NA	NA	NA	NA	–	7.3E-08	–	8.0E-08	1.5E-07	<0.1%
Benzene	1.77E-02		2.68E+03	V	3.1E-10	–	1.6E-08	1.6E-08	0.1%	2.2E-06	–	2.5E-05	2.7E-05	<0.1%
Carbon Disulfide	3.40E-02	m	1.17E+03	V	NA	NA	NA	NA	–	1.7E-07	–	8.3E-06	8.5E-06	<0.1%
Ethylbenzene	1.45E-01		5.29E+03	V	2.8E-10	–	5.6E-09	5.8E-09	<0.1%	7.1E-07	–	3.1E-06	3.8E-06	<0.1%
Isopropylbenzene	3.55E-01		1.65E+03	V	NA	NA	NA	NA	–	1.7E-06	–	1.2E-04	1.2E-04	0.2%
Methyl-t-Butyl Ether (MTBE)	1.03E-02		4.07E+03	V	3.2E-12	–	5.4E-11	5.7E-11	<0.1%	NA	NA	7.2E-08	7.2E-08	<0.1%
n-Buty benzene	3.99E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propy benzene	5.77E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	2.02E-01		5.16E+03	V	NA	NA	NA	NA	–	4.9E-08	–	1.3E-05	1.3E-05	<0.1%
p/m-Xylene	4.96E-01		3.79E+03	V	NA	NA	NA	NA	–	1.2E-06	–	3.0E-04	3.0E-04	0.6%
p-Isopropyltoluene	9.39E-02		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Buty benzene	2.02E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	1.37E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Toluene	9.52E-02		3.90E+03	V	NA	NA	NA	NA	–	5.8E-07	–	1.9E-05	1.9E-05	<0.1%
Xylenes, total	6.82E-01		4.39E+03	V	NA	NA	NA	NA	–	1.7E-06	–	5.1E-05	5.2E-05	0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	1.90E+01		1.63E+05	V	9.6E-08	–	NA	9.6E-08	0.6%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.40E+01		1.13E+05	V	NA	NA	NA	NA	–	2.9E-03	–	NA	2.9E-03	5.7%
Acenaphthene	2.50E+00		2.12E+05	V	NA	NA	NA	NA	–	2.0E-05	3.5E-05	NA	5.5E-05	0.1%
Acenaphthylene	1.27E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	2.26E-01		7.70E+05	V	NA	NA	NA	NA	–	3.7E-07	6.3E-07	NA	1.0E-06	<0.1%
Benzo(a)anthracene	7.27E-01		1.32E+09	P	1.5E-07	2.6E-07	4.9E-12	4.1E-07	2.7%	NA	NA	NA	NA	–
Benzo(a)pyrene	3.12E-01		1.32E+09	P	6.6E-07	1.1E-06	2.1E-11	1.8E-06	11.4%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	2.00E-01		1.32E+09	P	4.2E-08	7.2E-08	1.4E-12	1.1E-07	0.7%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.56E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–

Table F-1
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(k)fluoranthene	1.25E-01	1.32E+09	P	2.6E-08	4.5E-08	8.5E-13	7.1E-08	0.5%	NA	NA	NA	NA	–
Chrysene	1.92E+00	1.32E+09	P	4.0E-08	6.9E-08	1.3E-12	1.1E-07	0.7%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	8.40E-02	1.32E+09	P	6.0E-08	1.0E-07	6.2E-12	1.6E-07	1.1%	NA	NA	NA	NA	–
Fluoranthene	3.21E-01	1.32E+09	P	NA	NA	NA	NA	–	3.9E-06	6.7E-06	NA	1.1E-05	<0.1%
Fluorene	2.59E+00	5.02E+05	V	NA	NA	NA	NA	–	3.2E-05	5.4E-05	NA	8.6E-05	0.2%
Indeno(1,2,3-cd)pyrene	9.28E-02	1.32E+09	P	1.9E-08	3.3E-08	6.3E-13	5.3E-08	0.3%	NA	NA	NA	NA	–
Naphthalene	1.03E+00	5.49E+04	V	NA	NA	5.2E-08	5.2E-08	0.3%	2.5E-05	4.3E-05	4.8E-04	5.5E-04	1.1%
Phenanthrene	6.50E+00	9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	3.87E+00	1.32E+09	P	NA	NA	NA	NA	–	6.3E-05	1.1E-04	NA	1.7E-04	0.3%
Inorganic Compounds													
Antimony	1.29E+00	1.32E+09	P	NA	NA	NA	NA	–	1.6E-03	–	NA	1.6E-03	3.1%
Arsenic	5.48E+00	1.32E+09	P	9.1E-06	3.6E-06	1.1E-09	1.3E-05	81.3%	8.9E-03	3.5E-03	6.3E-05	1.3E-02	24.5%
Barium	2.03E+02	1.32E+09	P	NA	NA	NA	NA	–	5.0E-04	–	7.0E-05	5.7E-04	1.1%
Beryllium	5.77E-01	1.32E+09	P	NA	NA	8.6E-11	8.6E-11	<0.1%	1.4E-04	–	1.4E-05	1.6E-04	0.3%
Cadmium	7.52E-01	1.32E+09	P	NA	NA	2.0E-10	2.0E-10	<0.1%	3.7E-04	1.9E-04	6.5E-06	5.7E-04	1.1%
Chromium	7.16E+01	1.32E+09	P	NA	NA	NA	NA	–	2.3E-05	–	NA	2.3E-05	<0.1%
Chromium, Hexavalent	1.20E+00 m	1.32E+09	P	NA	NA	1.1E-08	1.1E-08	<0.1%	2.0E-04	–	1.0E-06	2.0E-04	0.4%
Cobalt	1.18E+01	1.32E+09	P	NA	NA	6.5E-09	6.5E-09	<0.1%	1.9E-02	–	3.4E-04	2.0E-02	38.1%
Copper	1.36E+02	1.32E+09	P	NA	NA	NA	NA	–	1.7E-03	–	NA	1.7E-03	3.3%
Lead	2.17E+02	1.32E+09	P	NA	NA	1.6E-10	1.6E-10	<0.1%	NA	NA	NA	NA	–
Mercury	2.46E-01	1.32E+09	P	NA	NA	NA	NA	–	4.0E-04	–	1.4E-06	4.0E-04	0.8%
Molybdenum	8.64E+00	1.32E+09	P	NA	NA	NA	NA	–	8.5E-04	–	NA	8.5E-04	1.6%
Nickel	1.95E+01	1.32E+09	P	NA	NA	3.1E-10	3.1E-10	<0.1%	4.8E-04	–	6.8E-05	5.5E-04	1.1%
Selenium	1.08E+00	1.32E+09	P	NA	NA	NA	NA	–	1.1E-04	–	9.4E-09	1.1E-04	0.2%
Vanadium	4.08E+01	1.32E+09	P	NA	NA	NA	NA	–	2.8E-03	–	NA	2.8E-03	5.6%
Zinc	2.51E+02	1.32E+09	P	NA	NA	NA	NA	–	4.1E-04	–	NA	4.1E-04	0.8%

Table F-1
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral (ELCRo)	Dermal (ELCRd)	Inhalation (ELCRi)	Calculated Risk (ELCR)	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral (HQo)	Dermal (HQd)	Inhalation (HQi)	Calculated Hazard Index (HI)	Percent Total HI
Total Risk or Hazard			Total ELCR			2E-05	100%	Total HI			0.05	100%
Total Risk or Hazard from Arsenic						1E-05					0.01	
Total Risk or Hazard without Arsenic						3E-06					0.04	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-2
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	7.27E-01		1.32E+09	P	5.0E-12	<0.1%	NA	–
Benzo(a)pyrene	3.12E-01		1.32E+09	P	2.1E-11	0.1%	NA	–
Benzo(b)fluoranthene	2.00E-01		1.32E+09	P	1.4E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.56E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	1.25E-01		1.32E+09	P	8.5E-13	<0.1%	NA	–
Chrysene	1.92E+00		1.32E+09	P	1.3E-12	<0.1%	NA	–
Dibenzo(a,h)anthracene	8.40E-02		1.32E+09	P	6.3E-12	<0.1%	NA	–
Fluoranthene	3.21E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	9.28E-02		1.32E+09	P	6.4E-13	<0.1%	NA	–
Pyrene	3.87E+00		1.32E+09	P	NA	–	NA	–
Inorganic Compounds								
Antimony	1.29E+00		1.32E+09	P	NA	–	NA	–
Arsenic	5.48E+00		1.32E+09	P	1.1E-09	5.7%	2.7E-04	11.2%
Barium	2.03E+02		1.32E+09	P	NA	–	2.9E-04	12.4%
Beryllium	5.77E-01		1.32E+09	P	8.6E-11	0.4%	6.0E-05	2.5%
Cadmium	7.52E-01		1.32E+09	P	2.0E-10	1.0%	2.7E-05	1.2%
Chromium	7.16E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	1.20E+00	m	1.32E+09	P	1.1E-08	56.8%	4.4E-06	0.2%
Cobalt	1.18E+01		1.32E+09	P	6.6E-09	33.4%	1.4E-03	60.2%
Copper	1.36E+02		1.32E+09	P	NA	–	NA	–
Lead	2.17E+02		1.32E+09	P	1.6E-10	0.8%	NA	–
Mercury	2.46E-01		1.32E+09	P	NA	–	6.0E-06	0.3%
Molybdenum	8.64E+00		1.32E+09	P	NA	–	NA	–
Nickel	1.95E+01		1.32E+09	P	3.2E-10	1.6%	2.8E-04	12.0%
Selenium	1.08E+00		1.32E+09	P	NA	–	3.9E-08	<0.1%
Vanadium	4.08E+01		1.32E+09	P	NA	–	NA	–

Table F-2
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation	Percent Total HI
			ELCRi		HQi	
Zinc	2.51E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	2E-08	Total HI	0.002	
Total Risk or Hazard from Arsenic			1E-09		0.0003	
Total Risk or Hazard without Arsenic			2E-08		0.002	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-3
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	7.27E-01		1.32E+09	P	2.0E-11	<0.1%	NA	–
Benzo(a)pyrene	3.12E-01		1.32E+09	P	8.6E-11	0.1%	NA	–
Benzo(b)fluoranthene	2.00E-01		1.32E+09	P	5.5E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.56E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	1.25E-01		1.32E+09	P	3.4E-12	<0.1%	NA	–
Chrysene	1.92E+00		1.32E+09	P	5.3E-12	<0.1%	NA	–
Dibenzo(a,h)anthracene	8.40E-02		1.32E+09	P	2.5E-11	<0.1%	NA	–
Fluoranthene	3.21E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	9.28E-02		1.32E+09	P	2.5E-12	<0.1%	NA	–
Pyrene	3.87E+00		1.32E+09	P	NA	–	NA	–
Inorganic Compounds								
Antimony	1.29E+00		1.32E+09	P	NA	–	NA	–
Arsenic	5.48E+00		1.32E+09	P	4.5E-09	5.7%	2.7E-04	11.2%
Barium	2.03E+02		1.32E+09	P	NA	–	2.9E-04	12.4%
Beryllium	5.77E-01		1.32E+09	P	3.4E-10	0.4%	6.0E-05	2.5%
Cadmium	7.52E-01		1.32E+09	P	7.9E-10	1.0%	2.7E-05	1.2%
Chromium	7.16E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	1.20E+00	m	1.32E+09	P	4.5E-08	56.8%	4.4E-06	0.2%
Cobalt	1.18E+01		1.32E+09	P	2.6E-08	33.4%	1.4E-03	60.2%
Copper	1.36E+02		1.32E+09	P	NA	–	NA	–
Lead	2.17E+02		1.32E+09	P	6.5E-10	0.8%	NA	–
Mercury	2.46E-01		1.32E+09	P	NA	–	6.0E-06	0.3%
Molybdenum	8.64E+00		1.32E+09	P	NA	–	NA	–
Nickel	1.95E+01		1.32E+09	P	1.3E-09	1.6%	2.8E-04	12.0%
Selenium	1.08E+00		1.32E+09	P	NA	–	3.9E-08	<0.1%
Vanadium	4.08E+01		1.32E+09	P	NA	–	NA	–

Table F-3
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation	Percent Total HI
			ELCRi		HQi	
Zinc	2.51E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	8E-08	Total HI	0.002	
Total Risk or Hazard from Arsenic			5E-09		0.0003	
Total Risk or Hazard without Arsenic			7E-08		0.002	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

Table F-4
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2,2-Tetrachloroethane	1.20E-02	m	1.38E+04	V	1.5E-10	–	1.6E-10	3.1E-10	<0.1%	9.7E-06	–	NA	9.7E-06	<0.1%
1,1,2-Trichloroethane	7.70E-03	m	6.36E+03	V	2.6E-11	–	6.3E-11	8.9E-11	<0.1%	6.2E-07	–	NA	6.2E-07	<0.1%
1,2,3-Trichlorobenzene	9.00E-03	m	1.93E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
1,2,4-Trichlorobenzene	4.63E-03	m	4.23E+04	V	7.7E-13	–	NA	7.7E-13	<0.1%	1.5E-06	–	1.2E-08	1.5E-06	<0.1%
1,2,4-Trimethylbenzene	1.54E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	1.7E-02	1.7E-02	1.6%
1,2-Dichloropropane	2.10E-03	m	3.52E+03	V	3.5E-12	–	1.9E-11	2.3E-11	<0.1%	NA	NA	1.0E-05	1.0E-05	<0.1%
1,3,5-Trimethylbenzene	6.51E+00		1.15E+04	V	NA	NA	NA	NA	–	4.2E-04	–	2.2E-02	2.2E-02	2.0%
2-Chlorotoluene	2.80E-03	m	1.30E+04	V	NA	NA	NA	NA	–	4.5E-08	–	NA	4.5E-08	<0.1%
2-Hexanone	3.13E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
4-Chlorotoluene	2.10E-03	m	7.18E+03	V	NA	NA	NA	NA	–	9.7E-08	–	NA	9.7E-08	<0.1%
4-Methyl-2-Pentanone	1.20E-02	m	1.14E+04	V	NA	NA	NA	NA	–	4.8E-07	–	8.0E-08	5.6E-07	<0.1%
Benzene	4.70E-01		2.68E+03	V	2.2E-09	–	1.7E-08	1.9E-08	0.6%	1.3E-04	–	6.7E-04	7.9E-04	<0.1%
Carbon Disulfide	9.45E-03		1.17E+03	V	NA	NA	NA	NA	–	3.1E-07	–	2.3E-06	2.6E-06	<0.1%
Chloroethane	6.50E-03	m	8.86E+02	V	NA	NA	NA	NA	–	NA	NA	5.6E-08	5.6E-08	<0.1%
Chloromethane	2.13E-03	m	1.55E+03	V	1.3E-12	–	8.0E-12	9.3E-12	<0.1%	NA	NA	3.5E-07	3.5E-07	<0.1%
Ethylbenzene	3.32E+00		5.29E+03	V	1.7E-09	–	5.1E-09	6.8E-09	0.2%	1.1E-05	–	7.2E-05	8.2E-05	<0.1%
Iodomethane	1.38E-02	m	1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.13E-01		1.65E+03	V	NA	NA	NA	NA	–	2.5E-06	–	1.1E-04	1.1E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	6.74E-03		4.07E+03	V	5.6E-13	–	1.4E-12	2.0E-12	<0.1%	NA	NA	4.7E-08	4.7E-08	<0.1%
n-Butylbenzene	1.32E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.91E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.70E+00		5.16E+03	V	NA	NA	NA	NA	–	1.2E-05	–	4.9E-04	5.0E-04	<0.1%
p/m-Xylene	1.50E+01		3.79E+03	V	NA	NA	NA	NA	–	2.4E-04	–	3.0E-03	3.3E-03	0.3%
p-Isopropyltoluene	6.99E-02		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	1.48E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	4.30E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.46E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Toluene	3.46E+00		3.90E+03	V	NA	NA	NA	NA	–	1.4E-05	–	6.8E-04	6.9E-04	<0.1%
Xylenes, total	2.26E+01		4.39E+03	V	NA	NA	NA	NA	–	3.6E-04	–	1.7E-03	2.0E-03	0.2%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.22E+01		1.63E+05	V	3.0E-08	–	NA	3.0E-08	0.9%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.72E+01		1.13E+05	V	NA	NA	NA	NA	–	3.0E-02	–	NA	3.0E-02	2.8%
Acenaphthene	1.24E+00		2.12E+05	V	NA	NA	NA	NA	–	6.7E-06	3.1E-06	NA	9.7E-06	<0.1%

Table F-4
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Acenaphthylene	1.02E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.49E-01		7.70E+05	V	NA	NA	NA	NA	–	1.6E-07	7.3E-08	NA	2.3E-07	<0.1%
Benzo(a)anthracene	3.04E-01		1.00E+06	P	1.7E-08	7.7E-09	1.1E-10	2.5E-08	0.7%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.44E-01		1.00E+06	P	8.0E-08	3.7E-08	5.2E-10	1.2E-07	3.5%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	9.40E-02		1.00E+06	P	5.2E-09	2.4E-09	3.4E-11	7.6E-09	0.2%	NA	NA	NA	NA	–
Benzo(ghi)perylene	8.15E-02		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	6.03E-02		1.00E+06	P	3.3E-09	1.5E-09	2.2E-11	4.9E-09	0.1%	NA	NA	NA	NA	–
Chrysene	6.53E-01		1.00E+06	P	3.6E-09	1.7E-09	2.3E-11	5.3E-09	0.2%	NA	NA	NA	NA	–
D benzo(a,h)anthracene	6.70E-02		1.00E+06	P	1.3E-08	5.8E-09	2.6E-10	1.9E-08	0.6%	NA	NA	NA	NA	–
Fluoranthene	2.37E-01		1.00E+06	P	NA	NA	NA	NA	–	1.9E-06	8.8E-07	NA	2.8E-06	<0.1%
Fluorene	1.80E+00		5.02E+05	V	NA	NA	NA	NA	–	1.5E-05	6.7E-06	NA	2.1E-05	<0.1%
Indeno(1,2,3-cd)pyrene	5.03E-02		1.00E+06	P	2.8E-09	1.3E-09	1.8E-11	4.1E-09	0.1%	NA	NA	NA	NA	–
Naphthalene	5.06E+00		5.49E+04	V	NA	NA	1.0E-08	1.0E-08	0.3%	8.2E-05	3.7E-05	2.3E-03	2.5E-03	0.2%
Phenanthrene	4.47E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.32E+00		1.00E+06	P	NA	NA	NA	NA	–	1.4E-05	6.5E-06	NA	2.1E-05	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	5.00E-02	m	1.00E+06	P	4.6E-09	2.3E-09	9.3E-11	7.0E-09	0.2%	3.2E-03	1.6E-03	NA	4.8E-03	0.4%
PCB-1260	4.00E-02	m	1.00E+06	P	3.7E-09	1.8E-09	7.4E-11	5.6E-09	0.2%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.29E+00		1.00E+06	P	NA	NA	NA	NA	–	1.8E-02	–	NA	1.8E-02	1.7%
Arsenic	4.75E+00		1.00E+06	P	2.1E-06	2.2E-07	5.1E-08	2.3E-06	69.0%	5.1E-02	5.4E-03	7.2E-02	1.3E-01	12.0%
Barium	1.93E+02		1.00E+06	P	NA	NA	NA	NA	–	3.1E-03	–	8.8E-03	1.2E-02	1.1%
Beryllium	7.96E-01		1.00E+06	P	NA	NA	6.2E-09	6.2E-09	0.2%	5.1E-04	–	2.6E-02	2.6E-02	2.5%
Cadmium	4.96E-01		1.00E+06	P	NA	NA	6.8E-09	6.8E-09	0.2%	1.6E-03	2.3E-04	5.7E-03	7.5E-03	0.7%
Chromium	5.91E+01		1.00E+06	P	NA	NA	NA	NA	–	1.3E-04	–	NA	1.3E-04	<0.1%
Chromium, Hexavalent	7.28E-01		1.00E+06	P	NA	NA	3.6E-07	3.6E-07	10.5%	1.2E-04	–	8.3E-04	9.5E-04	<0.1%
Cobalt	1.35E+01		1.00E+06	P	NA	NA	4.0E-07	4.0E-07	11.7%	1.5E-01	–	5.1E-01	6.6E-01	61.3%
Copper	7.33E+01		1.00E+06	P	NA	NA	NA	NA	–	5.9E-03	–	NA	5.9E-03	0.6%
Lead	1.45E+02		1.00E+06	P	NA	NA	5.7E-09	5.7E-09	0.2%	NA	NA	NA	NA	–
Mercury	1.78E-01		1.00E+06	P	NA	NA	NA	NA	–	1.9E-03	–	1.4E-03	3.3E-03	0.3%
Molybdenum	3.52E+00		1.00E+06	P	NA	NA	NA	NA	–	2.3E-03	–	NA	2.3E-03	0.2%
Nickel	2.14E+01		1.00E+06	P	NA	NA	1.8E-08	1.8E-08	0.5%	3.5E-03	–	9.8E-02	1.0E-01	9.4%
Selenium	1.06E+00		1.00E+06	P	NA	NA	NA	NA	–	6.8E-04	–	1.2E-05	6.9E-04	<0.1%
Vanadium	4.92E+01		1.00E+06	P	NA	NA	NA	NA	–	2.3E-02	–	NA	2.3E-02	2.1%

Table F-4
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Zinc	1.89E+02	1.00E+06	P	NA	NA	NA	NA	–	2.0E-03	–	NA	2.0E-03	0.2%
Total Risk or Hazard				Total ELCR			3E-06	100%	Total HI			1	100%
Total Risk or Hazard from Arsenic							2E-06					0.1	
Total Risk or Hazard without Arsenic							1E-06					0.9	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 250 × 1 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 250 × 1 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 1 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 250 × 1) / (1,000,000 × 70 × 365 × RfDo)
HQd = (EPCs × 5,800 × 0.2 × ABSd × 250 × 1) / (1,000,000 × 70 × 365 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 1) / ([VF or PEF] × 365 × RfC)

Table F-5
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2,2-Tetrachloroethane	1.20E-02	m	1.38E+04	V	8.4E-11	–	9.2E-11	1.8E-10	<0.1%	7.7E-07	–	NA	7.7E-07	<0.1%
1,1,2-Trichloroethane	7.70E-03	m	6.36E+03	V	1.4E-11	–	3.5E-11	5.0E-11	<0.1%	5.0E-08	–	NA	5.0E-08	<0.1%
1,2,3-Trichlorobenzene	9.00E-03	m	1.93E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
1,2,4-Trichlorobenzene	4.63E-03	m	4.23E+04	V	4.3E-13	–	NA	4.3E-13	<0.1%	1.2E-07	–	1.0E-09	1.2E-07	<0.1%
1,2,4-Trimethylbenzene	1.54E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	1.4E-03	1.4E-03	1.6%
1,2-Dichloropropane	2.10E-03	m	3.52E+03	V	2.0E-12	–	1.1E-11	1.3E-11	<0.1%	NA	NA	8.4E-07	8.4E-07	<0.1%
1,3,5-Trimethylbenzene	6.51E+00		1.15E+04	V	NA	NA	NA	NA	–	3.4E-05	–	1.7E-03	1.8E-03	2.0%
2-Chlorotoluene	2.80E-03	m	1.30E+04	V	NA	NA	NA	NA	–	3.6E-09	–	NA	3.6E-09	<0.1%
2-Hexanone	3.13E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
4-Chlorotoluene	2.10E-03	m	7.18E+03	V	NA	NA	NA	NA	–	7.7E-09	–	NA	7.7E-09	<0.1%
4-Methyl-2-Pentanone	1.20E-02	m	1.14E+04	V	NA	NA	NA	NA	–	3.9E-08	–	6.4E-09	4.5E-08	<0.1%
Benzene	4.70E-01		2.68E+03	V	1.2E-09	–	9.3E-09	1.0E-08	0.6%	1.0E-05	–	5.3E-05	6.3E-05	<0.1%
Carbon Disulfide	9.45E-03		1.17E+03	V	NA	NA	NA	NA	–	2.4E-08	–	1.8E-07	2.1E-07	<0.1%
Chloroethane	6.50E-03	m	8.86E+02	V	NA	NA	NA	NA	–	NA	NA	4.5E-09	4.5E-09	<0.1%
Chloromethane	2.13E-03	m	1.55E+03	V	7.1E-13	–	4.5E-12	5.2E-12	<0.1%	NA	NA	2.8E-08	2.8E-08	<0.1%
Ethylbenzene	3.32E+00		5.29E+03	V	9.4E-10	–	2.9E-09	3.8E-09	0.2%	8.6E-07	–	5.7E-06	6.6E-06	<0.1%
Iodomethane	1.38E-02	m	1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.13E-01		1.65E+03	V	NA	NA	NA	NA	–	2.0E-07	–	8.7E-06	8.9E-06	<0.1%
Methyl-t-Butyl Ether (MTBE)	6.74E-03		4.07E+03	V	3.1E-13	–	7.9E-13	1.1E-12	<0.1%	NA	NA	3.8E-09	3.8E-09	<0.1%
n-Butylbenzene	1.32E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.91E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.70E+00		5.16E+03	V	NA	NA	NA	NA	–	9.9E-07	–	3.9E-05	4.0E-05	<0.1%
p/m-Xylene	1.50E+01		3.79E+03	V	NA	NA	NA	NA	–	1.9E-05	–	2.4E-04	2.6E-04	0.3%
p-Isopropyltoluene	6.99E-02		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	1.48E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	4.30E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.46E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Toluene	3.46E+00		3.90E+03	V	NA	NA	NA	NA	–	1.1E-06	–	5.4E-05	5.5E-05	<0.1%
Xylenes, total	2.26E+01		4.39E+03	V	NA	NA	NA	NA	–	2.9E-05	–	1.3E-04	1.6E-04	0.2%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.22E+01		1.63E+05	V	1.7E-08	–	NA	1.7E-08	0.9%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.72E+01		1.13E+05	V	NA	NA	NA	NA	–	2.4E-03	–	NA	2.4E-03	2.8%
Acenaphthene	1.24E+00		2.12E+05	V	NA	NA	NA	NA	–	5.3E-07	2.4E-07	NA	7.8E-07	<0.1%

Table F-5
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Acenaphthylene	1.02E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.49E-01		7.70E+05	V	NA	NA	NA	NA	–	1.3E-08	5.9E-09	NA	1.9E-08	<0.1%
Benzo(a)anthracene	3.04E-01		1.00E+06	P	9.4E-09	4.3E-09	6.1E-11	1.4E-08	0.7%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.44E-01		1.00E+06	P	4.5E-08	2.0E-08	2.9E-10	6.5E-08	3.5%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	9.40E-02		1.00E+06	P	2.9E-09	1.3E-09	1.9E-11	4.3E-09	0.2%	NA	NA	NA	NA	–
Benzo(ghi)perylene	8.15E-02		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	6.03E-02		1.00E+06	P	1.9E-09	8.5E-10	1.2E-11	2.7E-09	0.1%	NA	NA	NA	NA	–
Chrysene	6.53E-01		1.00E+06	P	2.0E-09	9.3E-10	1.3E-11	3.0E-09	0.2%	NA	NA	NA	NA	–
D benzo(a,h)anthracene	6.70E-02		1.00E+06	P	7.1E-09	3.2E-09	1.5E-10	1.0E-08	0.6%	NA	NA	NA	NA	–
Fluoranthene	2.37E-01		1.00E+06	P	NA	NA	NA	NA	–	1.5E-07	7.0E-08	NA	2.2E-07	<0.1%
Fluorene	1.80E+00		5.02E+05	V	NA	NA	NA	NA	–	1.2E-06	5.3E-07	NA	1.7E-06	<0.1%
Indeno(1,2,3-cd)pyrene	5.03E-02		1.00E+06	P	1.6E-09	7.1E-10	1.0E-11	2.3E-09	0.1%	NA	NA	NA	NA	–
Naphthalene	5.06E+00		5.49E+04	V	NA	NA	5.7E-09	5.7E-09	0.3%	6.5E-06	3.0E-06	1.9E-04	2.0E-04	0.2%
Phenanthrene	4.47E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.32E+00		1.00E+06	P	NA	NA	NA	NA	–	1.1E-06	5.2E-07	NA	1.7E-06	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	5.00E-02	m	1.00E+06	P	2.6E-09	1.3E-09	5.2E-11	3.9E-09	0.2%	2.6E-04	1.3E-04	NA	3.9E-04	0.4%
PCB-1260	4.00E-02	m	1.00E+06	P	2.1E-09	1.0E-09	4.2E-11	3.1E-09	0.2%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.29E+00		1.00E+06	P	NA	NA	NA	NA	–	1.5E-03	–	NA	1.5E-03	1.7%
Arsenic	4.75E+00		1.00E+06	P	1.2E-06	1.2E-07	2.9E-08	1.3E-06	69.0%	4.1E-03	4.3E-04	5.8E-03	1.0E-02	12.0%
Barium	1.93E+02		1.00E+06	P	NA	NA	NA	NA	–	2.5E-04	–	7.1E-04	9.6E-04	1.1%
Beryllium	7.96E-01		1.00E+06	P	NA	NA	3.5E-09	3.5E-09	0.2%	4.1E-05	–	2.1E-03	2.1E-03	2.5%
Cadmium	4.96E-01		1.00E+06	P	NA	NA	3.8E-09	3.8E-09	0.2%	1.3E-04	1.8E-05	4.5E-04	6.0E-04	0.7%
Chromium	5.91E+01		1.00E+06	P	NA	NA	NA	NA	–	1.0E-05	–	NA	1.0E-05	<0.1%
Chromium, Hexavalent	7.28E-01		1.00E+06	P	NA	NA	2.0E-07	2.0E-07	10.5%	9.4E-06	–	6.6E-05	7.6E-05	<0.1%
Cobalt	1.35E+01		1.00E+06	P	NA	NA	2.2E-07	2.2E-07	11.7%	1.2E-02	–	4.1E-02	5.3E-02	61.3%
Copper	7.33E+01		1.00E+06	P	NA	NA	NA	NA	–	4.7E-04	–	NA	4.7E-04	0.6%
Lead	1.45E+02		1.00E+06	P	NA	NA	3.2E-09	3.2E-09	0.2%	NA	NA	NA	NA	–
Mercury	1.78E-01		1.00E+06	P	NA	NA	NA	NA	–	1.5E-04	–	1.1E-04	2.6E-04	0.3%
Molybdenum	3.52E+00		1.00E+06	P	NA	NA	NA	NA	–	1.8E-04	–	NA	1.8E-04	0.2%
Nickel	2.14E+01		1.00E+06	P	NA	NA	1.0E-08	1.0E-08	0.5%	2.8E-04	–	7.8E-03	8.1E-03	9.4%
Selenium	1.06E+00		1.00E+06	P	NA	NA	NA	NA	–	5.5E-05	–	9.6E-07	5.6E-05	<0.1%
Vanadium	4.92E+01		1.00E+06	P	NA	NA	NA	NA	–	1.8E-03	–	NA	1.8E-03	2.1%

Table F-5
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Zinc	1.89E+02	1.00E+06	P	NA	NA	NA	NA	–	1.6E-04	–	NA	1.6E-04	0.2%
Total Risk or Hazard				Total ELCR			2E-06	100%	Total HI			0.09	100%
Total Risk or Hazard from Arsenic							1E-06					0.01	
Total Risk or Hazard without Arsenic							6E-07					0.08	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 20 × 7 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 20 × 7 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×20 × 7 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDo)
HQd = (EPCs × 5,800 × 0.2 × ABSd × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDa)
HQi = (EPCs × 8 × 0.042 × 20 × 7) / ([VF or PEF] × 2,555 × RfC)

Table F-6
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2,2-Tetrachloroethane	1.20E-02	m	1.38E+04	V	5.7E-10	–	4.1E-09	4.7E-09	<0.1%	1.5E-06	–	NA	1.5E-06	<0.1%
1,1,2-Trichloroethane	7.70E-03	m	6.36E+03	V	9.7E-11	–	1.6E-09	1.7E-09	<0.1%	9.4E-07	–	NA	9.4E-07	<0.1%
1,2,3-Trichlorobenzene	9.00E-03	m	1.93E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
1,2,4-Trichlorobenzene	4.63E-03	m	4.23E+04	V	2.9E-12	–	NA	2.9E-12	<0.1%	2.3E-07	–	6.2E-06	6.5E-06	<0.1%
1,2,4-Trimethylbenzene	1.54E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	1.7E-02	1.7E-02	16.4%
1,2-Dichloropropane	2.10E-03	m	3.52E+03	V	1.3E-11	–	4.9E-10	5.0E-10	<0.1%	NA	NA	3.4E-05	3.4E-05	<0.1%
1,3,5-Trimethylbenzene	6.51E+00		1.15E+04	V	NA	NA	NA	NA	–	6.4E-05	–	2.2E-02	2.2E-02	20.3%
2-Chlorotoluene	2.80E-03	m	1.30E+04	V	NA	NA	NA	NA	–	6.8E-08	–	NA	6.8E-08	<0.1%
2-Hexanone	3.13E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
4-Chlorotoluene	2.10E-03	m	7.18E+03	V	NA	NA	NA	NA	–	1.5E-08	–	NA	1.5E-08	<0.1%
4-Methyl-2-Pentanone	1.20E-02	m	1.14E+04	V	NA	NA	NA	NA	–	7.3E-08	–	8.0E-08	1.5E-07	<0.1%
Benzene	4.70E-01		2.68E+03	V	8.2E-09	–	4.1E-07	4.2E-07	3.2%	5.8E-05	–	6.7E-04	7.2E-04	0.7%
Carbon Disulfide	9.45E-03		1.17E+03	V	NA	NA	NA	NA	–	4.6E-08	–	2.3E-06	2.4E-06	<0.1%
Chloroethane	6.50E-03	m	8.86E+02	V	NA	NA	NA	NA	–	NA	NA	5.6E-08	5.6E-08	<0.1%
Chloromethane	2.13E-03	m	1.55E+03	V	4.8E-12	–	2.0E-10	2.1E-10	<0.1%	NA	NA	3.5E-06	3.5E-06	<0.1%
Ethylbenzene	3.32E+00		5.29E+03	V	6.4E-09	–	1.3E-07	1.3E-07	1.0%	1.6E-05	–	7.2E-05	8.8E-05	<0.1%
Iodomethane	1.38E-02	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.13E-01		1.65E+03	V	NA	NA	NA	NA	–	1.5E-06	–	1.1E-04	1.1E-04	0.1%
Methyl-t-Butyl Ether (MTBE)	6.74E-03		4.07E+03	V	2.1E-12	–	3.5E-11	3.7E-11	<0.1%	NA	NA	4.7E-08	4.7E-08	<0.1%
n-Butylbenzene	1.32E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.91E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.70E+00		5.16E+03	V	NA	NA	NA	NA	–	1.9E-06	–	4.9E-04	4.9E-04	0.5%
p/m-Xylene	1.50E+01		3.79E+03	V	NA	NA	NA	NA	–	3.7E-05	–	9.0E-03	9.1E-03	8.6%
p-Isopropyltoluene	6.99E-02		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	1.48E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	4.30E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.46E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Toluene	3.46E+00		3.90E+03	V	NA	NA	NA	NA	–	2.1E-05	–	6.8E-04	7.0E-04	0.7%
Xylenes, total	2.26E+01		4.39E+03	V	NA	NA	NA	NA	–	5.5E-05	–	1.7E-03	1.7E-03	1.6%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.22E+01		1.63E+05	V	1.1E-07	–	NA	1.1E-07	0.8%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.72E+01		1.13E+05	V	NA	NA	NA	NA	–	4.6E-03	–	NA	4.6E-03	4.3%
Acenaphthene	1.24E+00		2.12E+05	V	NA	NA	NA	NA	–	1.0E-05	1.7E-05	NA	2.7E-05	<0.1%

Table F-6
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Acenaphthylene	1.02E-01	1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.49E-01	7.70E+05	V	NA	NA	NA	NA	–	2.4E-07	4.2E-07	NA	6.6E-07	<0.1%
Benzo(a)anthracene	3.04E-01	1.32E+09	P	6.4E-08	1.1E-07	2.1E-12	1.7E-07	1.3%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.44E-01	1.32E+09	P	3.0E-07	5.2E-07	9.8E-12	8.2E-07	6.2%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	9.40E-02	1.32E+09	P	2.0E-08	3.4E-08	6.4E-13	5.4E-08	0.4%	NA	NA	NA	NA	–
Benzo(ghi)perylene	8.15E-02	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	6.03E-02	1.32E+09	P	1.3E-08	2.2E-08	4.1E-13	3.4E-08	0.3%	NA	NA	NA	NA	–
Chrysene	6.53E-01	1.32E+09	P	1.4E-08	2.4E-08	4.4E-13	3.7E-08	0.3%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	6.70E-02	1.32E+09	P	4.8E-08	8.2E-08	5.0E-12	1.3E-07	1.0%	NA	NA	NA	NA	–
Fluoranthene	2.37E-01	1.32E+09	P	NA	NA	NA	NA	–	2.9E-06	5.0E-06	NA	7.9E-06	<0.1%
Fluorene	1.80E+00	5.02E+05	V	NA	NA	NA	NA	–	2.2E-05	3.8E-05	NA	6.0E-05	<0.1%
Indeno(1,2,3-cd)pyrene	5.03E-02	1.32E+09	P	1.1E-08	1.8E-08	3.4E-13	2.9E-08	0.2%	NA	NA	NA	NA	–
Naphthalene	5.06E+00	5.49E+04	V	NA	NA	2.6E-07	2.6E-07	1.9%	1.2E-04	2.1E-04	2.3E-03	2.7E-03	2.5%
Phenanthrene	4.47E+00	9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.32E+00	1.32E+09	P	NA	NA	NA	NA	–	2.2E-05	3.7E-05	NA	5.8E-05	<0.1%
Polychlorinated Biphenyls (PCBs)													
PCB-1254	5.00E-02 m	1.32E+09	P	1.7E-08	3.2E-08	1.8E-12	5.0E-08	0.4%	1.2E-03	2.3E-03	NA	3.5E-03	3.3%
PCB-1260	4.00E-02 m	1.32E+09	P	1.4E-08	2.6E-08	1.4E-12	4.0E-08	0.3%	NA	NA	NA	NA	–
Inorganic Compounds													
Antimony	2.29E+00	1.32E+09	P	NA	NA	NA	NA	–	2.8E-03	–	NA	2.8E-03	2.6%
Arsenic	4.75E+00	1.32E+09	P	7.8E-06	3.1E-06	9.7E-10	1.1E-05	82.5%	7.7E-03	3.1E-03	5.5E-05	1.1E-02	10.2%
Barium	1.93E+02	1.32E+09	P	NA	NA	NA	NA	–	4.7E-04	–	6.7E-05	5.4E-04	0.5%
Beryllium	7.96E-01	1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	1.9E-04	–	2.0E-05	2.1E-04	0.2%
Cadmium	4.96E-01	1.32E+09	P	NA	NA	1.3E-10	1.3E-10	<0.1%	2.4E-04	1.3E-04	4.3E-06	3.8E-04	0.4%
Chromium	5.91E+01	1.32E+09	P	NA	NA	NA	NA	–	1.9E-05	–	NA	1.9E-05	<0.1%
Chromium, Hexavalent	7.28E-01	1.32E+09	P	NA	NA	6.7E-09	6.7E-09	<0.1%	1.2E-04	–	6.3E-07	1.2E-04	0.1%
Cobalt	1.35E+01	1.32E+09	P	NA	NA	7.5E-09	7.5E-09	<0.1%	2.2E-02	–	3.9E-04	2.2E-02	21.1%
Copper	7.33E+01	1.32E+09	P	NA	NA	NA	NA	–	9.0E-04	–	NA	9.0E-04	0.8%
Lead	1.45E+02	1.32E+09	P	NA	NA	1.1E-10	1.1E-10	<0.1%	NA	NA	NA	NA	–
Mercury	1.78E-01	1.32E+09	P	NA	NA	NA	NA	–	2.9E-04	–	1.0E-06	2.9E-04	0.3%
Molybdenum	3.52E+00	1.32E+09	P	NA	NA	NA	NA	–	3.4E-04	–	NA	3.4E-04	0.3%
Nickel	2.14E+01	1.32E+09	P	NA	NA	3.4E-10	3.4E-10	<0.1%	5.2E-04	–	7.4E-05	6.0E-04	0.6%
Selenium	1.06E+00	1.32E+09	P	NA	NA	NA	NA	–	1.0E-04	–	9.1E-09	1.0E-04	<0.1%
Vanadium	4.92E+01	1.32E+09	P	NA	NA	NA	NA	–	3.4E-03	–	NA	3.4E-03	3.2%

Table F-6
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Zinc	1.89E+02	1.32E+09 P	NA	NA	NA	NA	–	3.1E-04	–	NA	3.1E-04	0.3%
Total Risk or Hazard			Total ELCR			1E-05	100%	Total HI			0.1	100%
Total Risk or Hazard from Arsenic						1E-05					0.01	
Total Risk or Hazard without Arsenic						2E-06					0.1	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-7
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2,2-Tetrachloroethane	1.20E-02	m	1.38E+04	V	1.8E-09	–	4.1E-09	5.9E-09	<0.1%	1.9E-05	–	NA	1.9E-05	<0.1%
1,1,2-Trichloroethane	7.70E-03	m	6.36E+03	V	3.0E-10	–	1.6E-09	1.9E-09	<0.1%	1.2E-05	–	NA	1.2E-05	<0.1%
1,2,3-Trichlorobenzene	9.00E-03	m	1.93E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
1,2,4-Trichlorobenzene	4.63E-03	m	4.23E+04	V	9.1E-12	–	NA	9.1E-12	<0.1%	3.0E-06	–	2.6E-05	2.9E-05	<0.1%
1,2,4-Trimethylbenzene	1.54E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	7.3E-02	7.3E-02	8.5%
1,2-Dichloropropane	2.10E-03	m	3.52E+03	V	4.1E-11	–	4.9E-10	5.3E-10	<0.1%	NA	NA	1.4E-04	1.4E-04	<0.1%
1,3,5-Trimethylbenzene	6.51E+00		1.15E+04	V	NA	NA	NA	NA	–	8.3E-04	–	9.0E-02	9.1E-02	10.6%
2-Chlorotoluene	2.80E-03	m	1.30E+04	V	NA	NA	NA	NA	–	8.9E-07	–	NA	8.9E-07	<0.1%
2-Hexanone	3.13E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
4-Chlorotoluene	2.10E-03	m	7.18E+03	V	NA	NA	NA	NA	–	1.9E-07	–	NA	1.9E-07	<0.1%
4-Methyl-2-Pentanone	1.20E-02	m	1.14E+04	V	NA	NA	NA	NA	–	9.6E-07	–	3.4E-07	1.3E-06	<0.1%
Benzene	4.70E-01		2.68E+03	V	2.6E-08	–	4.2E-07	4.4E-07	1.4%	7.5E-04	–	2.8E-03	3.6E-03	0.4%
Carbon Disulfide	9.45E-03		1.17E+03	V	NA	NA	NA	NA	–	6.0E-07	–	9.7E-06	1.0E-05	<0.1%
Chloroethane	6.50E-03	m	8.86E+02	V	NA	NA	NA	NA	–	NA	NA	2.3E-07	2.3E-07	<0.1%
Chloromethane	2.13E-03	m	1.55E+03	V	1.5E-11	–	2.0E-10	2.2E-10	<0.1%	NA	NA	1.5E-05	1.5E-05	<0.1%
Ethy benzene	3.32E+00		5.29E+03	V	2.0E-08	–	1.3E-07	1.5E-07	0.5%	2.1E-04	–	3.0E-04	5.1E-04	<0.1%
Iodomethane	1.38E-02	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.13E-01		1.65E+03	V	NA	NA	NA	NA	–	2.0E-05	–	4.6E-04	4.8E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	6.74E-03		4.07E+03	V	6.6E-12	–	3.5E-11	4.2E-11	<0.1%	NA	NA	2.0E-07	2.0E-07	<0.1%
n-Butylbenzene	1.32E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.91E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.70E+00		5.16E+03	V	NA	NA	NA	NA	–	2.5E-05	–	2.0E-03	2.1E-03	0.2%
p/m-Xylene	1.50E+01		3.79E+03	V	NA	NA	NA	NA	–	4.8E-04	–	3.8E-02	3.8E-02	4.5%
p-Isopropyltoluene	6.99E-02		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	1.48E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	4.30E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.46E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Toluene	3.46E+00		3.90E+03	V	NA	NA	NA	NA	–	2.8E-04	–	2.8E-03	3.1E-03	0.4%
Xylenes, total	2.26E+01		4.39E+03	V	NA	NA	NA	NA	–	7.2E-04	–	7.0E-03	7.8E-03	0.9%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.22E+01		1.63E+05	V	3.5E-07	–	NA	3.5E-07	1.1%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.72E+01		1.13E+05	V	NA	NA	NA	NA	–	6.0E-02	–	NA	6.0E-02	6.9%
Acenaphthene	1.24E+00		2.12E+05	V	NA	NA	NA	NA	–	1.3E-04	9.6E-05	NA	2.3E-04	<0.1%

Table F-7
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Acenaphthylene	1.02E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.49E-01		7.70E+05	V	NA	NA	NA	NA	–	3.2E-06	2.3E-06	NA	5.5E-06	<0.1%
Benzo(a)anthracene	3.04E-01		1.32E+09	P	2.0E-07	1.5E-07	2.1E-12	3.4E-07	1.1%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.44E-01		1.32E+09	P	9.5E-07	6.9E-07	9.9E-12	1.6E-06	5.0%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	9.40E-02		1.32E+09	P	6.2E-08	4.5E-08	6.4E-13	1.1E-07	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	8.15E-02		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	6.03E-02		1.32E+09	P	4.0E-08	2.9E-08	4.1E-13	6.8E-08	0.2%	NA	NA	NA	NA	–
Chrysene	6.53E-01		1.32E+09	P	4.3E-08	3.1E-08	4.5E-13	7.4E-08	0.2%	NA	NA	NA	NA	–
D benzo(a,h)anthracene	6.70E-02		1.32E+09	P	1.5E-07	1.1E-07	5.0E-12	2.6E-07	0.8%	NA	NA	NA	NA	–
Fluoranthene	2.37E-01		1.32E+09	P	NA	NA	NA	NA	–	3.8E-05	2.8E-05	NA	6.6E-05	<0.1%
Fluorene	1.80E+00		5.02E+05	V	NA	NA	NA	NA	–	2.9E-04	2.1E-04	NA	5.0E-04	<0.1%
Indeno(1,2,3-cd)pyrene	5.03E-02		1.32E+09	P	3.3E-08	2.4E-08	3.4E-13	5.7E-08	0.2%	NA	NA	NA	NA	–
Naphthalene	5.06E+00		5.49E+04	V	NA	NA	2.6E-07	2.6E-07	0.8%	1.6E-03	1.2E-03	9.8E-03	1.3E-02	1.5%
Phenanthrene	4.47E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.32E+00		1.32E+09	P	NA	NA	NA	NA	–	2.8E-04	2.0E-04	NA	4.9E-04	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	5.00E-02	m	1.32E+09	P	5.5E-08	4.3E-08	1.8E-12	9.8E-08	0.3%	1.6E-02	1.3E-02	NA	2.9E-02	3.3%
PCB-1260	4.00E-02	m	1.32E+09	P	4.4E-08	3.4E-08	1.4E-12	7.8E-08	0.2%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.29E+00		1.32E+09	P	NA	NA	NA	NA	–	3.7E-02	–	NA	3.7E-02	4.3%
Arsenic	4.75E+00		1.32E+09	P	2.5E-05	4.1E-06	9.8E-10	2.9E-05	87.9%	1.0E-01	1.7E-02	2.3E-04	1.2E-01	13.8%
Barium	1.93E+02		1.32E+09	P	NA	NA	NA	NA	–	6.2E-03	–	2.8E-04	6.5E-03	0.8%
Beryllium	7.96E-01		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	2.5E-03	–	8.3E-05	2.6E-03	0.3%
Cadmium	4.96E-01		1.32E+09	P	NA	NA	1.3E-10	1.3E-10	<0.1%	3.2E-03	7.1E-04	1.8E-05	3.9E-03	0.5%
Chromium	5.91E+01		1.32E+09	P	NA	NA	NA	NA	–	2.5E-04	–	NA	2.5E-04	<0.1%
Chromium, Hexavalent	7.28E-01		1.32E+09	P	NA	NA	6.8E-09	6.8E-09	<0.1%	1.6E-03	–	2.6E-06	1.6E-03	0.2%
Cobalt	1.35E+01		1.32E+09	P	NA	NA	7.6E-09	7.6E-09	<0.1%	2.9E-01	–	1.6E-03	2.9E-01	33.7%
Copper	7.33E+01		1.32E+09	P	NA	NA	NA	NA	–	1.2E-02	–	NA	1.2E-02	1.4%
Lead	1.45E+02		1.32E+09	P	NA	NA	1.1E-10	1.1E-10	<0.1%	NA	NA	NA	NA	–
Mercury	1.78E-01		1.32E+09	P	NA	NA	NA	NA	–	3.8E-03	–	4.3E-06	3.8E-03	0.4%
Molybdenum	3.52E+00		1.32E+09	P	NA	NA	NA	NA	–	4.5E-03	–	NA	4.5E-03	0.5%
Nickel	2.14E+01		1.32E+09	P	NA	NA	3.5E-10	3.5E-10	<0.1%	6.8E-03	–	3.1E-04	7.2E-03	0.8%
Selenium	1.06E+00		1.32E+09	P	NA	NA	NA	NA	–	1.4E-03	–	3.8E-08	1.4E-03	0.2%

Table F-7
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard Index	Percent Total HI
			ELCRo	ELCRd	ELCRi	ELCR		HQo	HQd	HQi	HI	
Vanadium	4.92E+01	1.32E+09 P	NA	NA	NA	NA	–	4.5E-02	–	NA	4.5E-02	5.2%
Zinc	1.89E+02	1.32E+09 P	NA	NA	NA	NA	–	4.0E-03	–	NA	4.0E-03	0.5%
Total Risk or Hazard			Total ELCR			3E-05	100%	Total HI			0.9	100%
Total Risk or Hazard from Arsenic						3E-05					0.1	
Total Risk or Hazard without Arsenic						4E-06					0.7	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 100 × 350 × 6 × CSFo) / (1,000,000 × 15 × 25,550)
ELCRd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6 × CSFa) / (1,000,000 × 15 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 100 × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDo)
HQd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / ([VF or PEF] × 2,190 × RfC)

Table F-8
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2,2-Tetrachloroethane	1.20E-02	m	1.38E+04	V	7.6E-10	–	1.7E-08	1.7E-08	<0.1%	2.1E-06	–	NA	2.1E-06	<0.1%
1,1,2-Trichloroethane	7.70E-03	m	6.36E+03	V	1.3E-10	–	6.4E-09	6.5E-09	<0.1%	1.3E-06	–	NA	1.3E-06	<0.1%
1,2,3-Trichlorobenzene	9.00E-03	m	1.93E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
1,2,4-Trichlorobenzene	4.63E-03	m	4.23E+04	V	3.9E-12	–	NA	3.9E-12	<0.1%	3.2E-07	–	2.6E-05	2.7E-05	<0.1%
1,2,4-Trimethylbenzene	1.54E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	7.3E-02	7.3E-02	24.5%
1,2-Dichloropropane	2.10E-03	m	3.52E+03	V	1.8E-11	–	2.0E-09	2.0E-09	<0.1%	NA	NA	1.4E-04	1.4E-04	<0.1%
1,3,5-Trimethylbenzene	6.51E+00		1.15E+04	V	NA	NA	NA	NA	–	8.9E-05	–	9.0E-02	9.0E-02	30.3%
2-Chlorotoluene	2.80E-03	m	1.30E+04	V	NA	NA	NA	NA	–	9.6E-08	–	NA	9.6E-08	<0.1%
2-Hexanone	3.13E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
4-Chlorotoluene	2.10E-03	m	7.18E+03	V	NA	NA	NA	NA	–	2.1E-08	–	NA	2.1E-08	<0.1%
4-Methyl-2-Pentanone	1.20E-02	m	1.14E+04	V	NA	NA	NA	NA	–	1.0E-07	–	3.4E-07	4.4E-07	<0.1%
Benzene	4.70E-01		2.68E+03	V	1.1E-08	–	1.7E-06	1.7E-06	9.4%	8.1E-05	–	2.8E-03	2.9E-03	1.0%
Carbon Disulfide	9.45E-03		1.17E+03	V	NA	NA	NA	NA	–	6.5E-08	–	9.7E-06	9.8E-06	<0.1%
Chloroethane	6.50E-03	m	8.86E+02	V	NA	NA	NA	NA	–	NA	NA	2.3E-07	2.3E-07	<0.1%
Chloromethane	2.13E-03	m	1.55E+03	V	6.5E-12	–	8.1E-10	8.2E-10	<0.1%	NA	NA	1.5E-05	1.5E-05	<0.1%
Ethylbenzene	3.32E+00		5.29E+03	V	8.6E-09	–	5.2E-07	5.2E-07	2.9%	2.3E-05	–	3.0E-04	3.2E-04	0.1%
Iodomethane	1.38E-02	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.13E-01		1.65E+03	V	NA	NA	NA	NA	–	2.1E-06	–	4.6E-04	4.6E-04	0.2%
Methyl-t-Butyl Ether (MTBE)	6.74E-03		4.07E+03	V	2.8E-12	–	1.4E-10	1.4E-10	<0.1%	NA	NA	2.0E-07	2.0E-07	<0.1%
n-Butylbenzene	1.32E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.91E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.70E+00		5.16E+03	V	NA	NA	NA	NA	–	2.6E-06	–	2.0E-03	2.0E-03	0.7%
p/m-Xylene	1.50E+01		3.79E+03	V	NA	NA	NA	NA	–	5.1E-05	–	3.8E-02	3.8E-02	12.8%
p-Isopropyltoluene	6.99E-02		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	1.48E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	4.30E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.46E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Toluene	3.46E+00		3.90E+03	V	NA	NA	NA	NA	–	3.0E-05	–	2.8E-03	2.9E-03	1.0%
Xylenes, total	2.26E+01		4.39E+03	V	NA	NA	NA	NA	–	7.7E-05	–	7.0E-03	7.1E-03	2.4%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.22E+01		1.63E+05	V	1.5E-07	–	NA	1.5E-07	0.8%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.72E+01		1.13E+05	V	NA	NA	NA	NA	–	6.4E-03	–	NA	6.4E-03	2.1%

Table F-8
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Acenaphthene	1.24E+00		2.12E+05	V	NA	NA	NA	NA	–	1.4E-05	1.5E-05	NA	2.9E-05	<0.1%
Acenaphthylene	1.02E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.49E-01		7.70E+05	V	NA	NA	NA	NA	–	3.4E-07	3.5E-07	NA	6.9E-07	<0.1%
Benzo(a)anthracene	3.04E-01		1.32E+09	P	8.6E-08	8.9E-08	8.3E-12	1.7E-07	1.0%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.44E-01		1.32E+09	P	4.1E-07	4.2E-07	4.0E-11	8.3E-07	4.6%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	9.40E-02		1.32E+09	P	2.6E-08	2.7E-08	2.6E-12	5.4E-08	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	8.15E-02		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	6.03E-02		1.32E+09	P	1.7E-08	1.8E-08	1.7E-12	3.5E-08	0.2%	NA	NA	NA	NA	–
Chrysene	6.53E-01		1.32E+09	P	1.8E-08	1.9E-08	1.8E-12	3.8E-08	0.2%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	6.70E-02		1.32E+09	P	6.4E-08	6.7E-08	2.0E-11	1.3E-07	0.7%	NA	NA	NA	NA	–
Fluoranthene	2.37E-01		1.32E+09	P	NA	NA	NA	NA	–	4.1E-06	4.2E-06	NA	8.3E-06	<0.1%
Fluorene	1.80E+00		5.02E+05	V	NA	NA	NA	NA	–	3.1E-05	3.2E-05	NA	6.3E-05	<0.1%
Indeno(1,2,3-cd)pyrene	5.03E-02		1.32E+09	P	1.4E-08	1.5E-08	1.4E-12	2.9E-08	0.2%	NA	NA	NA	NA	–
Naphthalene	5.06E+00		5.49E+04	V	NA	NA	1.0E-06	1.0E-06	5.7%	1.7E-04	1.8E-04	9.8E-03	1.0E-02	3.4%
Phenanthrene	4.47E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.32E+00		1.32E+09	P	NA	NA	NA	NA	–	3.0E-05	3.1E-05	NA	6.1E-05	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	5.00E-02	m	1.32E+09	P	2.3E-08	2.6E-08	7.1E-12	5.0E-08	0.3%	1.7E-03	1.9E-03	NA	3.6E-03	1.2%
PCB-1260	4.00E-02	m	1.32E+09	P	1.9E-08	2.1E-08	5.7E-12	4.0E-08	0.2%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.29E+00		1.32E+09	P	NA	NA	NA	NA	–	3.9E-03	–	NA	3.9E-03	1.3%
Arsenic	4.75E+00		1.32E+09	P	1.1E-05	2.5E-06	3.9E-09	1.3E-05	72.9%	1.1E-02	2.6E-03	2.3E-04	1.4E-02	4.6%
Barium	1.93E+02		1.32E+09	P	NA	NA	NA	NA	–	6.6E-04	–	2.8E-04	9.4E-04	0.3%
Beryllium	7.96E-01		1.32E+09	P	NA	NA	4.8E-10	4.8E-10	<0.1%	2.7E-04	–	8.3E-05	3.6E-04	0.1%
Cadmium	4.96E-01		1.32E+09	P	NA	NA	5.2E-10	5.2E-10	<0.1%	3.4E-04	1.1E-04	1.8E-05	4.7E-04	0.2%
Chromium	5.91E+01		1.32E+09	P	NA	NA	NA	NA	–	2.7E-05	–	NA	2.7E-05	<0.1%
Chromium, Hexavalent	7.28E-01		1.32E+09	P	NA	NA	2.7E-08	2.7E-08	0.2%	1.7E-04	–	2.6E-06	1.7E-04	<0.1%
Cobalt	1.35E+01		1.32E+09	P	NA	NA	3.0E-08	3.0E-08	0.2%	3.1E-02	–	1.6E-03	3.2E-02	10.9%
Copper	7.33E+01		1.32E+09	P	NA	NA	NA	NA	–	1.3E-03	–	NA	1.3E-03	0.4%
Lead	1.45E+02		1.32E+09	P	NA	NA	4.3E-10	4.3E-10	<0.1%	NA	NA	NA	NA	–
Mercury	1.78E-01		1.32E+09	P	NA	NA	NA	NA	–	4.1E-04	–	4.3E-06	4.1E-04	0.1%
Molybdenum	3.52E+00		1.32E+09	P	NA	NA	NA	NA	–	4.8E-04	–	NA	4.8E-04	0.2%
Nickel	2.14E+01		1.32E+09	P	NA	NA	1.4E-09	1.4E-09	<0.1%	7.3E-04	–	3.1E-04	1.0E-03	0.4%

Table F-8
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Selenium	1.06E+00	1.32E+09	P	NA	NA	NA	NA	–	1.4E-04	–	3.8E-08	1.4E-04	<0.1%
Vanadium	4.92E+01	1.32E+09	P	NA	NA	NA	NA	–	4.8E-03	–	NA	4.8E-03	1.6%
Zinc	1.89E+02	1.32E+09	P	NA	NA	NA	NA	–	4.3E-04	–	NA	4.3E-04	0.1%
Total Risk or Hazard				Total ELCR			2E-05	100%	Total HI			0.3	100%
Total Risk or Hazard from Arsenic							1E-05					0.01	
Total Risk or Hazard without Arsenic							5E-06					0.3	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 350 × 24 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDo)
HQd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / ([VF or PEF] × 8,760 × RfC)

Table F-9
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	3.04E-01		1.32E+09	P	2.1E-12	<0.1%	NA	–
Benzo(a)pyrene	1.44E-01		1.32E+09	P	9.9E-12	<0.1%	NA	–
Benzo(b)fluoranthene	9.40E-02		1.32E+09	P	6.4E-13	<0.1%	NA	–
Benzo(ghi)perylene	8.15E-02		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	6.03E-02		1.32E+09	P	4.1E-13	<0.1%	NA	–
Chrysene	6.53E-01		1.32E+09	P	4.5E-13	<0.1%	NA	–
Dibenzo(a,h)anthracene	6.70E-02		1.32E+09	P	5.0E-12	<0.1%	NA	–
Fluoranthene	2.37E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	5.03E-02		1.32E+09	P	3.4E-13	<0.1%	NA	–
Pyrene	1.32E+00		1.32E+09	P	NA	–	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	5.00E-02	m	1.32E+09	P	1.8E-12	<0.1%	NA	–
PCB-1260	4.00E-02	m	1.32E+09	P	1.4E-12	<0.1%	NA	–
Inorganic Compounds								
Antimony	2.29E+00		1.32E+09	P	NA	–	NA	–
Arsenic	4.75E+00		1.32E+09	P	9.8E-10	6.1%	2.3E-04	9.0%
Barium	1.93E+02		1.32E+09	P	NA	–	2.8E-04	10.9%
Beryllium	7.96E-01		1.32E+09	P	1.2E-10	0.7%	8.3E-05	3.2%
Cadmium	4.96E-01		1.32E+09	P	1.3E-10	0.8%	1.8E-05	0.7%
Chromium	5.91E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	7.28E-01		1.32E+09	P	6.8E-09	42.3%	2.6E-06	0.1%
Cobalt	1.35E+01		1.32E+09	P	7.6E-09	47.1%	1.6E-03	63.8%
Copper	7.33E+01		1.32E+09	P	NA	–	NA	–
Lead	1.45E+02		1.32E+09	P	1.1E-10	0.7%	NA	–
Mercury	1.78E-01		1.32E+09	P	NA	–	4.3E-06	0.2%
Molybdenum	3.52E+00		1.32E+09	P	NA	–	NA	–

Table F-9
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)		CANCER RISK Inhalation	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation	Percent Total HI
				ELCRi		HQi	
Nickel	2.14E+01	1.32E+09	P	3.5E-10	2.2%	3.1E-04	12.1%
Selenium	1.06E+00	1.32E+09	P	NA	–	3.8E-08	<0.1%
Vanadium	4.92E+01	1.32E+09	P	NA	–	NA	–
Zinc	1.89E+02	1.32E+09	P	NA	–	NA	–
Total Risk or Hazard		Total ELCR		2E-08	Total HI	0.003	
Total Risk or Hazard from Arsenic				1E-09		0.0002	
Total Risk or Hazard without Arsenic				2E-08		0.002	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-10
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	3.04E-01		1.32E+09	P	8.3E-12	<0.1%	NA	–
Benzo(a)pyrene	1.44E-01		1.32E+09	P	4.0E-11	<0.1%	NA	–
Benzo(b)fluoranthene	9.40E-02		1.32E+09	P	2.6E-12	<0.1%	NA	–
Benzo(ghi)perylene	8.15E-02		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	6.03E-02		1.32E+09	P	1.7E-12	<0.1%	NA	–
Chrysene	6.53E-01		1.32E+09	P	1.8E-12	<0.1%	NA	–
Dibenzo(a,h)anthracene	6.70E-02		1.32E+09	P	2.0E-11	<0.1%	NA	–
Fluoranthene	2.37E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	5.03E-02		1.32E+09	P	1.4E-12	<0.1%	NA	–
Pyrene	1.32E+00		1.32E+09	P	NA	–	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	5.00E-02	m	1.32E+09	P	7.1E-12	<0.1%	NA	–
PCB-1260	4.00E-02	m	1.32E+09	P	5.7E-12	<0.1%	NA	–
Inorganic Compounds								
Antimony	2.29E+00		1.32E+09	P	NA	–	NA	–
Arsenic	4.75E+00		1.32E+09	P	3.9E-09	6.1%	2.3E-04	9.0%
Barium	1.93E+02		1.32E+09	P	NA	–	2.8E-04	10.9%
Beryllium	7.96E-01		1.32E+09	P	4.8E-10	0.7%	8.3E-05	3.2%
Cadmium	4.96E-01		1.32E+09	P	5.2E-10	0.8%	1.8E-05	0.7%
Chromium	5.91E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	7.28E-01		1.32E+09	P	2.7E-08	42.3%	2.6E-06	0.1%
Cobalt	1.35E+01		1.32E+09	P	3.0E-08	47.1%	1.6E-03	63.8%
Copper	7.33E+01		1.32E+09	P	NA	–	NA	–

Table F-10
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 1

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)		CANCER RISK Inhalation	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation	Percent Total HI
				ELCRi		HQi	
Lead	1.45E+02	1.32E+09	P	4.3E-10	0.7%	NA	–
Mercury	1.78E-01	1.32E+09	P	NA	–	4.3E-06	0.2%
Molybdenum	3.52E+00	1.32E+09	P	NA	–	NA	–
Nickel	2.14E+01	1.32E+09	P	1.4E-09	2.2%	3.1E-04	12.1%
Selenium	1.06E+00	1.32E+09	P	NA	–	3.8E-08	<0.1%
Vanadium	4.92E+01	1.32E+09	P	NA	–	NA	–
Zinc	1.89E+02	1.32E+09	P	NA	–	NA	–
Total Risk or Hazard		Total ELCR		6E-08	Total HI	0.003	
Total Risk or Hazard from Arsenic				4E-09		0.0002	
Total Risk or Hazard without Arsenic				6E-08		0.002	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

Table F-11
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	2.49E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	2.8E-02	2.8E-02	17.6%
1,3,5-Trimethylbenzene	8.22E+00		1.15E+04	V	NA	NA	NA	NA	–	8.0E-05	–	2.7E-02	2.7E-02	17.1%
Benzene	1.17E+01		2.68E+03	V	2.0E-07	–	1.0E-05	1.1E-05	31.5%	1.4E-03	–	1.7E-02	1.8E-02	11.3%
Carbon Disulfide	4.50E-02	m	1.17E+03	V	NA	NA	NA	NA	–	2.2E-07	–	1.1E-05	1.1E-05	<0.1%
Chloroform	6.00E-02	m	2.61E+03	V	3.2E-10	–	9.9E-09	1.0E-08	<0.1%	2.9E-06	–	1.8E-05	2.0E-05	<0.1%
Ethylbenzene	5.41E+00		5.29E+03	V	1.0E-08	–	2.1E-07	2.2E-07	0.7%	2.6E-05	–	1.2E-04	1.4E-04	<0.1%
Isopropy benzene	9.13E-01		1.65E+03	V	NA	NA	NA	NA	–	4.5E-06	–	3.2E-04	3.2E-04	0.2%
Methylene Chloride	4.70E-01	m	2.45E+03	V	1.1E-09	–	1.6E-08	1.7E-08	<0.1%	3.8E-06	–	1.1E-04	1.1E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.60E-03	m	4.07E+03	V	8.2E-13	–	1.4E-11	1.4E-11	<0.1%	NA	NA	1.8E-08	1.8E-08	<0.1%
n-Butylbenzene	2.18E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	3.51E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	1.82E+00		5.16E+03	V	NA	NA	NA	NA	–	4.4E-07	–	1.1E-04	1.2E-04	<0.1%
p/m-Xylene	1.27E+01		3.79E+03	V	NA	NA	NA	NA	–	3.1E-05	–	7.6E-03	7.7E-03	4.8%
p-Isopropyltoluene	4.79E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	6.56E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	8.90E-02	m	1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	7.50E-03	m	2.50E+03	V	7.1E-10	–	1.4E-09	2.1E-09	<0.1%	3.7E-07	–	2.0E-05	2.0E-05	<0.1%
Toluene	3.03E-03		3.90E+03	V	NA	NA	NA	NA	–	1.9E-08	–	5.9E-07	6.1E-07	<0.1%
Xylenes, total	1.44E+01		4.39E+03	V	NA	NA	NA	NA	–	3.5E-05	–	1.1E-03	1.1E-03	0.7%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.74E+00		1.63E+05	V	1.4E-08	–	NA	1.4E-08	<0.1%	NA	NA	NA	NA	–
2-Methylnaphthalene	4.13E+00		1.13E+05	V	NA	NA	NA	NA	–	5.0E-04	–	NA	5.0E-04	0.3%
Acenaphthene	3.48E-01		2.12E+05	V	NA	NA	NA	NA	–	2.8E-06	4.9E-06	NA	7.7E-06	<0.1%
Acenaphthylene	2.80E-01	m	1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	4.59E-01		7.70E+05	V	NA	NA	NA	NA	–	7.5E-07	1.3E-06	NA	2.0E-06	<0.1%
Benzo(a)anthracene	6.50E-01		1.32E+09	P	1.4E-07	2.3E-07	4.4E-12	3.7E-07	1.1%	NA	NA	NA	NA	–
Benzo(a)pyrene	2.97E-01		1.32E+09	P	6.2E-07	1.1E-06	2.0E-11	1.7E-06	5.1%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	9.63E-02		1.32E+09	P	2.0E-08	3.5E-08	6.5E-13	5.5E-08	0.2%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.90E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	1.64E-01		1.32E+09	P	3.4E-08	5.9E-08	1.1E-12	9.3E-08	0.3%	NA	NA	NA	NA	–
Chrysene	9.10E-01		1.32E+09	P	1.9E-08	3.3E-08	6.2E-13	5.2E-08	0.2%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	2.40E-01	m	1.32E+09	P	1.7E-07	3.0E-07	1.8E-11	4.7E-07	1.4%	NA	NA	NA	NA	–
Fluoranthene	3.52E-01		1.32E+09	P	NA	NA	NA	NA	–	4.3E-06	7.4E-06	NA	1.2E-05	<0.1%

Table F-11
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Fluorene	5.94E-01		5.02E+05	V	NA	NA	NA	NA	–	7.3E-06	1.2E-05	NA	2.0E-05	<0.1%
Indeno(1,2,3-cd)pyrene	9.39E-02		1.32E+09	P	2.0E-08	3.4E-08	6.4E-13	5.3E-08	0.2%	NA	NA	NA	NA	–
Naphthalene	2.84E+00		5.49E+04	V	NA	NA	1.4E-07	1.4E-07	0.4%	6.9E-05	1.2E-04	1.3E-03	1.5E-03	0.9%
Phenanthrene	3.63E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.34E+00		1.32E+09	P	NA	NA	NA	NA	–	2.2E-05	3.7E-05	NA	5.9E-05	<0.1%
Pesticides and Herbicides														
Dieldrin	1.90E-02	m	1.32E+09	P	5.3E-08	7.0E-08	5.4E-12	1.2E-07	0.4%	1.9E-04	2.5E-04	NA	4.3E-04	0.3%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	8.50E-02	m	1.32E+09	P	3.0E-08	5.5E-08	3.0E-12	8.5E-08	0.3%	2.1E-03	3.8E-03	NA	5.9E-03	3.7%
Inorganic Compounds														
Antimony	1.51E+00		1.32E+09	P	NA	NA	NA	NA	–	1.8E-03	–	NA	1.8E-03	1.2%
Arsenic	8.43E+00		1.32E+09	P	1.4E-05	5.5E-06	1.7E-09	1.9E-05	58.2%	1.4E-02	5.4E-03	9.7E-05	1.9E-02	12.1%
Barium	2.03E+02		1.32E+09	P	NA	NA	NA	NA	–	5.0E-04	–	7.0E-05	5.7E-04	0.4%
Beryllium	8.32E-01		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	2.0E-04	–	2.1E-05	2.2E-04	0.1%
Cadmium	1.39E+00		1.32E+09	P	NA	NA	3.6E-10	3.6E-10	<0.1%	6.8E-04	3.6E-04	1.2E-05	1.1E-03	0.7%
Chromium	6.47E+01		1.32E+09	P	NA	NA	NA	NA	–	2.1E-05	–	NA	2.1E-05	<0.1%
Cobalt	1.58E+01		1.32E+09	P	NA	NA	8.8E-09	8.8E-09	<0.1%	2.6E-02	–	4.6E-04	2.6E-02	16.5%
Copper	3.43E+02		1.32E+09	P	NA	NA	NA	NA	–	4.2E-03	–	NA	4.2E-03	2.6%
Lead	1.37E+02		1.32E+09	P	NA	NA	1.0E-10	1.0E-10	<0.1%	NA	NA	NA	NA	–
Mercury	2.36E-01		1.32E+09	P	NA	NA	NA	NA	–	3.8E-04	–	1.4E-06	3.9E-04	0.2%
Molybdenum	7.84E+00		1.32E+09	P	NA	NA	NA	NA	–	7.7E-04	–	NA	7.7E-04	0.5%
Nickel	3.21E+02		1.32E+09	P	NA	NA	5.1E-09	5.1E-09	<0.1%	7.8E-03	–	1.1E-03	9.0E-03	5.6%
Selenium	1.89E+00		1.32E+09	P	NA	NA	NA	NA	–	1.8E-04	–	1.6E-08	1.8E-04	0.1%
Silver	2.49E+00	m	1.32E+09	P	NA	NA	NA	NA	–	2.4E-04	–	NA	2.4E-04	0.2%
Vanadium	4.88E+01		1.32E+09	P	NA	NA	NA	NA	–	3.4E-03	–	NA	3.4E-03	2.1%
Zinc	3.12E+02		1.32E+09	P	NA	NA	NA	NA	–	5.1E-04	–	NA	5.1E-04	0.3%

Table F-11
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard Index	Percent Total HI
			ELCRo	ELCRd	ELCRi	ELCR		HQo	HQd	HQi	HI	
Total Risk or Hazard			Total ELCR			3E-05	100%	Total HI			0.2	100%
Total Risk or Hazard from Arsenic						2E-05					0.02	
Total Risk or Hazard without Arsenic						1E-05					0.1	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-12
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	6.50E-01		1.32E+09	P	4.4E-12	<0.1%	NA	–
Benzo(a)pyrene	2.97E-01		1.32E+09	P	2.0E-11	0.1%	NA	–
Benzo(b)fluoranthene	9.63E-02		1.32E+09	P	6.6E-13	<0.1%	NA	–
Benzo(ghi)perylene	1.90E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	1.64E-01		1.32E+09	P	1.1E-12	<0.1%	NA	–
Chrysene	9.10E-01		1.32E+09	P	6.2E-13	<0.1%	NA	–
Dibenzo(a,h)anthracene	2.40E-01	m	1.32E+09	P	1.8E-11	0.1%	NA	–
Fluoranthene	3.52E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	9.39E-02		1.32E+09	P	6.4E-13	<0.1%	NA	–
Pyrene	1.34E+00		1.32E+09	P	NA	–	NA	–
Pesticides and Herbicides								
Dieldrin	1.90E-02	m	1.32E+09	P	5.4E-12	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	8.50E-02	m	1.32E+09	P	3.0E-12	<0.1%	NA	–
Inorganic Compounds								
Antimony	1.51E+00		1.32E+09	P	NA	–	NA	–
Arsenic	8.43E+00		1.32E+09	P	1.7E-09	10.5%	4.1E-04	5.5%
Barium	2.03E+02		1.32E+09	P	NA	–	2.9E-04	4.0%
Beryllium	8.32E-01		1.32E+09	P	1.2E-10	0.8%	8.6E-05	1.2%
Cadmium	1.39E+00		1.32E+09	P	3.6E-10	2.2%	5.1E-05	0.7%
Chromium	6.47E+01		1.32E+09	P	NA	–	NA	–
Cobalt	1.58E+01		1.32E+09	P	8.9E-09	54.0%	1.9E-03	25.8%
Copper	3.43E+02		1.32E+09	P	NA	–	NA	–
Lead	1.37E+02		1.32E+09	P	1.0E-10	0.6%	NA	–

Table F-12
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Mercury	2.36E-01		1.32E+09	P	NA	–	5.7E-06	<0.1%
Molybdenum	7.84E+00		1.32E+09	P	NA	–	NA	–
Nickel	3.21E+02		1.32E+09	P	5.2E-09	31.6%	4.7E-03	62.8%
Selenium	1.89E+00		1.32E+09	P	NA	–	6.9E-08	<0.1%
Silver	2.49E+00	m	1.32E+09	P	NA	–	NA	–
Vanadium	4.88E+01		1.32E+09	P	NA	–	NA	–
Zinc	3.12E+02		1.32E+09	P	NA	–	NA	–
Total Risk or Hazard			Total ELCR		2E-08	Total HI	0.007	
Total Risk or Hazard from Arsenic					2E-09		0.0004	
Total Risk or Hazard without Arsenic					1E-08		0.007	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-13
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	6.50E-01		1.32E+09	P	1.8E-11	<0.1%	NA	–
Benzo(a)pyrene	2.97E-01		1.32E+09	P	8.1E-11	0.1%	NA	–
Benzo(b)fluoranthene	9.63E-02		1.32E+09	P	2.6E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.90E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	1.64E-01		1.32E+09	P	4.5E-12	<0.1%	NA	–
Chrysene	9.10E-01		1.32E+09	P	2.5E-12	<0.1%	NA	–
Dibenzo(a,h)anthracene	2.40E-01	m	1.32E+09	P	7.2E-11	0.1%	NA	–
Fluoranthene	3.52E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	9.39E-02		1.32E+09	P	2.6E-12	<0.1%	NA	–
Pyrene	1.34E+00		1.32E+09	P	NA	–	NA	–
Pesticides and Herbicides								
Dieldrin	1.90E-02	m	1.32E+09	P	2.2E-11	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	8.50E-02	m	1.32E+09	P	1.2E-11	<0.1%	NA	–
Inorganic Compounds								
Antimony	1.51E+00		1.32E+09	P	NA	–	NA	–
Arsenic	8.43E+00		1.32E+09	P	6.9E-09	10.5%	4.1E-04	5.5%
Barium	2.03E+02		1.32E+09	P	NA	–	2.9E-04	4.0%
Beryllium	8.32E-01		1.32E+09	P	5.0E-10	0.8%	8.6E-05	1.2%
Cadmium	1.39E+00		1.32E+09	P	1.5E-09	2.2%	5.1E-05	0.7%
Chromium	6.47E+01		1.32E+09	P	NA	–	NA	–
Cobalt	1.58E+01		1.32E+09	P	3.6E-08	54.0%	1.9E-03	25.8%
Copper	3.43E+02		1.32E+09	P	NA	–	NA	–
Lead	1.37E+02		1.32E+09	P	4.1E-10	0.6%	NA	–
Mercury	2.36E-01		1.32E+09	P	NA	–	5.7E-06	<0.1%
Molybdenum	7.84E+00		1.32E+09	P	NA	–	NA	–

Table F-13
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Nickel	3.21E+02	1.32E+09 P	2.1E-08	31.6%	4.7E-03	62.8%
Selenium	1.89E+00	1.32E+09 P	NA	–	6.9E-08	<0.1%
Silver	2.49E+00 m	1.32E+09 P	NA	–	NA	–
Vanadium	4.88E+01	1.32E+09 P	NA	–	NA	–
Zinc	3.12E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	7E-08	Total HI	0.007	
Total Risk or Hazard from Arsenic			7E-09		0.0004	
Total Risk or Hazard without Arsenic			6E-08		0.007	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

Table F-14
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	2.03E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	2.3E-02	2.3E-02	0.9%
1,2-Dichlorobenzene	1.29E-01	m	1.43E+04	V	NA	NA	NA	NA	–	4.6E-07	–	1.0E-06	1.5E-06	<0.1%
1,2-Dichloropropane	1.90E-02	m	3.52E+03	V	3.2E-11	–	1.8E-10	2.1E-10	<0.1%	NA	NA	9.5E-05	9.5E-05	<0.1%
1,3,5-Trimethylbenzene	2.81E+00		1.15E+04	V	NA	NA	NA	NA	–	1.8E-04	–	9.3E-03	9.5E-03	0.4%
Benzene	4.04E+00		2.68E+03	V	1.9E-08	–	1.4E-07	1.6E-07	3.0%	1.1E-03	–	5.7E-03	6.8E-03	0.3%
Carbon Disulfide	4.50E-02	m	1.17E+03	V	NA	NA	NA	NA	–	1.5E-06	–	1.1E-05	1.2E-05	<0.1%
Chloroform	6.00E-02	m	2.61E+03	V	8.6E-11	–	4.0E-10	4.8E-10	<0.1%	1.9E-05	–	1.8E-05	3.7E-05	<0.1%
Ethy benzene	1.93E+00		5.29E+03	V	9.8E-10	–	3.0E-09	3.9E-09	<0.1%	6.2E-06	–	4.2E-05	4.8E-05	<0.1%
Isopropylbenzene	3.24E-01		1.65E+03	V	NA	NA	NA	NA	–	2.6E-06	–	1.1E-04	1.1E-04	<0.1%
Methylene Chloride	4.70E-01	m	2.45E+03	V	3.0E-10	–	6.3E-10	9.3E-10	<0.1%	2.5E-05	–	1.1E-04	1.3E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.72E-03		4.07E+03	V	2.3E-13	–	5.7E-13	7.9E-13	<0.1%	NA	NA	1.9E-08	1.9E-08	<0.1%
n-Butylbenzene	1.78E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.22E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	6.15E-01		5.16E+03	V	NA	NA	NA	NA	–	9.9E-07	–	3.9E-05	4.0E-05	<0.1%
p/m-Xylene	9.92E+00		3.79E+03	V	NA	NA	NA	NA	–	1.6E-04	–	2.0E-03	2.2E-03	<0.1%
p-Isopropyltoluene	1.65E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.36E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	1.91E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.10E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	7.50E-03	m	2.50E+03	V	1.9E-10	–	5.8E-11	2.4E-10	<0.1%	2.4E-07	–	2.0E-05	2.0E-05	<0.1%
Toluene	9.43E-02		3.90E+03	V	NA	NA	NA	NA	–	3.8E-07	–	1.8E-05	1.9E-05	<0.1%
Xylenes, total	1.13E+01		4.39E+03	V	NA	NA	NA	NA	–	1.8E-04	–	8.4E-04	1.0E-03	<0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+00		1.63E+05	V	2.9E-09	–	NA	2.9E-09	<0.1%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.28E+00		1.13E+05	V	NA	NA	NA	NA	–	2.6E-03	–	NA	2.6E-03	0.1%
Acenaphthene	1.96E-01		2.12E+05	V	NA	NA	NA	NA	–	1.1E-06	4.8E-07	NA	1.5E-06	<0.1%
Acenaphthylene	1.11E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	4.80E-01		7.70E+05	V	NA	NA	NA	NA	–	5.2E-07	2.4E-07	NA	7.5E-07	<0.1%
Benzo(a)anthracene	4.77E-01		1.00E+06	P	2.6E-08	1.2E-08	1.7E-10	3.9E-08	0.7%	NA	NA	NA	NA	–
Benzo(a)pyrene	3.17E-01		1.00E+06	P	1.8E-07	8.0E-08	1.1E-09	2.6E-07	4.8%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.81E-01		1.00E+06	P	1.0E-08	4.6E-09	6.5E-11	1.5E-08	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.04E-01		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	2.74E-01		1.00E+06	P	1.5E-08	6.9E-09	9.8E-11	2.2E-08	0.4%	NA	NA	NA	NA	–

Table F-14
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Chrysene	6.62E-01		1.00E+06	P	3.7E-09	1.7E-09	2.4E-11	5.4E-09	0.1%	NA	NA	NA	NA	–
D benzo(a,h)anthracene	2.18E-02		1.00E+06	P	4.1E-09	1.9E-09	8.5E-11	6.1E-09	0.1%	NA	NA	NA	NA	–
Fluoranthene	1.04E+00		1.00E+06	P	NA	NA	NA	NA	–	8.4E-06	3.8E-06	NA	1.2E-05	<0.1%
Fluorene	2.34E-01		5.02E+05	V	NA	NA	NA	NA	–	1.9E-06	8.6E-07	NA	2.8E-06	<0.1%
Indeno(1,2,3-cd)pyrene	7.86E-02		1.00E+06	P	4.4E-09	2.0E-09	2.8E-11	6.4E-09	0.1%	NA	NA	NA	NA	–
Naphthalene	9.39E-01		5.49E+04	V	NA	NA	1.9E-09	1.9E-09	<0.1%	1.5E-05	6.9E-06	4.3E-04	4.6E-04	<0.1%
Phenanthrene	2.09E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.41E+00		1.00E+06	P	NA	NA	NA	NA	–	1.5E-05	6.9E-06	NA	2.2E-05	<0.1%
Pesticides and Herbicides														
Dieldrin	1.90E-02	m	1.00E+06	P	1.4E-08	4.9E-09	2.9E-10	1.9E-08	0.4%	1.2E-03	4.3E-04	NA	1.7E-03	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	2.24E+00		1.00E+06	P	2.1E-07	1.0E-07	4.2E-09	3.1E-07	5.9%	1.4E-01	7.1E-02	NA	2.2E-01	8.9%
PCB-1260	7.50E-02	m	1.00E+06	P	6.9E-09	3.4E-09	1.4E-10	1.0E-08	0.2%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.27E+00		1.00E+06	P	NA	NA	NA	NA	–	1.8E-02	–	NA	1.8E-02	0.8%
Arsenic	7.38E+00		1.00E+06	P	3.2E-06	3.4E-07	7.9E-08	3.6E-06	68.2%	7.9E-02	8.4E-03	1.1E-01	2.0E-01	8.3%
Barium	2.01E+02		1.00E+06	P	NA	NA	NA	NA	–	3.2E-03	–	9.2E-03	1.2E-02	0.5%
Beryllium	9.64E-01		1.00E+06	P	NA	NA	7.5E-09	7.5E-09	0.1%	6.2E-04	–	3.1E-02	3.2E-02	1.3%
Cadmium	7.03E-01		1.00E+06	P	NA	NA	9.6E-09	9.6E-09	0.2%	2.3E-03	3.2E-04	8.0E-03	1.1E-02	0.4%
Chromium	5.63E+01		1.00E+06	P	NA	NA	NA	NA	–	1.2E-04	–	NA	1.2E-04	<0.1%
Chromium, Hexavalent	2.95E-01	m	1.00E+06	P	NA	NA	1.4E-07	1.4E-07	2.7%	4.8E-05	–	3.4E-04	3.8E-04	<0.1%
Cobalt	1.65E+01		1.00E+06	P	NA	NA	4.8E-07	4.8E-07	9.1%	1.8E-01	–	6.3E-01	8.0E-01	33.4%
Copper	1.45E+02		1.00E+06	P	NA	NA	NA	NA	–	1.2E-02	–	NA	1.2E-02	0.5%
Lead	9.38E+01		1.00E+06	P	NA	NA	3.7E-09	3.7E-09	<0.1%	NA	NA	NA	NA	–
Mercury	1.67E-01		1.00E+06	P	NA	NA	NA	NA	–	1.8E-03	–	1.3E-03	3.1E-03	0.1%
Molybdenum	5.83E+00		1.00E+06	P	NA	NA	NA	NA	–	3.8E-03	–	NA	3.8E-03	0.2%
Nickel	2.16E+02		1.00E+06	P	NA	NA	1.8E-07	1.8E-07	3.4%	3.5E-02	–	9.9E-01	1.0E+00	42.3%
Selenium	1.61E+00		1.00E+06	P	NA	NA	NA	NA	–	1.0E-03	–	1.8E-05	1.1E-03	<0.1%
Silver	2.49E+00	m	1.00E+06	P	NA	NA	NA	NA	–	1.6E-03	–	NA	1.6E-03	<0.1%
Vanadium	5.66E+01		1.00E+06	P	NA	NA	NA	NA	–	2.6E-02	–	NA	2.6E-02	1.1%
Zinc	2.31E+02		1.00E+06	P	NA	NA	NA	NA	–	2.5E-03	–	NA	2.5E-03	0.1%

Table F-14
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral (ELCRo)	Dermal (ELCRd)	Inhalation (ELCRi)	Calculated Risk (ELCR)	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral (HQo)	Dermal (HQd)	Inhalation (HQi)	Calculated Hazard Index (HI)	Percent Total HI
Total Risk or Hazard			Total ELCR			5E-06	100%	Total HI **			2	100%
Total Risk or Hazard from Arsenic						4E-06					0.2	
Total Risk or Hazard without Arsenic						2E-06					2	

** HI Segregated by Target Site/Critical Effect:	HI (liver, kidney) =	0.05	HI (forestomach, gastrointestinal tract) =	0.003
CNS - Central nervous system	HI (CNS, whole body, immune system) =	0.1	HI (nasal, lung) =	0.6
NA - Not available	HI (blood) =	0.1	HI (eyes, nails, hair, skin) =	0.03
NR - None reported	HI (fetus, developmental) =	0.00002	HI (NA, NR) =	1

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 250 × 1 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 250 × 1 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 1 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 250 × 1) / (1,000,000 × 70 × 365 × RfDo)
HQd = (EPCs × 5,800 × 0.2 × ABSd × 250 × 1) / (1,000,000 × 70 × 365 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 1) / ([VF or PEF] × 365 × RfC)

Table F-15
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Trench/Utility Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard INDEX HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	2.03E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	1.8E-03	1.8E-03	0.9%
1,2-Dichlorobenzene	1.29E-01	m	1.43E+04	V	NA	NA	NA	NA	–	3.7E-08	–	8.2E-08	1.2E-07	<0.1%
1,2-Dichloropropane	1.90E-02	m	3.52E+03	V	1.8E-11	–	9.9E-11	1.2E-10	<0.1%	NA	NA	7.6E-06	7.6E-06	<0.1%
1,3,5-Trimethylbenzene	2.81E+00		1.15E+04	V	NA	NA	NA	NA	–	1.5E-05	–	7.4E-04	7.6E-04	0.4%
Benzene	4.04E+00		2.68E+03	V	1.0E-08	–	8.0E-08	9.0E-08	3.0%	8.7E-05	–	4.6E-04	5.5E-04	0.3%
Carbon Disulfide	4.50E-02	m	1.17E+03	V	NA	NA	NA	NA	–	1.2E-07	–	8.8E-07	1.0E-06	<0.1%
Chloroform	6.00E-02	m	2.61E+03	V	4.8E-11	–	2.2E-10	2.7E-10	<0.1%	1.5E-06	–	1.4E-06	3.0E-06	<0.1%
Ethy benzene	1.93E+00		5.29E+03	V	5.5E-10	–	1.7E-09	2.2E-09	<0.1%	5.0E-07	–	3.3E-06	3.8E-06	<0.1%
Isopropylbenzene	3.24E-01		1.65E+03	V	NA	NA	NA	NA	–	2.1E-07	–	9.0E-06	9.2E-06	<0.1%
Methylene Chloride	4.70E-01	m	2.45E+03	V	1.7E-10	–	3.5E-10	5.2E-10	<0.1%	2.0E-06	–	8.8E-06	1.1E-05	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.72E-03		4.07E+03	V	1.3E-13	–	3.2E-13	4.4E-13	<0.1%	NA	NA	1.5E-09	1.5E-09	<0.1%
n-Butylbenzene	1.78E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.22E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	6.15E-01		5.16E+03	V	NA	NA	NA	NA	–	7.9E-08	–	3.1E-06	3.2E-06	<0.1%
p/m-Xylene	9.92E+00		3.79E+03	V	NA	NA	NA	NA	–	1.3E-05	–	1.6E-04	1.7E-04	<0.1%
p-Isopropyltoluene	1.65E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.36E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	1.91E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.10E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	7.50E-03	m	2.50E+03	V	1.0E-10	–	3.2E-11	1.4E-10	<0.1%	1.9E-08	–	1.6E-06	1.6E-06	<0.1%
Toluene	9.43E-02		3.90E+03	V	NA	NA	NA	NA	–	3.0E-08	–	1.5E-06	1.5E-06	<0.1%
Xylenes, total	1.13E+01		4.39E+03	V	NA	NA	NA	NA	–	1.5E-05	–	6.7E-05	8.2E-05	<0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+00		1.63E+05	V	1.6E-09	–	NA	1.6E-09	<0.1%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.28E+00		1.13E+05	V	NA	NA	NA	NA	–	2.1E-04	–	NA	2.1E-04	0.1%
Acenaphthene	1.96E-01		2.12E+05	V	NA	NA	NA	NA	–	8.4E-08	3.9E-08	NA	1.2E-07	<0.1%
Acenaphthylene	1.11E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	4.80E-01		7.70E+05	V	NA	NA	NA	NA	–	4.1E-08	1.9E-08	NA	6.0E-08	<0.1%
Benzo(a)anthracene	4.77E-01		1.00E+06	P	1.5E-08	6.7E-09	9.6E-11	2.2E-08	0.7%	NA	NA	NA	NA	–
Benzo(a)pyrene	3.17E-01		1.00E+06	P	9.8E-08	4.5E-08	6.4E-10	1.4E-07	4.8%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.81E-01		1.00E+06	P	5.6E-09	2.6E-09	3.6E-11	8.2E-09	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.04E-01		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	2.74E-01		1.00E+06	P	8.5E-09	3.9E-09	5.5E-11	1.2E-08	0.4%	NA	NA	NA	NA	–

Table F-15
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Trench/Utility Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard INDEX HI	Percent Total HI
Chrysene	6.62E-01		1.00E+06	P	2.1E-09	9.4E-10	1.3E-11	3.0E-09	0.1%	NA	NA	NA	NA	–
D benzo(a,h)anthracene	2.18E-02		1.00E+06	P	2.3E-09	1.1E-09	4.8E-11	3.4E-09	0.1%	NA	NA	NA	NA	–
Fluoranthene	1.04E+00		1.00E+06	P	NA	NA	NA	NA	–	6.7E-07	3.1E-07	NA	9.8E-07	<0.1%
Fluorene	2.34E-01		5.02E+05	V	NA	NA	NA	NA	–	1.5E-07	6.9E-08	NA	2.2E-07	<0.1%
Indeno(1,2,3-cd)pyrene	7.86E-02		1.00E+06	P	2.4E-09	1.1E-09	1.6E-11	3.6E-09	0.1%	NA	NA	NA	NA	–
Naphthalene	9.39E-01		5.49E+04	V	NA	NA	1.1E-09	1.1E-09	<0.1%	1.2E-06	5.5E-07	3.5E-05	3.6E-05	<0.1%
Phenanthrene	2.09E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.41E+00		1.00E+06	P	NA	NA	NA	NA	–	1.2E-06	5.5E-07	NA	1.8E-06	<0.1%
Pesticides and Herbicides														
Dieldrin	1.90E-02	m	1.00E+06	P	7.9E-09	2.8E-09	1.6E-10	1.1E-08	0.4%	9.8E-05	3.5E-05	NA	1.3E-04	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	2.24E+00		1.00E+06	P	1.2E-07	5.7E-08	2.3E-09	1.7E-07	5.9%	1.2E-02	5.7E-03	NA	1.7E-02	8.9%
PCB-1260	7.50E-02	m	1.00E+06	P	3.9E-09	1.9E-09	7.8E-11	5.9E-09	0.2%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.27E+00		1.00E+06	P	NA	NA	NA	NA	–	1.5E-03	–	NA	1.5E-03	0.8%
Arsenic	7.38E+00		1.00E+06	P	1.8E-06	1.9E-07	4.4E-08	2.0E-06	68.2%	6.4E-03	6.7E-04	9.0E-03	1.6E-02	8.3%
Barium	2.01E+02		1.00E+06	P	NA	NA	NA	NA	–	2.6E-04	–	7.3E-04	9.9E-04	0.5%
Beryllium	9.64E-01		1.00E+06	P	NA	NA	4.2E-09	4.2E-09	0.1%	5.0E-05	–	2.5E-03	2.6E-03	1.3%
Cadmium	7.03E-01		1.00E+06	P	NA	NA	5.4E-09	5.4E-09	0.2%	1.8E-04	2.6E-05	6.4E-04	8.5E-04	0.4%
Chromium	5.63E+01		1.00E+06	P	NA	NA	NA	NA	–	9.7E-06	–	NA	9.7E-06	<0.1%
Chromium, Hexavalent	2.95E-01	m	1.00E+06	P	NA	NA	8.1E-08	8.1E-08	2.7%	3.8E-06	–	2.7E-05	3.1E-05	<0.1%
Cobalt	1.65E+01		1.00E+06	P	NA	NA	2.7E-07	2.7E-07	9.1%	1.4E-02	–	5.0E-02	6.4E-02	33.4%
Copper	1.45E+02		1.00E+06	P	NA	NA	NA	NA	–	9.4E-04	–	NA	9.4E-04	0.5%
Lead	9.38E+01		1.00E+06	P	NA	NA	2.1E-09	2.1E-09	<0.1%	NA	NA	NA	NA	–
Mercury	1.67E-01		1.00E+06	P	NA	NA	NA	NA	–	1.4E-04	–	1.0E-04	2.5E-04	0.1%
Molybdenum	5.83E+00		1.00E+06	P	NA	NA	NA	NA	–	3.0E-04	–	NA	3.0E-04	0.2%
Nickel	2.16E+02		1.00E+06	P	NA	NA	1.0E-07	1.0E-07	3.4%	2.8E-03	–	7.9E-02	8.2E-02	42.3%
Selenium	1.61E+00		1.00E+06	P	NA	NA	NA	NA	–	8.3E-05	–	1.5E-06	8.4E-05	<0.1%
Silver	2.49E+00	m	1.00E+06	P	NA	NA	NA	NA	–	1.3E-04	–	NA	1.3E-04	<0.1%
Vanadium	5.66E+01		1.00E+06	P	NA	NA	NA	NA	–	2.1E-03	–	NA	2.1E-03	1.1%

Table F-15
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Trench/Utility Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard INDEX	Percent Total HI
				ELCRo	ELCRd	ELCRi	ELCR		HQo	HQd	HQi	HI	
Zinc	2.31E+02	1.00E+06	P	NA	NA	NA	NA	–	2.0E-04	–	NA	2.0E-04	0.1%
Total Risk or Hazard				Total ELCR			3E-06	100%	Total HI			0.2	100%
Total Risk or Hazard from Arsenic							2E-06					0.02	
Total Risk or Hazard without Arsenic							9E-07					0.2	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 20 × 7 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 20 × 7 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×20 × 7 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDo)
HQd = (EPCs × 5,800 × 0.2 × ABSd × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDa)
HQi = (EPCs × 8 × 0.042 × 20 × 7) / ([VF or PEF] × 2,555 × RfC)

Table F-16
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethy benzene	2.03E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	2.3E-02	2.3E-02	8.6%
1,2-Dichlorobenzene	1.29E-01	m	1.43E+04	V	NA	NA	NA	NA	–	7.0E-07	–	1.0E-05	1.1E-05	<0.1%
1,2-Dichloropropane	1.90E-02	m	3.52E+03	V	1.2E-10	–	4.4E-09	4.5E-09	<0.1%	NA	NA	3.1E-04	3.1E-04	0.1%
1,3,5-Trimethy benzene	2.81E+00		1.15E+04	V	NA	NA	NA	NA	–	2.7E-05	–	9.3E-03	9.3E-03	3.5%
Benzene	4.04E+00		2.68E+03	V	7.1E-08	–	3.6E-06	3.6E-06	14.1%	4.9E-04	–	5.7E-03	6.2E-03	2.4%
Carbon Disulfide	4.50E-02	m	1.17E+03	V	NA	NA	NA	NA	–	2.2E-07	–	1.1E-05	1.1E-05	<0.1%
Chloroform	6.00E-02	m	2.61E+03	V	3.2E-10	–	9.9E-09	1.0E-08	<0.1%	2.9E-06	–	1.8E-05	2.0E-05	<0.1%
Ethylbenzene	1.93E+00		5.29E+03	V	3.7E-09	–	7.4E-08	7.8E-08	0.3%	9.4E-06	–	4.2E-05	5.1E-05	<0.1%
Isopropylbenzene	3.24E-01		1.65E+03	V	NA	NA	NA	NA	–	1.6E-06	–	1.1E-04	1.1E-04	<0.1%
Methylene Chloride	4.70E-01	m	2.45E+03	V	1.1E-09	–	1.6E-08	1.7E-08	<0.1%	3.8E-06	–	1.1E-04	1.1E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.72E-03		4.07E+03	V	8.6E-13	–	1.4E-11	1.5E-11	<0.1%	NA	NA	1.9E-08	1.9E-08	<0.1%
n-Buty benzene	1.78E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propy benzene	1.22E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	6.15E-01		5.16E+03	V	NA	NA	NA	NA	–	1.5E-07	–	3.9E-05	3.9E-05	<0.1%
p/m-Xylene	9.92E+00		3.79E+03	V	NA	NA	NA	NA	–	2.4E-05	–	6.0E-03	6.0E-03	2.3%
p-Isopropyltoluene	1.65E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Buty benzene	2.36E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	1.91E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Buty benzene	1.10E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	7.50E-03	m	2.50E+03	V	7.1E-10	–	1.4E-09	2.1E-09	<0.1%	3.7E-07	–	2.0E-05	2.0E-05	<0.1%
Toluene	9.43E-02		3.90E+03	V	NA	NA	NA	NA	–	5.8E-07	–	1.8E-05	1.9E-05	<0.1%
Xylenes, total	1.13E+01		4.39E+03	V	NA	NA	NA	NA	–	2.8E-05	–	8.4E-04	8.7E-04	0.3%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+00		1.63E+05	V	1.1E-08	–	NA	1.1E-08	<0.1%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.28E+00		1.13E+05	V	NA	NA	NA	NA	–	4.0E-04	–	NA	4.0E-04	0.2%
Acenaphthene	1.96E-01		2.12E+05	V	NA	NA	NA	NA	–	1.6E-06	2.7E-06	NA	4.3E-06	<0.1%
Acenaphthylene	1.11E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	4.80E-01		7.70E+05	V	NA	NA	NA	NA	–	7.8E-07	1.3E-06	NA	2.1E-06	<0.1%
Benzo(a)anthracene	4.77E-01		1.32E+09	P	1.0E-07	1.7E-07	3.2E-12	2.7E-07	1.1%	NA	NA	NA	NA	–
Benzo(a)pyrene	3.17E-01		1.32E+09	P	6.6E-07	1.1E-06	2.2E-11	1.8E-06	7.0%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.81E-01		1.32E+09	P	3.8E-08	6.5E-08	1.2E-12	1.0E-07	0.4%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.04E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	2.74E-01		1.32E+09	P	5.8E-08	9.9E-08	1.9E-12	1.6E-07	0.6%	NA	NA	NA	NA	–

Table F-16
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Chrysene	6.62E-01		1.32E+09	P	1.4E-08	2.4E-08	4.5E-13	3.8E-08	0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	2.18E-02		1.32E+09	P	1.6E-08	2.7E-08	1.6E-12	4.2E-08	0.2%	NA	NA	NA	NA	–
Fluoranthene	1.04E+00		1.32E+09	P	NA	NA	NA	NA	–	1.3E-05	2.2E-05	NA	3.5E-05	<0.1%
Fluorene	2.34E-01		5.02E+05	V	NA	NA	NA	NA	–	2.9E-06	4.9E-06	NA	7.8E-06	<0.1%
Indeno(1,2,3-cd)pyrene	7.86E-02		1.32E+09	P	1.6E-08	2.8E-08	5.3E-13	4.5E-08	0.2%	NA	NA	NA	NA	–
Naphthalene	9.39E-01		5.49E+04	V	NA	NA	4.7E-08	4.7E-08	0.2%	2.3E-05	3.9E-05	4.3E-04	5.0E-04	0.2%
Phenanthrene	2.09E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.41E+00		1.32E+09	P	NA	NA	NA	NA	–	2.3E-05	3.9E-05	NA	6.2E-05	<0.1%
Pesticides and Herbicides														
Dieldrin	1.90E-02	m	1.32E+09	P	5.3E-08	7.0E-08	5.4E-12	1.2E-07	0.5%	1.9E-04	2.5E-04	NA	4.3E-04	0.2%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	2.24E+00		1.32E+09	P	7.8E-07	1.4E-06	7.9E-11	2.2E-06	8.7%	5.5E-02	1.0E-01	NA	1.6E-01	58.8%
PCB-1260	7.50E-02	m	1.32E+09	P	2.6E-08	4.8E-08	2.6E-12	7.5E-08	0.3%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.27E+00		1.32E+09	P	NA	NA	NA	NA	–	2.8E-03	–	NA	2.8E-03	1.0%
Arsenic	7.38E+00		1.32E+09	P	1.2E-05	4.8E-06	1.5E-09	1.7E-05	66.1%	1.2E-02	4.8E-03	8.5E-05	1.7E-02	6.4%
Barium	2.01E+02		1.32E+09	P	NA	NA	NA	NA	–	4.9E-04	–	7.0E-05	5.6E-04	0.2%
Beryllium	9.64E-01		1.32E+09	P	NA	NA	1.4E-10	1.4E-10	<0.1%	2.4E-04	–	2.4E-05	2.6E-04	<0.1%
Cadmium	7.03E-01		1.32E+09	P	NA	NA	1.8E-10	1.8E-10	<0.1%	3.4E-04	1.8E-04	6.1E-06	5.3E-04	0.2%
Chromium	5.63E+01		1.32E+09	P	NA	NA	NA	NA	–	1.8E-05	–	NA	1.8E-05	<0.1%
Chromium, Hexavalent	2.95E-01	m	1.32E+09	P	NA	NA	2.7E-09	2.7E-09	<0.1%	4.8E-05	–	2.6E-07	4.8E-05	<0.1%
Cobalt	1.65E+01		1.32E+09	P	NA	NA	9.2E-09	9.2E-09	<0.1%	2.7E-02	–	4.8E-04	2.7E-02	10.3%
Copper	1.45E+02		1.32E+09	P	NA	NA	NA	NA	–	1.8E-03	–	NA	1.8E-03	0.7%
Lead	9.38E+01		1.32E+09	P	NA	NA	7.0E-11	7.0E-11	<0.1%	NA	NA	NA	NA	–
Mercury	1.67E-01		1.32E+09	P	NA	NA	NA	NA	–	2.7E-04	–	9.6E-07	2.7E-04	0.1%
Molybdenum	5.83E+00		1.32E+09	P	NA	NA	NA	NA	–	5.7E-04	–	NA	5.7E-04	0.2%
Nickel	2.16E+02		1.32E+09	P	NA	NA	3.5E-09	3.5E-09	<0.1%	5.3E-03	–	7.5E-04	6.0E-03	2.3%
Selenium	1.61E+00		1.32E+09	P	NA	NA	NA	NA	–	1.6E-04	–	1.4E-08	1.6E-04	<0.1%
Silver	2.49E+00	m	1.32E+09	P	NA	NA	NA	NA	–	2.4E-04	–	NA	2.4E-04	<0.1%
Vanadium	5.66E+01		1.32E+09	P	NA	NA	NA	NA	–	4.0E-03	–	NA	4.0E-03	1.5%

Table F-16
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard Index	Percent Total HI
			ELCRo	ELCRd	ELCRi	ELCR		HQo	HQd	HQi	HI	
Zinc	2.31E+02	1.32E+09 P	NA	NA	NA	NA	–	3.8E-04	–	NA	3.8E-04	0.1%
Total Risk or Hazard			Total ELCR			3E-05	100%	Total HI			0.3	100%
Total Risk or Hazard from Arsenic						2E-05					0.02	
Total Risk or Hazard without Arsenic						9E-06					0.2	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-17
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	2.03E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	9.6E-02	9.6E-02	4.3%
1,2-Dichlorobenzene	1.29E-01	m	1.43E+04	V	NA	NA	NA	NA	–	9.1E-06	–	4.3E-05	5.2E-05	<0.1%
1,2-Dichloropropane	1.90E-02	m	3.52E+03	V	3.7E-10	–	4.4E-09	4.8E-09	<0.1%	NA	NA	1.3E-03	1.3E-03	<0.1%
1,3,5-Trimethylbenzene	2.81E+00		1.15E+04	V	NA	NA	NA	NA	–	3.6E-04	–	3.9E-02	3.9E-02	1.8%
Benzene	4.04E+00		2.68E+03	V	2.2E-07	–	3.6E-06	3.8E-06	6.5%	6.5E-03	–	2.4E-02	3.1E-02	1.4%
Carbon Disulfide	4.50E-02	m	1.17E+03	V	NA	NA	NA	NA	–	2.9E-06	–	4.6E-05	4.9E-05	<0.1%
Chloroform	6.00E-02	m	2.61E+03	V	1.0E-09	–	1.0E-08	1.1E-08	<0.1%	3.8E-05	–	7.4E-05	1.1E-04	<0.1%
Ethylbenzene	1.93E+00		5.29E+03	V	1.2E-08	–	7.5E-08	8.6E-08	0.1%	1.2E-04	–	1.7E-04	3.0E-04	<0.1%
Isopropy benzene	3.24E-01		1.65E+03	V	NA	NA	NA	NA	–	2.1E-05	–	4.7E-04	4.9E-04	<0.1%
Methylene Chloride	4.70E-01	m	2.45E+03	V	3.6E-09	–	1.6E-08	1.9E-08	<0.1%	5.0E-05	–	4.6E-04	5.1E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.72E-03		4.07E+03	V	2.7E-12	–	1.4E-11	1.7E-11	<0.1%	NA	NA	8.0E-08	8.0E-08	<0.1%
n-Butylbenzene	1.78E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.22E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	6.15E-01		5.16E+03	V	NA	NA	NA	NA	–	2.0E-06	–	1.6E-04	1.7E-04	<0.1%
p/m-Xylene	9.92E+00		3.79E+03	V	NA	NA	NA	NA	–	3.2E-04	–	2.5E-02	2.5E-02	1.1%
p-Isopropyltoluene	1.65E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.36E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	1.91E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.10E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	7.50E-03	m	2.50E+03	V	2.2E-09	–	1.5E-09	3.7E-09	<0.1%	4.8E-06	–	8.2E-05	8.7E-05	<0.1%
Toluene	9.43E-02		3.90E+03	V	NA	NA	NA	NA	–	7.5E-06	–	7.7E-05	8.5E-05	<0.1%
Xylenes, total	1.13E+01		4.39E+03	V	NA	NA	NA	NA	–	3.6E-04	–	3.5E-03	3.9E-03	0.2%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+00		1.63E+05	V	3.5E-08	–	NA	3.5E-08	<0.1%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.28E+00		1.13E+05	V	NA	NA	NA	NA	–	5.2E-03	–	NA	5.2E-03	0.2%
Acenaphthene	1.96E-01		2.12E+05	V	NA	NA	NA	NA	–	2.1E-05	1.5E-05	NA	3.6E-05	<0.1%
Acenaphthylene	1.11E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	4.80E-01		7.70E+05	V	NA	NA	NA	NA	–	1.0E-05	7.4E-06	NA	1.8E-05	<0.1%
Benzo(a)anthracene	4.77E-01		1.32E+09	P	3.1E-07	2.3E-07	3.3E-12	5.4E-07	0.9%	NA	NA	NA	NA	–
Benzo(a)pyrene	3.17E-01		1.32E+09	P	2.1E-06	1.5E-06	2.2E-11	3.6E-06	6.2%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.81E-01		1.32E+09	P	1.2E-07	8.7E-08	1.2E-12	2.1E-07	0.4%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.04E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	2.74E-01		1.32E+09	P	1.8E-07	1.3E-07	1.9E-12	3.1E-07	0.5%	NA	NA	NA	NA	–

Table F-17
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Chrysene	6.62E-01		1.32E+09	P	4.4E-08	3.2E-08	4.5E-13	7.5E-08	0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	2.18E-02		1.32E+09	P	4.9E-08	3.6E-08	1.6E-12	8.5E-08	0.1%	NA	NA	NA	NA	–
Fluoranthene	1.04E+00		1.32E+09	P	NA	NA	NA	NA	–	1.7E-04	1.2E-04	NA	2.9E-04	<0.1%
Fluorene	2.34E-01		5.02E+05	V	NA	NA	NA	NA	–	3.7E-05	2.7E-05	NA	6.5E-05	<0.1%
Indeno(1,2,3-cd)pyrene	7.86E-02		1.32E+09	P	5.2E-08	3.8E-08	5.4E-13	8.9E-08	0.2%	NA	NA	NA	NA	–
Naphthalene	9.39E-01		5.49E+04	V	NA	NA	4.8E-08	4.8E-08	<0.1%	3.0E-04	2.2E-04	1.8E-03	2.3E-03	0.1%
Phenanthrene	2.09E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.41E+00		1.32E+09	P	NA	NA	NA	NA	–	3.0E-04	2.2E-04	NA	5.2E-04	<0.1%
Pesticides and Herbicides														
Dieldrin	1.90E-02	m	1.32E+09	P	1.7E-07	9.3E-08	5.4E-12	2.6E-07	0.4%	2.4E-03	1.4E-03	NA	3.8E-03	0.2%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	2.24E+00		1.32E+09	P	2.5E-06	1.9E-06	7.9E-11	4.4E-06	7.5%	7.1E-01	5.6E-01	NA	1.3E+00	56.8%
PCB-1260	7.50E-02	m	1.32E+09	P	8.2E-08	6.4E-08	2.7E-12	1.5E-07	0.3%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.27E+00		1.32E+09	P	NA	NA	NA	NA	–	3.6E-02	–	NA	3.6E-02	1.6%
Arsenic	7.38E+00		1.32E+09	P	3.8E-05	6.4E-06	1.5E-09	4.5E-05	76.5%	1.6E-01	2.6E-02	3.6E-04	1.8E-01	8.2%
Barium	2.01E+02		1.32E+09	P	NA	NA	NA	NA	–	6.4E-03	–	2.9E-04	6.7E-03	0.3%
Beryllium	9.64E-01		1.32E+09	P	NA	NA	1.4E-10	1.4E-10	<0.1%	3.1E-03	–	1.0E-04	3.2E-03	0.1%
Cadmium	7.03E-01		1.32E+09	P	NA	NA	1.8E-10	1.8E-10	<0.1%	4.5E-03	1.0E-03	2.6E-05	5.5E-03	0.2%
Chromium	5.63E+01		1.32E+09	P	NA	NA	NA	NA	–	2.4E-04	–	NA	2.4E-04	<0.1%
Chromium, Hexavalent	2.95E-01	m	1.32E+09	P	NA	NA	2.8E-09	2.8E-09	<0.1%	6.3E-04	–	1.1E-06	6.3E-04	<0.1%
Cobalt	1.65E+01		1.32E+09	P	NA	NA	9.2E-09	9.2E-09	<0.1%	3.5E-01	–	2.0E-03	3.5E-01	15.7%
Copper	1.45E+02		1.32E+09	P	NA	NA	NA	NA	–	2.3E-02	–	NA	2.3E-02	1.0%
Lead	9.38E+01		1.32E+09	P	NA	NA	7.0E-11	7.0E-11	<0.1%	NA	NA	NA	NA	–
Mercury	1.67E-01		1.32E+09	P	NA	NA	NA	NA	–	3.6E-03	–	4.0E-06	3.6E-03	0.2%
Molybdenum	5.83E+00		1.32E+09	P	NA	NA	NA	NA	–	7.5E-03	–	NA	7.5E-03	0.3%
Nickel	2.16E+02		1.32E+09	P	NA	NA	3.5E-09	3.5E-09	<0.1%	6.9E-02	–	3.1E-03	7.2E-02	3.2%
Selenium	1.61E+00		1.32E+09	P	NA	NA	NA	NA	–	2.1E-03	–	5.8E-08	2.1E-03	<0.1%
Silver	2.49E+00	m	1.32E+09	P	NA	NA	NA	NA	–	3.2E-03	–	NA	3.2E-03	0.1%
Vanadium	5.66E+01		1.32E+09	P	NA	NA	NA	NA	–	5.2E-02	–	NA	5.2E-02	2.3%

Table F-17
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m³/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Zinc	2.31E+02	1.32E+09 P	NA	NA	NA	NA	–	4.9E-03	–	NA	4.9E-03	0.2%
Total Risk or Hazard			Total ELCR			6E-05	100%	Total HI **			2	100%
Total Risk or Hazard from Arsenic						4E-05					0.2	
Total Risk or Hazard without Arsenic						1E-05					2	

** HI Segregated by Target Site/Critical Effect:	HI (liver, kidney) =	0.1	HI (forestomach, gastrointestinal tract) =	0.03
CNS - Central nervous system	HI (CNS, whole body, immune system) =	0.1	HI (nasal, lung) =	0.003
NA - Not available	HI (blood) =	0.1	HI (eyes, nails, hair, skin) =	1
NR - None reported	HI (fetus, developmental) =	0.0002	HI (NA, NR) =	0.1

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 100 × 350 × 6 × CSFo) / (1,000,000 × 15 × 25,550)
ELCRd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6 × CSFa) / (1,000,000 × 15 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 100 × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDo)
HQd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / ([VF or PEF] × 2,190 × RfC)

Table F-18
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	2.03E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	9.6E-02	9.6E-02	21.6%
1,2-Dichlorobenzene	1.29E-01	m	1.43E+04	V	NA	NA	NA	NA	–	9.8E-07	–	4.3E-05	4.4E-05	<0.1%
1,2-Dichloropropane	1.90E-02	m	3.52E+03	V	1.6E-10	–	1.8E-08	1.8E-08	<0.1%	NA	NA	1.3E-03	1.3E-03	0.3%
1,3,5-Trimethylbenzene	2.81E+00		1.15E+04	V	NA	NA	NA	NA	–	3.8E-05	–	3.9E-02	3.9E-02	8.8%
Benzene	4.04E+00		2.68E+03	V	9.5E-08	–	1.4E-05	1.4E-05	35.8%	6.9E-04	–	2.4E-02	2.5E-02	5.6%
Carbon Disulfide	4.50E-02	m	1.17E+03	V	NA	NA	NA	NA	–	3.1E-07	–	4.6E-05	4.6E-05	<0.1%
Chloroform	6.00E-02	m	2.61E+03	V	4.4E-10	–	4.0E-08	4.1E-08	0.1%	4.1E-06	–	7.4E-05	7.8E-05	<0.1%
Ethylbenzene	1.93E+00		5.29E+03	V	5.0E-09	–	3.0E-07	3.0E-07	0.8%	1.3E-05	–	1.7E-04	1.9E-04	<0.1%
Isopropy benzene	3.24E-01		1.65E+03	V	NA	NA	NA	NA	–	2.2E-06	–	4.7E-04	4.7E-04	0.1%
Methylene Chloride	4.70E-01	m	2.45E+03	V	1.5E-09	–	6.3E-08	6.5E-08	0.2%	5.4E-06	–	4.6E-04	4.7E-04	0.1%
Methyl-t-Butyl Ether (MTBE)	2.72E-03		4.07E+03	V	1.2E-12	–	5.7E-11	5.8E-11	<0.1%	NA	NA	8.0E-08	8.0E-08	<0.1%
n-Butylbenzene	1.78E+00		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.22E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	6.15E-01		5.16E+03	V	NA	NA	NA	NA	–	2.1E-07	–	1.6E-04	1.6E-04	<0.1%
p/m-Xylene	9.92E+00		3.79E+03	V	NA	NA	NA	NA	–	3.4E-05	–	2.5E-02	2.5E-02	5.7%
p-Isopropyltoluene	1.65E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.36E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	1.91E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.10E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	7.50E-03	m	2.50E+03	V	9.5E-10	–	5.8E-09	6.8E-09	<0.1%	5.1E-07	–	8.2E-05	8.3E-05	<0.1%
Toluene	9.43E-02		3.90E+03	V	NA	NA	NA	NA	–	8.1E-07	–	7.7E-05	7.8E-05	<0.1%
Xylenes, total	1.13E+01		4.39E+03	V	NA	NA	NA	NA	–	3.9E-05	–	3.5E-03	3.6E-03	0.8%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+00		1.63E+05	V	1.5E-08	–	NA	1.5E-08	<0.1%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.28E+00		1.13E+05	V	NA	NA	NA	NA	–	5.6E-04	–	NA	5.6E-04	0.1%
Acenaphthene	1.96E-01		2.12E+05	V	NA	NA	NA	NA	–	2.2E-06	2.3E-06	NA	4.6E-06	<0.1%
Acenaphthylene	1.11E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	4.80E-01		7.70E+05	V	NA	NA	NA	NA	–	1.1E-06	1.1E-06	NA	2.2E-06	<0.1%
Benzo(a)anthracene	4.77E-01		1.32E+09	P	1.3E-07	1.4E-07	1.3E-11	2.7E-07	0.7%	NA	NA	NA	NA	–
Benzo(a)pyrene	3.17E-01		1.32E+09	P	8.9E-07	9.3E-07	8.7E-11	1.8E-06	4.5%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.81E-01		1.32E+09	P	5.1E-08	5.3E-08	5.0E-12	1.0E-07	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.04E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	2.74E-01		1.32E+09	P	7.7E-08	8.0E-08	7.5E-12	1.6E-07	0.4%	NA	NA	NA	NA	–

Table F-18
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Chrysene	6.62E-01		1.32E+09	P	1.9E-08	1.9E-08	1.8E-12	3.8E-08	<0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	2.18E-02		1.32E+09	P	2.1E-08	2.2E-08	6.5E-12	4.3E-08	0.1%	NA	NA	NA	NA	–
Fluoranthene	1.04E+00		1.32E+09	P	NA	NA	NA	NA	–	1.8E-05	1.8E-05	NA	3.6E-05	<0.1%
Fluorene	2.34E-01		5.02E+05	V	NA	NA	NA	NA	–	4.0E-06	4.2E-06	NA	8.2E-06	<0.1%
Indeno(1,2,3-cd)pyrene	7.86E-02		1.32E+09	P	2.2E-08	2.3E-08	2.2E-12	4.5E-08	0.1%	NA	NA	NA	NA	–
Naphthalene	9.39E-01		5.49E+04	V	NA	NA	1.9E-07	1.9E-07	0.5%	3.2E-05	3.3E-05	1.8E-03	1.9E-03	0.4%
Phenanthrene	2.09E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	1.41E+00		1.32E+09	P	NA	NA	NA	NA	–	3.2E-05	3.3E-05	NA	6.5E-05	<0.1%
Pesticides and Herbicides														
Dieldrin	1.90E-02	m	1.32E+09	P	7.1E-08	5.7E-08	2.2E-11	1.3E-07	0.3%	2.6E-04	2.1E-04	NA	4.7E-04	0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	2.24E+00		1.32E+09	P	1.1E-06	1.2E-06	3.2E-10	2.2E-06	5.5%	7.7E-02	8.6E-02	NA	1.6E-01	36.5%
PCB-1260	7.50E-02	m	1.32E+09	P	3.5E-08	3.9E-08	1.1E-11	7.5E-08	0.2%	NA	NA	NA	NA	–
Inorganic Compounds														
Antimony	2.27E+00		1.32E+09	P	NA	NA	NA	NA	–	3.9E-03	–	NA	3.9E-03	0.9%
Arsenic	7.38E+00		1.32E+09	P	1.6E-05	3.9E-06	6.1E-09	2.0E-05	50.3%	1.7E-02	4.0E-03	3.6E-04	2.1E-02	4.8%
Barium	2.01E+02		1.32E+09	P	NA	NA	NA	NA	–	6.9E-04	–	2.9E-04	9.8E-04	0.2%
Beryllium	9.64E-01		1.32E+09	P	NA	NA	5.8E-10	5.8E-10	<0.1%	3.3E-04	–	1.0E-04	4.3E-04	<0.1%
Cadmium	7.03E-01		1.32E+09	P	NA	NA	7.4E-10	7.4E-10	<0.1%	4.8E-04	1.5E-04	2.6E-05	6.6E-04	0.1%
Chromium	5.63E+01		1.32E+09	P	NA	NA	NA	NA	–	2.6E-05	–	NA	2.6E-05	<0.1%
Chromium, Hexavalent	2.95E-01	m	1.32E+09	P	NA	NA	1.1E-08	1.1E-08	<0.1%	6.7E-05	–	1.1E-06	6.8E-05	<0.1%
Cobalt	1.65E+01		1.32E+09	P	NA	NA	3.7E-08	3.7E-08	<0.1%	3.8E-02	–	2.0E-03	4.0E-02	8.9%
Copper	1.45E+02		1.32E+09	P	NA	NA	NA	NA	–	2.5E-03	–	NA	2.5E-03	0.6%
Lead	9.38E+01		1.32E+09	P	NA	NA	2.8E-10	2.8E-10	<0.1%	NA	NA	NA	NA	–
Mercury	1.67E-01		1.32E+09	P	NA	NA	NA	NA	–	3.8E-04	–	4.0E-06	3.9E-04	<0.1%
Molybdenum	5.83E+00		1.32E+09	P	NA	NA	NA	NA	–	8.0E-04	–	NA	8.0E-04	0.2%
Nickel	2.16E+02		1.32E+09	P	NA	NA	1.4E-08	1.4E-08	<0.1%	7.4E-03	–	3.1E-03	1.1E-02	2.4%
Selenium	1.61E+00		1.32E+09	P	NA	NA	NA	NA	–	2.2E-04	–	5.8E-08	2.2E-04	<0.1%
Silver	2.49E+00	m	1.32E+09	P	NA	NA	NA	NA	–	3.4E-04	–	NA	3.4E-04	<0.1%
Vanadium	5.66E+01		1.32E+09	P	NA	NA	NA	NA	–	5.5E-03	–	NA	5.5E-03	1.2%

Table F-18
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard Index	Percent Total HI
			ELCRo	ELCRd	ELCRi	ELCR		HQo	HQd	HQi	HI	
Zinc	2.31E+02	1.32E+09 P	NA	NA	NA	NA	–	5.3E-04	–	NA	5.3E-04	0.1%
Total Risk or Hazard			Total ELCR			4E-05	100%	Total HI			0.4	100%
Total Risk or Hazard from Arsenic						2E-05					0.02	
Total Risk or Hazard without Arsenic						2E-05					0.4	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 350 × 24 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDo)
HQd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / ([VF or PEF] × 8,760 × RfC)

Table F-19
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)						
Benzo(a)anthracene	4.77E-01	1.32E+09 P	3.3E-12	<0.1%	NA	–
Benzo(a)pyrene	3.17E-01	1.32E+09 P	2.2E-11	0.1%	NA	–
Benzo(b)fluoranthene	1.81E-01	1.32E+09 P	1.2E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.04E-01	1.32E+09 P	NA	–	NA	–
Benzo(k)fluoranthene	2.74E-01	1.32E+09 P	1.9E-12	<0.1%	NA	–
Chrysene	6.62E-01	1.32E+09 P	4.5E-13	<0.1%	NA	–
Dibenzo(a,h)anthracene	2.18E-02	1.32E+09 P	1.6E-12	<0.1%	NA	–
Fluoranthene	1.04E+00	1.32E+09 P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	7.86E-02	1.32E+09 P	5.4E-13	<0.1%	NA	–
Pyrene	1.41E+00	1.32E+09 P	NA	–	NA	–
Pesticides and Herbicides						
Dieldrin	1.90E-02 m	1.32E+09 P	5.4E-12	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)						
PCB-1254	2.24E+00	1.32E+09 P	7.9E-11	0.5%	NA	–
PCB-1260	7.50E-02 m	1.32E+09 P	2.7E-12	<0.1%	NA	–
Inorganic Compounds						
Antimony	2.27E+00	1.32E+09 P	NA	–	NA	–
Arsenic	7.38E+00	1.32E+09 P	1.5E-09	8.7%	3.6E-04	6.0%
Barium	2.01E+02	1.32E+09 P	NA	–	2.9E-04	4.9%
Beryllium	9.64E-01	1.32E+09 P	1.4E-10	0.8%	1.0E-04	1.7%
Cadmium	7.03E-01	1.32E+09 P	1.8E-10	1.0%	2.6E-05	0.4%
Chromium	5.63E+01	1.32E+09 P	NA	–	NA	–
Chromium, Hexavalent	2.95E-01 m	1.32E+09 P	2.8E-09	15.7%	1.1E-06	<0.1%
Cobalt	1.65E+01	1.32E+09 P	9.2E-09	52.7%	2.0E-03	33.8%

Table F-19
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Copper	1.45E+02	1.32E+09 P	NA	–	NA	–
Lead	9.38E+01	1.32E+09 P	7.0E-11	0.4%	NA	–
Mercury	1.67E-01	1.32E+09 P	NA	–	4.0E-06	<0.1%
Molybdenum	5.83E+00	1.32E+09 P	NA	–	NA	–
Nickel	2.16E+02	1.32E+09 P	3.5E-09	19.9%	3.1E-03	53.0%
Selenium	1.61E+00	1.32E+09 P	NA	–	5.8E-08	<0.1%
Silver	2.49E+00 m	1.32E+09 P	NA	–	NA	–
Vanadium	5.66E+01	1.32E+09 P	NA	–	NA	–
Zinc	2.31E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	2E-08	Total HI	0.006	
Total Risk or Hazard from Arsenic			2E-09		0.0004	
Total Risk or Hazard without Arsenic			2E-08		0.006	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-20
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	4.77E-01		1.32E+09	P	1.3E-11	<0.1%	NA	–
Benzo(a)pyrene	3.17E-01		1.32E+09	P	8.7E-11	0.1%	NA	–
Benzo(b)fluoranthene	1.81E-01		1.32E+09	P	5.0E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.04E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	2.74E-01		1.32E+09	P	7.5E-12	<0.1%	NA	–
Chrysene	6.62E-01		1.32E+09	P	1.8E-12	<0.1%	NA	–
Dibenzo(a,h)anthracene	2.18E-02		1.32E+09	P	6.5E-12	<0.1%	NA	–
Fluoranthene	1.04E+00		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	7.86E-02		1.32E+09	P	2.2E-12	<0.1%	NA	–
Pyrene	1.41E+00		1.32E+09	P	NA	–	NA	–
Pesticides and Herbicides								
Dieldrin	1.90E-02	m	1.32E+09	P	2.2E-11	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	2.24E+00		1.32E+09	P	3.2E-10	0.5%	NA	–
PCB-1260	7.50E-02	m	1.32E+09	P	1.1E-11	<0.1%	NA	–
Inorganic Compounds								
Antimony	2.27E+00		1.32E+09	P	NA	–	NA	–
Arsenic	7.38E+00		1.32E+09	P	6.1E-09	8.7%	3.6E-04	6.0%
Barium	2.01E+02		1.32E+09	P	NA	–	2.9E-04	4.9%
Beryllium	9.64E-01		1.32E+09	P	5.8E-10	0.8%	1.0E-04	1.7%
Cadmium	7.03E-01		1.32E+09	P	7.4E-10	1.0%	2.6E-05	0.4%
Chromium	5.63E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	2.95E-01	m	1.32E+09	P	1.1E-08	15.7%	1.1E-06	<0.1%
Cobalt	1.65E+01		1.32E+09	P	3.7E-08	52.7%	2.0E-03	33.8%

Table F-20
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 2

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Copper	1.45E+02	1.32E+09 P	NA	–	NA	–
Lead	9.38E+01	1.32E+09 P	2.8E-10	0.4%	NA	–
Mercury	1.67E-01	1.32E+09 P	NA	–	4.0E-06	<0.1%
Molybdenum	5.83E+00	1.32E+09 P	NA	–	NA	–
Nickel	2.16E+02	1.32E+09 P	1.4E-08	19.9%	3.1E-03	53.0%
Selenium	1.61E+00	1.32E+09 P	NA	–	5.8E-08	<0.1%
Silver	2.49E+00 m	1.32E+09 P	NA	–	NA	–
Vanadium	5.66E+01	1.32E+09 P	NA	–	NA	–
Zinc	2.31E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	7E-08	Total HI	0.006	
Total Risk or Hazard from Arsenic			6E-09		0.0004	
Total Risk or Hazard without Arsenic			6E-08		0.006	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

Table F-21
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,1-Trichloroethane	3.80E-03	m	2.17E+03	V	NA	NA	NA	NA	–	9.3E-10	–	4.0E-07	4.0E-07	<0.1%
1,1,2-Trichloroethane	2.60E-03	m	6.36E+03	V	3.3E-11	–	5.3E-10	5.7E-10	<0.1%	3.2E-07	–	NA	3.2E-07	<0.1%
1,2,3-Trichloropropane	5.50E-01	m	1.14E+04	V	6.7E-07	–	NA	6.7E-07	2.6%	4.5E-05	–	NA	4.5E-05	<0.1%
1,2,4-Trichlorobenzene	1.70E-01	m	4.23E+04	V	1.1E-10	–	NA	1.1E-10	<0.1%	8.3E-06	–	2.3E-04	2.4E-04	0.1%
1,2,4-Trimethylbenzene	3.34E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	3.8E-03	3.8E-03	1.7%
1,2-Dichlorobenzene	2.90E+00	m	1.43E+04	V	NA	NA	NA	NA	–	1.6E-05	–	2.3E-04	2.5E-04	0.1%
1,2-Dichloropropane	2.20E-02	m	3.52E+03	V	1.4E-10	–	5.1E-09	5.2E-09	<0.1%	NA	NA	3.6E-04	3.6E-04	0 2%
1,3,5-Trimethylbenzene	6.09E-01		1.15E+04	V	NA	NA	NA	NA	–	6.0E-06	–	2.0E-03	2.0E-03	0 9%
1,4-Dichlorobenzene	4.00E-01	m	1.28E+04	V	3.8E-10	–	2.8E-08	2.9E-08	0.1%	NA	NA	9.0E-06	9.0E-06	<0.1%
Benzene	3.30E-01		2.68E+03	V	5.8E-09	–	2.9E-07	3.0E-07	1.2%	4.0E-05	–	4.7E-04	5.1E-04	0 2%
Bromodichloromethane	6.93E-03		8.10E+03	V	1.6E-10	–	2.6E-09	2.7E-09	<0.1%	1.7E-07	–	NA	1.7E-07	<0.1%
c-1,2-Dichloroethene	1.90E-03	m	2.85E+03	V	NA	NA	NA	NA	–	9.3E-08	–	NA	9.3E-08	<0.1%
Carbon Disulfide	1.15E-02		1.17E+03	V	NA	NA	NA	NA	–	5.6E-08	–	2.8E-06	2.9E-06	<0.1%
Chloroform	1.05E-02		2.61E+03	V	5.7E-11	–	1.7E-09	1.8E-09	<0.1%	5.1E-07	–	3.1E-06	3.6E-06	<0.1%
Ethylbenzene	1.26E+00		5.29E+03	V	2.4E-09	–	4.8E-08	5.1E-08	0.2%	6.2E-06	–	2.7E-05	3.3E-05	<0.1%
Isopropylbenzene	2.53E-01		1.65E+03	V	NA	NA	NA	NA	–	1.2E-06	–	8.8E-05	8.9E-05	<0.1%
Methylene Chloride	5.80E-01	m	2.45E+03	V	1.4E-09	–	1.9E-08	2.1E-08	<0.1%	4.7E-06	–	1.4E-04	1.4E-04	<0.1%
Methyl-t-Butyl E her (MTBE)	1.40E-02		4.07E+03	V	4.4E-12	–	7.3E-11	7.7E-11	<0.1%	NA	NA	9.8E-08	9.8E-08	<0.1%
n-Butylbenzene	4.06E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	4.09E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	2.14E+00		5.16E+03	V	NA	NA	NA	NA	–	5.2E-07	–	1.4E-04	1.4E-04	<0.1%
p/m-Xylene	4.67E+00		3.79E+03	V	NA	NA	NA	NA	–	1.1E-05	–	2.8E-03	2.8E-03	1 3%
p-Isopropyltoluene	7.43E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.29E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tert-Butyl Alcohol (TBA)	4.33E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	2.57E-02		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	2.00E-03	m	2.50E+03	V	1.9E-10	–	3.8E-10	5.7E-10	<0.1%	9.8E-08	–	5.2E-06	5.3E-06	<0.1%
Toluene	1.01E+00		3.90E+03	V	NA	NA	NA	NA	–	6.2E-06	–	2.0E-04	2.0E-04	<0.1%
Trichloroethene	2.60E-03	m	3.20E+03	V	5.9E-12	–	1.3E-10	1.4E-10	<0.1%	NA	NA	3.1E-07	3.1E-07	<0.1%
Vinyl Chloride	1.50E-03	m	1.02E+03	V	7.1E-11	–	9.4E-09	9.4E-09	<0.1%	2.4E-07	–	3.4E-06	3.6E-06	<0.1%
Xylenes, total	6.80E+00		4.39E+03	V	NA	NA	NA	NA	–	1.7E-05	–	5.0E-04	5.2E-04	0 2%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	1.93E+01		1.63E+05	V	9.8E-08	–	NA	9.8E-08	0.4%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.69E+01		1.13E+05	V	NA	NA	NA	NA	–	3.3E-03	–	NA	3.3E-03	1 5%
Acenaph hene	5.54E-01		2.12E+05	V	NA	NA	NA	NA	–	4.5E-06	7.8E-06	NA	1.2E-05	<0.1%
Acenaph hylene	4.21E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	3.83E-01		7.70E+05	V	NA	NA	NA	NA	–	6.3E-07	1.1E-06	NA	1.7E-06	<0.1%
Benzo(a)anthracene	4.18E-01		1.32E+09	P	8.8E-08	1.5E-07	2.8E-12	2.4E-07	0.9%	NA	NA	NA	NA	–
Benzo(a)pyrene	3.13E-01		1.32E+09	P	6.6E-07	1.1E-06	2.1E-11	1.8E-06	7.0%	NA	NA	NA	NA	–

Table F-21
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(b)fluoranthene	3.02E-01		1.32E+09	P	6.3E-08	1.1E-07	2.1E-12	1.7E-07	0.7%	NA	NA	NA	NA	–
Benzo(ghi)perylene	2.28E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	3.04E-01		1.32E+09	P	6.4E-08	1.1E-07	2.1E-12	1.7E-07	0.7%	NA	NA	NA	NA	–
Chrysene	5.38E-01		1.32E+09	P	1.1E-08	1.9E-08	3.7E-13	3.1E-08	0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	4.72E-01		1.32E+09	P	3.4E-07	5.8E-07	3.5E-11	9.2E-07	3.6%	NA	NA	NA	NA	–
Fluoranthene	5.65E-01		1.32E+09	P	NA	NA	NA	NA	–	6.9E-06	1.2E-05	NA	1.9E-05	<0.1%
Fluorene	2.07E+00		5.02E+05	V	NA	NA	NA	NA	–	2.5E-05	4.4E-05	NA	6.9E-05	<0.1%
Indeno(1,2,3-cd)pyrene	2.74E-01		1.32E+09	P	5.7E-08	9.9E-08	1.9E-12	1.6E-07	0.6%	NA	NA	NA	NA	–
Naphthalene	4.19E+00		5.49E+04	V	NA	NA	2.1E-07	2.1E-07	0.8%	1.0E-04	1.8E-04	1.9E-03	2.2E-03	1 0%
Phenanthrene	1.86E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	8.12E-01		1.32E+09	P	NA	NA	NA	NA	–	1.3E-05	2.3E-05	NA	3.6E-05	<0.1%
Pesticides and Herbicides														
4,4-DDE	1.30E-02	m	1.32E+09	P	7.7E-10	1.0E-09	7.8E-14	1.8E-09	<0.1%	NA	NA	NA	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	5.3E-07	7.1E-07	5.4E-11	1.2E-06	4.9%	2.9E-03	3.9E-03	NA	6.8E-03	3.1%
Chlordane	1.50E+00	m	1.32E+09	P	3.4E-07	1.8E-07	3.2E-11	5.2E-07	2.0%	1.5E-03	7.7E-04	3.7E-07	2.2E-03	1 0%
Dieldrin	2.50E-02	m	1.32E+09	P	7.0E-08	9.2E-08	7.1E-12	1.6E-07	0.6%	2.4E-04	3.2E-04	NA	5.7E-04	0 3%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	1.90E+00	m	1.32E+09	P	6.6E-07	1.2E-06	6.7E-11	1.9E-06	7.4%	4.6E-02	8.6E-02	NA	1.3E-01	60.7%
Inorganic Compounds														
Antimony	1.33E+00		1.32E+09	P	NA	NA	NA	NA	–	1.6E-03	–	NA	1.6E-03	0.7%
Arsenic	7.25E+00		1.32E+09	P	1.2E-05	4.7E-06	1.5E-09	1.7E-05	65.7%	1.2E-02	4.7E-03	8.4E-05	1.7E-02	7.6%
Barium	2.06E+02		1.32E+09	P	NA	NA	NA	NA	–	5.0E-04	–	7.1E-05	5.7E-04	0 3%
Beryllium	6.55E-01		1.32E+09	P	NA	NA	9.7E-11	9.7E-11	<0.1%	1.6E-04	–	1.6E-05	1.8E-04	<0.1%
Cadmium	7.87E-01		1.32E+09	P	NA	NA	2.0E-10	2.0E-10	<0.1%	3.9E-04	2.0E-04	6.8E-06	6.0E-04	0 3%
Chromium	1.70E+02		1.32E+09	P	NA	NA	NA	NA	–	5.5E-05	–	NA	5.5E-05	<0.1%
Chromium, Hexavalent	2.80E+00	m	1.32E+09	P	NA	NA	2.6E-08	2.6E-08	0.1%	4.6E-04	–	2.4E-06	4.6E-04	0 2%
Cobalt	1.27E+01		1.32E+09	P	NA	NA	7.0E-09	7.0E-09	<0.1%	2.1E-02	–	3.7E-04	2.1E-02	9.6%
Copper	1.39E+02		1.32E+09	P	NA	NA	NA	NA	–	1.7E-03	–	NA	1.7E-03	0 8%
Lead	6.87E+02		1.32E+09	P	NA	NA	5.1E-10	5.1E-10	<0.1%	NA	NA	NA	NA	–
Mercury	3.25E+00		1.32E+09	P	NA	NA	NA	NA	–	5.3E-03	–	1.9E-05	5.3E-03	2.4%
Molybdenum	5.82E+00		1.32E+09	P	NA	NA	NA	NA	–	5.7E-04	–	NA	5.7E-04	0 3%
Nickel	2.32E+01		1.32E+09	P	NA	NA	3.7E-10	3.7E-10	<0.1%	5.7E-04	–	8.0E-05	6.5E-04	0 3%
Selenium	9.55E-01		1.32E+09	P	NA	NA	NA	NA	–	9.3E-05	–	8.3E-09	9.3E-05	<0.1%
Silver	9.33E-01	m	1.32E+09	P	NA	NA	NA	NA	–	9.1E-05	–	NA	9.1E-05	<0.1%
Thallium	8.41E-01	m	1.32E+09	P	NA	NA	NA	NA	–	6.3E-03	–	NA	6.3E-03	2 9%
Vanadium	4.43E+01		1.32E+09	P	NA	NA	NA	NA	–	3.1E-03	–	NA	3.1E-03	1.4%
Zinc	2.21E+02		1.32E+09	P	NA	NA	NA	NA	–	3.6E-04	–	NA	3.6E-04	0 2%

Table F-21
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Total Risk or Hazard			Total ELCR			3E-05	100%	Total HI			0.2	100%
Total Risk or Hazard from Arsenic						2E-05					0.02	
Total Risk or Hazard without Arsenic						9E-06					0.2	

Notes:
[a] Minimum of he volatiliza ion factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of he HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-22
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	4.18E-01		1.32E+09	P	2.9E-12	<0.1%	NA	–
Benzo(a)pyrene	3.13E-01		1.32E+09	P	2.1E-11	<0.1%	NA	–
Benzo(b)fluoranthene	3.02E-01		1.32E+09	P	2.1E-12	<0.1%	NA	–
Benzo(ghi)perylene	2.28E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	3.04E-01		1.32E+09	P	2.1E-12	<0.1%	NA	–
Chrysene	5.38E-01		1.32E+09	P	3.7E-13	<0.1%	NA	–
Dibenzo(a,h)an hracene	4.72E-01		1.32E+09	P	3.5E-11	<0.1%	NA	–
Fluoranthene	5.65E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	2.74E-01		1.32E+09	P	1.9E-12	<0.1%	NA	–
Pyrene	8.12E-01		1.32E+09	P	NA	–	NA	–
Pesticides and Herbicides								
4,4-DDE	1.30E-02	m	1.32E+09	P	7.9E-14	<0.1%	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	5.5E-11	0.2%	NA	–
Chlordane	1 50E+00	m	1.32E+09	P	3.2E-11	<0.1%	1.6E-06	<0.1%
Dieldrin	2.50E-02	m	1.32E+09	P	7.2E-12	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	1 90E+00	m	1.32E+09	P	6.7E-11	0.2%	NA	–
Inorganic Compounds								
Antimony	1 33E+00		1.32E+09	P	NA	–	NA	–
Arsenic	7 25E+00		1.32E+09	P	1.5E-09	4.1%	3.5E-04	13.0%
Barium	2 06E+02		1.32E+09	P	NA	–	3.0E-04	11.0%
Beryllium	6.55E-01		1.32E+09	P	9.8E-11	0.3%	6.8E-05	2.5%
Cadmium	7.87E-01		1.32E+09	P	2.1E-10	0.6%	2.9E-05	1.1%
Chromium	1.70E+02		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	2 80E+00	m	1.32E+09	P	2.6E-08	72.3%	1.0E-05	0.4%

Table F-22
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation	Percent Total HI
			ELCRi		HQi	
Cobalt	1 27E+01	1.32E+09 P	7.1E-09	19.6%	1.5E-03	56.6%
Copper	1 39E+02	1.32E+09 P	NA	–	NA	–
Lead	6 87E+02	1.32E+09 P	5.1E-10	1.4%	NA	–
Mercury	3 25E+00	1.32E+09 P	NA	–	7.9E-05	2.9%
Molybdenum	5 82E+00	1.32E+09 P	NA	–	NA	–
Nickel	2 32E+01	1.32E+09 P	3.8E-10	1.0%	3.4E-04	12.5%
Selenium	9.55E-01	1.32E+09 P	NA	–	3.5E-08	<0.1%
Silver	9.33E-01 m	1.32E+09 P	NA	–	NA	–
Thallium	8.41E-01 m	1.32E+09 P	NA	–	NA	–
Vanadium	4.43E+01	1.32E+09 P	NA	–	NA	–
Zinc	2 21E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	4E-08	Total HI	0.003	
Total Risk or Hazard from Arsenic			1E-09		0 0004	
Total Risk or Hazard without Arsenic			3E-08		0.002	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on he Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-23
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	4.18E-01		1.32E+09	P	1.1E-11	<0.1%	NA	–
Benzo(a)pyrene	3.13E-01		1.32E+09	P	8.6E-11	<0.1%	NA	–
Benzo(b)fluoranthene	3.02E-01		1.32E+09	P	8.3E-12	<0.1%	NA	–
Benzo(ghi)perylene	2.28E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	3.04E-01		1.32E+09	P	8.3E-12	<0.1%	NA	–
Chrysene	5.38E-01		1.32E+09	P	1.5E-12	<0.1%	NA	–
Dibenzo(a,h)an hracene	4.72E-01		1.32E+09	P	1.4E-10	<0.1%	NA	–
Fluoranthene	5.65E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	2.74E-01		1.32E+09	P	7.5E-12	<0.1%	NA	–
Pyrene	8.12E-01		1.32E+09	P	NA	–	NA	–
Pesticides and Herbicides								
4,4-DDE	1.30E-02	m	1.32E+09	P	3.1E-13	<0.1%	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	2.2E-10	0.2%	NA	–
Chlordane	1 50E+00	m	1.32E+09	P	1.3E-10	<0.1%	1.6E-06	<0.1%
Dieldrin	2.50E-02	m	1.32E+09	P	2.9E-11	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	1 90E+00	m	1.32E+09	P	2.7E-10	0.2%	NA	–
Inorganic Compounds								
Antimony	1 33E+00		1.32E+09	P	NA	–	NA	–
Arsenic	7 25E+00		1.32E+09	P	6.0E-09	4.1%	3.5E-04	13.0%
Barium	2 06E+02		1.32E+09	P	NA	–	3.0E-04	11.0%
Beryllium	6.55E-01		1.32E+09	P	3.9E-10	0.3%	6.8E-05	2.5%
Cadmium	7.87E-01		1.32E+09	P	8.2E-10	0.6%	2.9E-05	1.1%
Chromium	1.70E+02		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	2 80E+00	m	1.32E+09	P	1.0E-07	72.3%	1.0E-05	0.4%

Table F-23
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Cobalt	1 27E+01	1.32E+09 P	2.8E-08	19.6%	1.5E-03	56.6%
Copper	1 39E+02	1.32E+09 P	NA	–	NA	–
Lead	6 87E+02	1.32E+09 P	2.1E-09	1.4%	NA	–
Mercury	3 25E+00	1.32E+09 P	NA	–	7.9E-05	2.9%
Molybdenum	5 82E+00	1.32E+09 P	NA	–	NA	–
Nickel	2 32E+01	1.32E+09 P	1.5E-09	1.0%	3.4E-04	12.5%
Selenium	9.55E-01	1.32E+09 P	NA	–	3.5E-08	<0.1%
Silver	9.33E-01 m	1.32E+09 P	NA	–	NA	–
Thallium	8.41E-01 m	1.32E+09 P	NA	–	NA	–
Vanadium	4.43E+01	1.32E+09 P	NA	–	NA	–
Zinc	2 21E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	1E-07	Total HI	0.003	
Total Risk or Hazard from Arsenic			6E-09		0 0004	
Total Risk or Hazard without Arsenic			1E-07		0.002	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on he Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

Table F-24
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,1-Trichloroethane	3.80E-03	m	2.17E+03	V	NA	NA	NA	NA	–	6.1E-09	–	4.0E-07	4.1E-07	<0.1%
1,1,2-Trichloroethane	2.60E-03	m	6.36E+03	V	8.6E-12	–	2.1E-11	3 0E-11	<0.1%	2.1E-07	–	NA	2.1E-07	<0.1%
1,2,3-Trichloropropane	5.50E-01	m	1.14E+04	V	1 8E-07	–	NA	1 8E-07	3.7%	3.0E-05	–	NA	3.0E-05	<0.1%
1,2,4-Trichlorobenzene	1.70E-01	m	4.23E+04	V	2 8E-11	–	NA	2 8E-11	<0.1%	5.5E-05	–	4.6E-07	5.5E-05	<0.1%
1,2,4-Trime hylbenzene	1.05E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	1.2E-02	1.2E-02	0.9%
1,2-Dichlorobenzene	2.90E+00	m	1.43E+04	V	NA	NA	NA	NA	–	1.0E-05	–	2.3E-05	3.4E-05	<0.1%
1,2-Dichloropropane	2.20E-02	m	3.52E+03	V	3.7E-11	–	2.0E-10	2.4E-10	<0.1%	NA	NA	1.1E-04	1.1E-04	<0.1%
1,3,5-Trime hylbenzene	1.60E+00		1.15E+04	V	NA	NA	NA	NA	–	1.0E-04	–	5.3E-03	5.4E-03	0.4%
1,4-Dichlorobenzene	4.00E-01	m	1.28E+04	V	1 0E-10	–	1.1E-09	1 2E-09	<0.1%	NA	NA	9.0E-06	9.0E-06	<0.1%
Benzene	6.62E-01		2.68E+03	V	3.1E-09	–	2.3E-08	2.6E-08	0.6%	1.8E-04	–	9.4E-04	1.1E-03	<0.1%
Bromodichloromethane	1.40E-01	m	8.10E+03	V	8.4E-10	–	2.1E-09	2 9E-09	<0.1%	2.3E-05	–	NA	2.3E-05	<0.1%
c-1,2-Dichloroethene	1.75E-02	m	2.85E+03	V	NA	NA	NA	NA	–	5.7E-07	–	NA	5.7E-07	<0.1%
Carbon Disulfide	3.26E-03		1.17E+03	V	NA	NA	NA	NA	–	1.1E-07	–	8.0E-07	9.0E-07	<0.1%
Chloroform	5.91E-03		2.61E+03	V	8 5E-12	–	3.9E-11	4 8E-11	<0.1%	1.9E-06	–	1.7E-06	3.6E-06	<0.1%
Ethylbenzene	2.52E+00		5.29E+03	V	1 3E-09	–	3.9E-09	5 2E-09	0.1%	8.1E-06	–	5.4E-05	6.2E-05	<0.1%
Iodomethane	5.00E-03	m	1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropylbenzene	9.90E-01		1.65E+03	V	NA	NA	NA	NA	–	8.0E-06	–	3.4E-04	3.5E-04	<0.1%
Methylene Chloride	5.80E-01	m	2.45E+03	V	3.7E-10	–	7.7E-10	1.1E-09	<0.1%	3.1E-05	–	1.4E-04	1.7E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	5.15E-03		4.07E+03	V	4 3E-13	–	1.1E-12	1 5E-12	<0.1%	NA	NA	3.6E-08	3.6E-08	<0.1%
n-Butylbenzene	4.53E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.75E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	3.48E+00		5.16E+03	V	NA	NA	NA	NA	–	5.6E-06	–	2.2E-04	2.3E-04	<0.1%
p/m-Xylene	7.96E+00		3.79E+03	V	NA	NA	NA	NA	–	1.3E-04	–	1.6E-03	1.7E-03	0.1%
p-Isopropyltoluene	4.15E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	5.65E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
t-1,2-Dichloroethene	2.00E-03	m	2.28E+03	V	NA	NA	NA	NA	–	3.2E-08	–	3.3E-06	3.4E-06	<0.1%
Tert-Butyl Alcohol (TBA)	4.14E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.22E-02		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	1.53E-01	m	2.50E+03	V	3 8E-09	–	1.2E-09	5 0E-09	0.1%	4.9E-06	–	4.0E-04	4.0E-04	<0.1%
Toluene	8.93E-01		3.90E+03	V	NA	NA	NA	NA	–	3.6E-06	–	1.7E-04	1.8E-04	<0.1%
Trichloroethene	5.63E-02	m	3.20E+03	V	3.4E-11	–	1.1E-10	1 5E-10	<0.1%	NA	NA	6.7E-06	6.7E-06	<0.1%
Vinyl Chloride	1.50E-03	m	1.02E+03	V	1 9E-11	–	3.7E-10	3 9E-10	<0.1%	1.6E-06	–	3.4E-06	5.0E-06	<0.1%
Xylenes, total	1.14E+01		4.39E+03	V	NA	NA	NA	NA	–	1.8E-04	–	8.4E-04	1.0E-03	<0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaph halene	1.92E+01		1.63E+05	V	2.6E-08	–	NA	2.6E-08	0.5%	NA	NA	NA	NA	–
2-Methylnaph halene	2.70E+01		1.13E+05	V	NA	NA	NA	NA	–	2.2E-02	–	NA	2.2E-02	1.6%
Acenaphthene	5.01E-01		2.12E+05	V	NA	NA	NA	NA	–	2.7E-06	1.2E-06	NA	3.9E-06	<0.1%
Acenaphthylene	1.50E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
An hracene	1.75E-01		7.70E+05	V	NA	NA	NA	NA	–	1.9E-07	8.6E-08	NA	2.7E-07	<0.1%

Table F-24
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)anthracene	2.33E-01		1.00E+06	P	1 3E-08	5.9E-09	8.3E-11	1 9E-08	0.4%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.73E-01		1.00E+06	P	9.6E-08	4.4E-08	6.2E-10	1.4E-07	2.9%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.51E-01		1.00E+06	P	8.4E-09	3.8E-09	5.4E-11	1 2E-08	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.34E-01		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	1.41E-01		1.00E+06	P	7 8E-09	3.6E-09	5.0E-11	1.1E-08	0.2%	NA	NA	NA	NA	–
Chrysene	3.67E-01		1.00E+06	P	2 0E-09	9.3E-10	1.3E-11	3 0E-09	<0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	4.10E-02		1.00E+06	P	7.7E-09	3.5E-09	1.6E-10	1.1E-08	0.2%	NA	NA	NA	NA	–
Fluoranthene	3.49E-01		1.00E+06	P	NA	NA	NA	NA	–	2.8E-06	1.3E-06	NA	4.1E-06	<0.1%
Fluorene	1.47E+00		5.02E+05	V	NA	NA	NA	NA	–	1.2E-05	5.4E-06	NA	1.7E-05	<0.1%
Indeno(1,2,3-cd)pyrene	1.08E-01		1.00E+06	P	6 0E-09	2.7E-09	3.9E-11	8.7E-09	0.2%	NA	NA	NA	NA	–
Naph halene	3.59E+00		5.49E+04	V	NA	NA	7.2E-09	7 2E-09	0.2%	5.8E-05	2.6E-05	1.7E-03	1.7E-03	0.1%
Phenanthrene	2.13E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	5.58E-01		1.00E+06	P	NA	NA	NA	NA	–	6.0E-06	2.7E-06	NA	8.8E-06	<0.1%
Pesticides and Herbicides														
4,4-DDE	1.30E-02	m	1.00E+06	P	2 0E-10	7.2E-11	4.1E-12	2 8E-10	<0.1%	NA	NA	NA	NA	–
Aldrin	1.80E-01	m	1.00E+06	P	1.4E-07	5.0E-08	2.9E-09	1 9E-07	4.1%	1.9E-02	6.8E-03	NA	2.6E-02	1.9%
Chlordane	1.50E+00	m	1.00E+06	P	9 0E-08	1.3E-08	1.7E-09	1 0E-07	2.2%	9.7E-03	1.4E-03	4.9E-05	1.1E-02	0.8%
Dieldrin	2.50E-02	m	1.00E+06	P	1 8E-08	6.5E-09	3.8E-10	2 5E-08	0.5%	1.6E-03	5.7E-04	NA	2.2E-03	0.2%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	1.90E+00	m	1.00E+06	P	1 8E-07	8.6E-08	3.5E-09	2.7E-07	5.6%	1.2E-01	6.0E-02	NA	1.8E-01	13.6%
PCB-1260	3.06E-01	m	1.00E+06	P	2 8E-08	1.4E-08	5.7E-10	4 3E-08	0.9%	NA	NA	NA	NA	–
Inorganic Compounds														
An imony	1.79E+00		1.00E+06	P	NA	NA	NA	NA	–	1.4E-02	–	NA	1.4E-02	1.1%
Arsenic	5.40E+00		1.00E+06	P	2.4E-06	2.5E-07	5.8E-08	2.7E-06	55.9%	5.8E-02	6.1E-03	8.2E-02	1.5E-01	10.8%
Barium	2.06E+02		1.00E+06	P	NA	NA	NA	NA	–	3.3E-03	–	9.4E-03	1.3E-02	0.9%
Beryllium	8.67E-01		1.00E+06	P	NA	NA	6.8E-09	6 8E-09	0.1%	5.6E-04	–	2.8E-02	2.9E-02	2.1%
Cadmium	4.53E-01		1.00E+06	P	NA	NA	6.2E-09	6 2E-09	0.1%	1.5E-03	2.1E-04	5.2E-03	6.8E-03	0.5%
Chromium	8.92E+01		1.00E+06	P	NA	NA	NA	NA	–	1.9E-04	–	NA	1.9E-04	<0.1%
Chromium, Hexavalent	1.12E+00		1.00E+06	P	NA	NA	5.5E-07	5 5E-07	11.5%	1.8E-04	–	1.3E-03	1.5E-03	0.1%
Cobalt	1.40E+01		1.00E+06	P	NA	NA	4.1E-07	4.1E-07	8.6%	1.5E-01	–	5.3E-01	6.8E-01	50.7%
Copper	7.51E+01		1.00E+06	P	NA	NA	NA	NA	–	6.1E-03	–	NA	6.1E-03	0.4%
Lead	4.52E+02		1.00E+06	P	NA	NA	1.8E-08	1 8E-08	0.4%	NA	NA	NA	NA	–
Mercury	2.03E+00		1.00E+06	P	NA	NA	NA	NA	–	2.2E-02	–	1.5E-02	3.7E-02	2.8%
Molybdenum	2.73E+00		1.00E+06	P	NA	NA	NA	NA	–	1.8E-03	–	NA	1.8E-03	0.1%
Nickel	2.36E+01		1.00E+06	P	NA	NA	2.0E-08	2 0E-08	0.4%	3.8E-03	–	1.1E-01	1.1E-01	8.2%
Selenium	9.93E-01		1.00E+06	P	NA	NA	NA	NA	–	6.4E-04	–	1.1E-05	6.5E-04	<0.1%
Silver	9.33E-01	m	1.00E+06	P	NA	NA	NA	NA	–	6.0E-04	–	NA	6.0E-04	<0.1%
Thallium	8.41E-01	m	1.00E+06	P	NA	NA	NA	NA	–	3.4E-03	–	NA	3.4E-03	0.3%
Vanadium	5.00E+01		1.00E+06	P	NA	NA	NA	NA	–	2.3E-02	–	NA	2.3E-02	1.7%
Zinc	1.66E+02		1.00E+06	P	NA	NA	NA	NA	–	1.8E-03	–	NA	1.8E-03	0.1%

Table F-24
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Total Risk or Hazard			Total ELCR			5E-06	100%	Total HI			1	100%
Total Risk or Hazard from Arsenic						3E-06					0.1	
Total Risk or Hazard without Arsenic						2E-06					1	

Notes:
[a] Minimum of the vola ilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentra ion in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 250 × 1 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 250 × 1 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 1 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 250 × 1) / (1,000,000 × 70 × 365 × RfDo)
HQd = (EPCs × 5,800 × 0 2 × ABSd × 250 × 1) / (1,000,000 × 70 × 365 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 1) / ([VF or PEF] × 365 × RfC)

Table F-25
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,1-Trichloroethane	3.80E-03	m	2.17E+03	V	NA	NA	NA	NA	–	4.9E-10	–	3.2E-08	3.2E-08	<0.1%
1,1,2-Trichloroethane	2.60E-03	m	6.36E+03	V	4 8E-12	–	1.2E-11	1.7E-11	<0.1%	1.7E-08	–	NA	1.7E-08	<0.1%
1,2,3-Trichloropropane	5.50E-01	m	1.14E+04	V	9 9E-08	–	NA	9 9E-08	3.7%	2.4E-06	–	NA	2.4E-06	<0.1%
1,2,4-Trichlorobenzene	1.70E-01	m	4.23E+04	V	1.6E-11	–	NA	1.6E-11	<0.1%	4.4E-06	–	3.7E-08	4.4E-06	<0.1%
1,2,4-Trime hylbenzene	1.05E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	9.4E-04	9.4E-04	0.9%
1,2-Dichlorobenzene	2.90E+00	m	1.43E+04	V	NA	NA	NA	NA	–	8.3E-07	–	1.8E-06	2.7E-06	<0.1%
1,2-Dichloropropane	2.20E-02	m	3.52E+03	V	2 0E-11	–	1.1E-10	1 3E-10	<0.1%	NA	NA	8.8E-06	8.8E-06	<0.1%
1,3,5-Trime hylbenzene	1.60E+00		1.15E+04	V	NA	NA	NA	NA	–	8.3E-06	–	4.2E-04	4.3E-04	0.4%
1,4-Dichlorobenzene	4.00E-01	m	1.28E+04	V	5.6E-11	–	6.3E-10	6 9E-10	<0.1%	NA	NA	7.2E-07	7.2E-07	<0.1%
Benzene	6.62E-01		2.68E+03	V	1.7E-09	–	1.3E-08	1 5E-08	0.6%	1.4E-05	–	7.5E-05	8.9E-05	<0.1%
Bromodichloromethane	1.40E-01	m	8.10E+03	V	4.7E-10	–	1.2E-09	1.6E-09	<0.1%	1.8E-06	–	NA	1.8E-06	<0.1%
c-1,2-Dichloroethene	1.75E-02	m	2.85E+03	V	NA	NA	NA	NA	–	4.5E-08	–	NA	4.5E-08	<0.1%
Carbon Disulfide	3.26E-03		1.17E+03	V	NA	NA	NA	NA	–	8.4E-09	–	6.4E-08	7.2E-08	<0.1%
Chloroform	5.91E-03		2.61E+03	V	4.7E-12	–	2.2E-11	2.7E-11	<0.1%	1.5E-07	–	1.4E-07	2.9E-07	<0.1%
Ethylbenzene	2.52E+00		5.29E+03	V	7 2E-10	–	2.2E-09	2 9E-09	0.1%	6.5E-07	–	4.3E-06	5.0E-06	<0.1%
Iodomethane	5.00E-03	m	1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropylbenzene	9.90E-01		1.65E+03	V	NA	NA	NA	NA	–	6.4E-07	–	2.7E-05	2.8E-05	<0.1%
Methylene Chloride	5.80E-01	m	2.45E+03	V	2.1E-10	–	4.3E-10	6.4E-10	<0.1%	2.5E-06	–	1.1E-05	1.3E-05	<0.1%
Methyl-t-Butyl Ether (MTBE)	5.15E-03		4.07E+03	V	2.4E-13	–	6.0E-13	8.4E-13	<0.1%	NA	NA	2.9E-09	2.9E-09	<0.1%
n-Butylbenzene	4.53E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.75E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	3.48E+00		5.16E+03	V	NA	NA	NA	NA	–	4.5E-07	–	1.8E-05	1.8E-05	<0.1%
p/m-Xylene	7.96E+00		3.79E+03	V	NA	NA	NA	NA	–	1.0E-05	–	1.3E-04	1.4E-04	0.1%
p-Isopropyltoluene	4.15E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	5.65E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
t-1,2-Dichloroethene	2.00E-03	m	2.28E+03	V	NA	NA	NA	NA	–	2.6E-09	–	2.7E-07	2.7E-07	<0.1%
Tert-Butyl Alcohol (TBA)	4.14E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.22E-02		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	1.53E-01	m	2.50E+03	V	2.1E-09	–	6.6E-10	2 8E-09	0.1%	3.9E-07	–	3.2E-05	3.2E-05	<0.1%
Toluene	8.93E-01		3.90E+03	V	NA	NA	NA	NA	–	2.9E-07	–	1.4E-05	1.4E-05	<0.1%
Trichloroethene	5.63E-02	m	3.20E+03	V	1 9E-11	–	6.4E-11	8 3E-11	<0.1%	NA	NA	5.4E-07	5.4E-07	<0.1%
Vinyl Chloride	1.50E-03	m	1.02E+03	V	1 0E-11	–	2.1E-10	2 2E-10	<0.1%	1.3E-07	–	2.7E-07	4.0E-07	<0.1%
Xylenes, total	1.14E+01		4.39E+03	V	NA	NA	NA	NA	–	1.5E-05	–	6.8E-05	8.2E-05	<0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaph halene	1.92E+01		1.63E+05	V	1.4E-08	–	NA	1.4E-08	0.5%	NA	NA	NA	NA	–
2-Methylnaph halene	2.70E+01		1.13E+05	V	NA	NA	NA	NA	–	1.7E-03	–	NA	1.7E-03	1.6%
Acenaphthene	5.01E-01		2.12E+05	V	NA	NA	NA	NA	–	2.2E-07	9.9E-08	NA	3.1E-07	<0.1%
Acenaphthylene	1.50E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
An hracene	1.75E-01		7.70E+05	V	NA	NA	NA	NA	–	1.5E-08	6.9E-09	NA	2.2E-08	<0.1%

Table F-25
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)anthracene	2.33E-01		1.00E+06	P	7 2E-09	3.3E-09	4.7E-11	1.1E-08	0.4%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.73E-01		1.00E+06	P	5.4E-08	2.4E-08	3.5E-10	7 8E-08	2.9%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.51E-01		1.00E+06	P	4.7E-09	2.1E-09	3.0E-11	6 9E-09	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.34E-01		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	1.41E-01		1.00E+06	P	4.4E-09	2.0E-09	2.8E-11	6.4E-09	0.2%	NA	NA	NA	NA	–
Chrysene	3.67E-01		1.00E+06	P	1.1E-09	5.2E-10	7.4E-12	1.7E-09	<0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	4.10E-02		1.00E+06	P	4 3E-09	2.0E-09	9.0E-11	6.4E-09	0.2%	NA	NA	NA	NA	–
Fluoranthene	3.49E-01		1.00E+06	P	NA	NA	NA	NA	–	2.3E-07	1.0E-07	NA	3.3E-07	<0.1%
Fluorene	1.47E+00		5.02E+05	V	NA	NA	NA	NA	–	9.5E-07	4.3E-07	NA	1.4E-06	<0.1%
Indeno(1,2,3-cd)pyrene	1.08E-01		1.00E+06	P	3 3E-09	1.5E-09	2.2E-11	4 9E-09	0.2%	NA	NA	NA	NA	–
Naph halene	3.59E+00		5.49E+04	V	NA	NA	4.1E-09	4.1E-09	0.2%	4.6E-06	2.1E-06	1.3E-04	1.4E-04	0.1%
Phenanthrene	2.13E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	5.58E-01		1.00E+06	P	NA	NA	NA	NA	–	4.8E-07	2.2E-07	NA	7.0E-07	<0.1%
Pesticides and Herbicides														
4,4-DDE	1.30E-02	m	1.00E+06	P	1.1E-10	4.0E-11	2.3E-12	1.6E-10	<0.1%	NA	NA	NA	NA	–
Aldrin	1.80E-01	m	1.00E+06	P	7 9E-08	2.8E-08	1.6E-09	1.1E-07	4.1%	1.5E-03	5.4E-04	NA	2.1E-03	1.9%
Chlordane	1.50E+00	m	1.00E+06	P	5 0E-08	7.1E-09	9.3E-10	5 8E-08	2.2%	7.7E-04	1.1E-04	3.9E-06	8.9E-04	0.8%
Dieldrin	2.50E-02	m	1.00E+06	P	1 0E-08	3.6E-09	2.1E-10	1.4E-08	0.5%	1.3E-04	4.5E-05	NA	1.7E-04	0.2%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	1.90E+00	m	1.00E+06	P	9 8E-08	4.8E-08	2.0E-09	1 5E-07	5.6%	9.8E-03	4.8E-03	NA	1.5E-02	13.6%
PCB-1260	3.06E-01	m	1.00E+06	P	1.6E-08	7.8E-09	3.2E-10	2.4E-08	0.9%	NA	NA	NA	NA	–
Inorganic Compounds														
An imony	1.79E+00		1.00E+06	P	NA	NA	NA	NA	–	1.2E-03	–	NA	1.2E-03	1.1%
Arsenic	5.40E+00		1.00E+06	P	1 3E-06	1.4E-07	3.3E-08	1 5E-06	55.9%	4.6E-03	4.9E-04	6.6E-03	1.2E-02	10.8%
Barium	2.06E+02		1.00E+06	P	NA	NA	NA	NA	–	2.7E-04	–	7.5E-04	1.0E-03	0.9%
Beryllium	8.67E-01		1.00E+06	P	NA	NA	3.8E-09	3 8E-09	0.1%	4.5E-05	–	2.3E-03	2.3E-03	2.1%
Cadmium	4.53E-01		1.00E+06	P	NA	NA	3.5E-09	3 5E-09	0.1%	1.2E-04	1.6E-05	4.1E-04	5.5E-04	0.5%
Chromium	8.92E+01		1.00E+06	P	NA	NA	NA	NA	–	1.5E-05	–	NA	1.5E-05	<0.1%
Chromium, Hexavalent	1.12E+00		1.00E+06	P	NA	NA	3.1E-07	3.1E-07	11.5%	1.4E-05	–	1.0E-04	1.2E-04	0.1%
Cobalt	1.40E+01		1.00E+06	P	NA	NA	2.3E-07	2 3E-07	8.6%	1.2E-02	–	4.3E-02	5.5E-02	50.7%
Copper	7.51E+01		1.00E+06	P	NA	NA	NA	NA	–	4.9E-04	–	NA	4.9E-04	0.4%
Lead	4.52E+02		1.00E+06	P	NA	NA	9.9E-09	9 9E-09	0.4%	NA	NA	NA	NA	–
Mercury	2.03E+00		1.00E+06	P	NA	NA	NA	NA	–	1.7E-03	–	1.2E-03	3.0E-03	2.8%
Molybdenum	2.73E+00		1.00E+06	P	NA	NA	NA	NA	–	1.4E-04	–	NA	1.4E-04	0.1%
Nickel	2.36E+01		1.00E+06	P	NA	NA	1.1E-08	1.1E-08	0.4%	3.0E-04	–	8.6E-03	8.9E-03	8.2%
Selenium	9.93E-01		1.00E+06	P	NA	NA	NA	NA	–	5.1E-05	–	9.1E-07	5.2E-05	<0.1%
Silver	9.33E-01	m	1.00E+06	P	NA	NA	NA	NA	–	4.8E-05	–	NA	4.8E-05	<0.1%
Thallium	8.41E-01	m	1.00E+06	P	NA	NA	NA	NA	–	2.7E-04	–	NA	2.7E-04	0.3%
Vanadium	5.00E+01		1.00E+06	P	NA	NA	NA	NA	–	1.8E-03	–	NA	1.8E-03	1.7%
Zinc	1.66E+02		1.00E+06	P	NA	NA	NA	NA	–	1.4E-04	–	NA	1.4E-04	0.1%

Table F-25
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Total Risk or Hazard			Total ELCR			3E-06	100%	Total HI			0.1	100%
Total Risk or Hazard from Arsenic						1E-06					0.01	
Total Risk or Hazard without Arsenic						1E-06					0.1	

Notes:
[a] Minimum of the vola ilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentra ion in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 20 × 7 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 20 × 7 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×20 × 7 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDo)
HQd = (EPCs × 5,800 × 0 2 × ABSd × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDa)
HQi = (EPCs × 8 × 0.042 × 20 × 7) / ([VF or PEF] × 2,555 × RfC)

Table F-26
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,1-Trichloroethane	3.80E-03	m	2.17E+03	V	NA	NA	NA	NA	–	9.3E-10	–	4.0E-07	4.0E-07	<0.1%
1,1,2-Trichloroethane	2.60E-03	m	6.36E+03	V	3.3E-11	–	5.3E-10	5.7E-10	<0.1%	3.2E-07	–	NA	3.2E-07	<0.1%
1,2,3-Trichloropropane	5.50E-01	m	1.14E+04	V	6.7E-07	–	NA	6.7E-07	3.4%	4.5E-05	–	NA	4.5E-05	<0.1%
1,2,4-Trichlorobenzene	1.70E-01	m	4.23E+04	V	1.1E-10	–	NA	1.1E-10	<0.1%	8.3E-06	–	2.3E-04	2.4E-04	0.1%
1,2,4-Trimethylbenzene	1.05E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	1.2E-02	1.2E-02	5.2%
1,2-Dichlorobenzene	2.90E+00	m	1.43E+04	V	NA	NA	NA	NA	–	1.6E-05	–	2.3E-04	2.5E-04	0.1%
1,2-Dichloropropane	2.20E-02	m	3.52E+03	V	1.4E-10	–	5.1E-09	5.2E-09	<0.1%	NA	NA	3.6E-04	3.6E-04	0.2%
1,3,5-Trimethylbenzene	1.60E+00		1.15E+04	V	NA	NA	NA	NA	–	1.6E-05	–	5.3E-03	5.3E-03	2.3%
1,4-Dichlorobenzene	4.00E-01	m	1.28E+04	V	3.8E-10	–	2.8E-08	2.9E-08	0.1%	NA	NA	9.0E-06	9.0E-06	<0.1%
Benzene	6.62E-01		2.68E+03	V	1.2E-08	–	5.8E-07	6.0E-07	3.0%	8.1E-05	–	9.4E-04	1.0E-03	0.4%
Bromodichloromethane	1.40E-01	m	8.10E+03	V	3.2E-09	–	5.2E-08	5.5E-08	0.3%	3.4E-06	–	NA	3.4E-06	<0.1%
c-1,2-Dichloroethene	1.75E-02	m	2.85E+03	V	NA	NA	NA	NA	–	8.6E-07	–	NA	8.6E-07	<0.1%
Carbon Disulfide	3.26E-03		1.17E+03	V	NA	NA	NA	NA	–	1.6E-08	–	8.0E-07	8.1E-07	<0.1%
Chloroform	5.91E-03		2.61E+03	V	3.2E-11	–	9.8E-10	1.0E-09	<0.1%	2.9E-07	–	1.7E-06	2.0E-06	<0.1%
Ethylbenzene	2.52E+00		5.29E+03	V	4.8E-09	–	9.7E-08	1.0E-07	0.5%	1.2E-05	–	5.4E-05	6.7E-05	<0.1%
Iodomethane	5.00E-03	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropylbenzene	9.90E-01		1.65E+03	V	NA	NA	NA	NA	–	4.8E-06	–	3.4E-04	3.5E-04	0.2%
Methylene Chloride	5.80E-01	m	2.45E+03	V	1.4E-09	–	1.9E-08	2.1E-08	0.1%	4.7E-06	–	1.4E-04	1.4E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	5.15E-03		4.07E+03	V	1.6E-12	–	2.7E-11	2.8E-11	<0.1%	NA	NA	3.6E-08	3.6E-08	<0.1%
n-Butylbenzene	4.53E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.75E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	3.48E+00		5.16E+03	V	NA	NA	NA	NA	–	8.5E-07	–	2.2E-04	2.2E-04	<0.1%
p/m-Xylene	7.96E+00		3.79E+03	V	NA	NA	NA	NA	–	1.9E-05	–	4.8E-03	4.8E-03	2.1%
p-Isopropyltoluene	4.15E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	5.65E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
t-1,2-Dichloroethene	2.00E-03	m	2.28E+03	V	NA	NA	NA	NA	–	4.9E-08	–	3.3E-06	3.4E-06	<0.1%
Tert-Butyl Alcohol (TBA)	4.14E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.22E-02		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	1.53E-01	m	2.50E+03	V	1.4E-08	–	2.9E-08	4.4E-08	0.2%	7.5E-06	–	4.0E-04	4.1E-04	0.2%
Toluene	8.93E-01		3.90E+03	V	NA	NA	NA	NA	–	5.5E-06	–	1.7E-04	1.8E-04	<0.1%
Trichloroethene	5.63E-02	m	3.20E+03	V	1.3E-10	–	2.9E-09	3.0E-09	<0.1%	NA	NA	6.7E-06	6.7E-06	<0.1%
Vinyl Chloride	1.50E-03	m	1.02E+03	V	7.1E-11	–	9.4E-09	9.4E-09	<0.1%	2.4E-07	–	3.4E-06	3.6E-06	<0.1%
Xylenes, total	1.14E+01		4.39E+03	V	NA	NA	NA	NA	–	2.8E-05	–	8.4E-04	8.7E-04	0.4%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	1.92E+01		1.63E+05	V	9.7E-08	–	NA	9.7E-08	0.5%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.70E+01		1.13E+05	V	NA	NA	NA	NA	–	3.3E-03	–	NA	3.3E-03	1.4%
Acenaphthene	5.01E-01		2.12E+05	V	NA	NA	NA	NA	–	4.1E-06	7.0E-06	NA	1.1E-05	<0.1%
Acenaphthylene	1.50E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.75E-01		7.70E+05	V	NA	NA	NA	NA	–	2.9E-07	4.9E-07	NA	7.8E-07	<0.1%

Table F-26
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)anthracene	2.33E-01		1.32E+09	P	4.9E-08	8.4E-08	1.6E-12	1.3E-07	0.7%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.73E-01		1.32E+09	P	3.6E-07	6.2E-07	1.2E-11	9.8E-07	5.0%	NA	NA	NA	NA	–
Benzo(b)fluoran hene	1.51E-01		1.32E+09	P	3.2E-08	5.4E-08	1.0E-12	8.6E-08	0.4%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.34E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	1.41E-01		1.32E+09	P	2.9E-08	5.1E-08	9.5E-13	8.0E-08	0.4%	NA	NA	NA	NA	–
Chrysene	3.67E-01		1.32E+09	P	7.7E-09	1.3E-08	2.5E-13	2.1E-08	0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	4.10E-02		1.32E+09	P	2.9E-08	5.0E-08	3.0E-12	8.0E-08	0.4%	NA	NA	NA	NA	–
Fluoranthene	3.49E-01		1.32E+09	P	NA	NA	NA	NA	–	4.3E-06	7.3E-06	NA	1.2E-05	<0.1%
Fluorene	1.47E+00		5.02E+05	V	NA	NA	NA	NA	–	1.8E-05	3.1E-05	NA	4.9E-05	<0.1%
Indeno(1,2,3-cd)pyrene	1.08E-01		1.32E+09	P	2.3E-08	3.9E-08	7.3E-13	6.2E-08	0.3%	NA	NA	NA	NA	–
Naphthalene	3.59E+00		5.49E+04	V	NA	NA	1.8E-07	1.8E-07	0.9%	8.8E-05	1.5E-04	1.7E-03	1.9E-03	0.8%
Phenanthrene	2.13E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	5.58E-01		1.32E+09	P	NA	NA	NA	NA	–	9.1E-06	1.6E-05	NA	2.5E-05	<0.1%
Pesticides and Herbicides														
4,4-DDE	1.30E-02	m	1.32E+09	P	7.7E-10	1.0E-09	7.8E-14	1.8E-09	<0.1%	NA	NA	NA	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	5.3E-07	7.1E-07	5.4E-11	1.2E-06	6.3%	2.9E-03	3.9E-03	NA	6.8E-03	3.0%
Chlordane	1.50E+00	m	1.32E+09	P	3.4E-07	1.8E-07	3.2E-11	5.2E-07	2.6%	1.5E-03	7.7E-04	3.7E-07	2.2E-03	1.0%
Dieldrin	2.50E-02	m	1.32E+09	P	7.0E-08	9.2E-08	7.1E-12	1.6E-07	0.8%	2.4E-04	3.2E-04	NA	5.7E-04	0.2%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	1.90E+00	m	1.32E+09	P	6.6E-07	1.2E-06	6.7E-11	1.9E-06	9.5%	4.6E-02	8.6E-02	NA	1.3E-01	58.1%
PCB-1260	3.06E-01	m	1.32E+09	P	1.1E-07	2.0E-07	1.1E-11	3.0E-07	1.5%	NA	NA	NA	NA	–
norganic Compounds														
Antimony	1.79E+00		1.32E+09	P	NA	NA	NA	NA	–	2.2E-03	–	NA	2.2E-03	1.0%
Arsenic	5.40E+00		1.32E+09	P	8.9E-06	3.5E-06	1.1E-09	1.2E-05	62.7%	8.8E-03	3.5E-03	6.2E-05	1.2E-02	5.4%
Barium	2.06E+02		1.32E+09	P	NA	NA	NA	NA	–	5.0E-04	–	7.1E-05	5.8E-04	0.3%
Beryllium	8.67E-01		1.32E+09	P	NA	NA	1.3E-10	1.3E-10	<0.1%	2.1E-04	–	2.1E-05	2.3E-04	0.1%
Cadmium	4.53E-01		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	2.2E-04	1.2E-04	3.9E-06	3.4E-04	0.2%
Chromium	8.92E+01		1.32E+09	P	NA	NA	NA	NA	–	2.9E-05	–	NA	2.9E-05	<0.1%
Chromium, Hexavalent	1.12E+00		1.32E+09	P	NA	NA	1.0E-08	1.0E-08	<0.1%	1.8E-04	–	9.7E-07	1.8E-04	<0.1%
Cobalt	1.40E+01		1.32E+09	P	NA	NA	7.8E-09	7.8E-09	<0.1%	2.3E-02	–	4.0E-04	2.3E-02	10.2%
Copper	7.51E+01		1.32E+09	P	NA	NA	NA	NA	–	9.2E-04	–	NA	9.2E-04	0.4%
Lead	4.52E+02		1.32E+09	P	NA	NA	3.4E-10	3.4E-10	<0.1%	NA	NA	NA	NA	–
Mercury	2.03E+00		1.32E+09	P	NA	NA	NA	NA	–	3.3E-03	–	1.2E-05	3.3E-03	1.5%
Molybdenum	2.73E+00		1.32E+09	P	NA	NA	NA	NA	–	2.7E-04	–	NA	2.7E-04	0.1%
Nickel	2.36E+01		1.32E+09	P	NA	NA	3.8E-10	3.8E-10	<0.1%	5.8E-04	–	8.1E-05	6.6E-04	0.3%
Selenium	9.93E-01		1.32E+09	P	NA	NA	NA	NA	–	9.7E-05	–	8.6E-09	9.7E-05	<0.1%
Silver	9.33E-01	m	1.32E+09	P	NA	NA	NA	NA	–	9.1E-05	–	NA	9.1E-05	<0.1%
Thallium	8.41E-01	m	1.32E+09	P	NA	NA	NA	NA	–	6.3E-03	–	NA	6.3E-03	2.8%
Vanadium	5.00E+01		1.32E+09	P	NA	NA	NA	NA	–	3.5E-03	–	NA	3.5E-03	1.5%
Zinc	1.66E+02		1.32E+09	P	NA	NA	NA	NA	–	2.7E-04	–	NA	2.7E-04	0.1%

Table F-26
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Total Risk or Hazard			Total ELCR			2E-05	100%	Total HI			0.2	100%
Total Risk or Hazard from Arsenic						1E-05					0.01	
Total Risk or Hazard without Arsenic						7E-06					0.2	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-27
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,1-Trichloroethane	3.80E-03	m	2.17E+03	V	NA	NA	NA	NA	–	1.2E-08	–	1.7E-06	1.7E-06	<0.1%
1,1,2-Trichloroethane	2.60E-03	m	6.36E+03	V	1.0E-10	–	5.4E-10	6.4E-10	<0.1%	4.2E-06	–	NA	4.2E-06	<0.1%
1,2,3-Trichloropropane	5.50E-01	m	1.14E+04	V	2.1E-06	–	NA	2.1E-06	4.4%	5.9E-04	–	NA	5.9E-04	<0.1%
1,2,4-Trichlorobenzene	1.70E-01	m	4.23E+04	V	3.4E-10	–	NA	3.4E-10	<0.1%	1.1E-04	–	9.6E-04	1.1E-03	<0.1%
1,2,4-Trimethylbenzene	1.05E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	4.9E-02	4.9E-02	2.5%
1,2-Dichlorobenzene	2.90E+00	m	1.43E+04	V	NA	NA	NA	NA	–	2.1E-04	–	9.7E-04	1.2E-03	<0.1%
1,2-Dichloropropane	2.20E-02	m	3.52E+03	V	4.3E-10	–	5.1E-09	5.6E-09	<0.1%	NA	NA	1.5E-03	1.5E-03	<0.1%
1,3,5-Trimethylbenzene	1.60E+00		1.15E+04	V	NA	NA	NA	NA	–	2.0E-04	–	2.2E-02	2.2E-02	1.1%
1,4-Dichlorobenzene	4.00E-01	m	1.28E+04	V	1.2E-09	–	2.8E-08	3.0E-08	<0.1%	NA	NA	3.8E-05	3.8E-05	<0.1%
Benzene	6.62E-01		2.68E+03	V	3.6E-08	–	5.9E-07	6.2E-07	1.3%	1.1E-03	–	3.9E-03	5.0E-03	0.2%
Bromodichloromethane	1.40E-01	m	8.10E+03	V	1.0E-08	–	5.3E-08	6.3E-08	0.1%	4.5E-05	–	NA	4.5E-05	<0.1%
c-1,2-Dichloroethene	1.75E-02	m	2.85E+03	V	NA	NA	NA	NA	–	1.1E-05	–	NA	1.1E-05	<0.1%
Carbon Disulfide	3.26E-03		1.17E+03	V	NA	NA	NA	NA	–	2.1E-07	–	3.3E-06	3.6E-06	<0.1%
Chloroform	5.91E-03		2.61E+03	V	1.0E-10	–	9.9E-10	1.1E-09	<0.1%	3.8E-06	–	7.2E-06	1.1E-05	<0.1%
Ethylbenzene	2.52E+00		5.29E+03	V	1.5E-08	–	9.8E-08	1.1E-07	0.2%	1.6E-04	–	2.3E-04	3.9E-04	<0.1%
Iodomethane	5.00E-03	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropylbenzene	9.90E-01		1.65E+03	V	NA	NA	NA	NA	–	6.3E-05	–	1.4E-03	1.5E-03	<0.1%
Methylene Chloride	5.80E-01	m	2.45E+03	V	4.4E-09	–	1.9E-08	2.4E-08	<0.1%	6.2E-05	–	5.7E-04	6.3E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	5.15E-03		4.07E+03	V	5.1E-12	–	2.7E-11	3.2E-11	<0.1%	NA	NA	1.5E-07	1.5E-07	<0.1%
n-Butylbenzene	4.53E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.75E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	3.48E+00		5.16E+03	V	NA	NA	NA	NA	–	1.1E-05	–	9.2E-04	9.4E-04	<0.1%
p/m-Xylene	7.96E+00		3.79E+03	V	NA	NA	NA	NA	–	2.5E-04	–	2.0E-02	2.0E-02	1.0%
p-Isopropyltoluene	4.15E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	5.65E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
t-1,2-Dichloroethene	2.00E-03	m	2.28E+03	V	NA	NA	NA	NA	–	6.4E-07	–	1.4E-05	1.5E-05	<0.1%
Tert-Butyl Alcohol (TBA)	4.14E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.22E-02		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	1.53E-01	m	2.50E+03	V	4.5E-08	–	3.0E-08	7.5E-08	0.2%	9.7E-05	–	1.7E-03	1.8E-03	<0.1%
Toluene	8.93E-01		3.90E+03	V	NA	NA	NA	NA	–	7.1E-05	–	7.3E-04	8.0E-04	<0.1%
Trichloroethene	5.63E-02	m	3.20E+03	V	4.0E-10	–	2.9E-09	3.3E-09	<0.1%	NA	NA	2.8E-05	2.8E-05	<0.1%
Vinyl Chloride	1.50E-03	m	1.02E+03	V	2.2E-10	–	9.4E-09	9.7E-09	<0.1%	3.2E-06	–	1.4E-05	1.7E-05	<0.1%
Xylenes, total	1.14E+01		4.39E+03	V	NA	NA	NA	NA	–	3.6E-04	–	3.5E-03	3.9E-03	0.2%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	1.92E+01		1.63E+05	V	3.0E-07	–	NA	3.0E-07	0.6%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.70E+01		1.13E+05	V	NA	NA	NA	NA	–	4.3E-02	–	NA	4.3E-02	2.1%
Acenaphthene	5.01E-01		2.12E+05	V	NA	NA	NA	NA	–	5.3E-05	3.9E-05	NA	9.2E-05	<0.1%
Acenaphthylene	1.50E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.75E-01		7.70E+05	V	NA	NA	NA	NA	–	3.7E-06	2.7E-06	NA	6.5E-06	<0.1%

Table F-27
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)anthracene	2.33E-01		1.32E+09	P	1.5E-07	1.1E-07	1.6E-12	2.6E-07	0.6%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.73E-01		1.32E+09	P	1.1E-06	8.3E-07	1.2E-11	2.0E-06	4.1%	NA	NA	NA	NA	–
Benzo(b)fluoran hene	1.51E-01		1.32E+09	P	9.9E-08	7.2E-08	1.0E-12	1.7E-07	0.4%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.34E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	1.41E-01		1.32E+09	P	9.2E-08	6.7E-08	9.6E-13	1.6E-07	0.3%	NA	NA	NA	NA	–
Chrysene	3.67E-01		1.32E+09	P	2.4E-08	1.8E-08	2.5E-13	4.2E-08	<0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	4.10E-02		1.32E+09	P	9.2E-08	6.7E-08	3.1E-12	1.6E-07	0.3%	NA	NA	NA	NA	–
Fluoranthene	3.49E-01		1.32E+09	P	NA	NA	NA	NA	–	5.6E-05	4.1E-05	NA	9.6E-05	<0.1%
Fluorene	1.47E+00		5.02E+05	V	NA	NA	NA	NA	–	2.4E-04	1.7E-04	NA	4.1E-04	<0.1%
Indeno(1,2,3-cd)pyrene	1.08E-01		1.32E+09	P	7.1E-08	5.2E-08	7.4E-13	1.2E-07	0.3%	NA	NA	NA	NA	–
Naphthalene	3.59E+00		5.49E+04	V	NA	NA	1.8E-07	1.8E-07	0.4%	1.1E-03	8.3E-04	7.0E-03	8.9E-03	0.4%
Phenanthrene	2.13E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	5.58E-01		1.32E+09	P	NA	NA	NA	NA	–	1.2E-04	8.7E-05	NA	2.1E-04	<0.1%
Pesticides and Herbicides														
4,4-DDE	1.30E-02	m	1.32E+09	P	2.4E-09	1.4E-09	7.9E-14	3.8E-09	<0.1%	NA	NA	NA	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	1.7E-06	9.4E-07	5.5E-11	2.6E-06	5.5%	3.8E-02	2.1E-02	NA	6.0E-02	3.0%
Chlordane	1.50E+00	m	1.32E+09	P	1.1E-06	2.4E-07	3.2E-11	1.3E-06	2.7%	1.9E-02	4.3E-03	1.6E-06	2.3E-02	1.2%
Dieldrin	2.50E-02	m	1.32E+09	P	2.2E-07	1.2E-07	7.2E-12	3.4E-07	0.7%	3.2E-03	1.8E-03	NA	5.0E-03	0.2%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	1.90E+00	m	1.32E+09	P	2.1E-06	1.6E-06	6.7E-11	3.7E-06	7.8%	6.1E-01	4.8E-01	NA	1.1E+00	53.7%
PCB-1260	3.06E-01	m	1.32E+09	P	3.4E-07	2.6E-07	1.1E-11	6.0E-07	1.3%	NA	NA	NA	NA	–
norganic Compounds														
Antimony	1.79E+00		1.32E+09	P	NA	NA	NA	NA	–	2.9E-02	–	NA	2.9E-02	1.4%
Arsenic	5.40E+00		1.32E+09	P	2.8E-05	4.7E-06	1.1E-09	3.3E-05	68.5%	1.2E-01	1.9E-02	2.6E-04	1.3E-01	6.7%
Barium	2.06E+02		1.32E+09	P	NA	NA	NA	NA	–	6.6E-03	–	3.0E-04	6.9E-03	0.3%
Beryllium	8.67E-01		1.32E+09	P	NA	NA	1.3E-10	1.3E-10	<0.1%	2.8E-03	–	9.0E-05	2.9E-03	0.1%
Cadmium	4.53E-01		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	2.9E-03	6.5E-04	1.6E-05	3.6E-03	0.2%
Chromium	8.92E+01		1.32E+09	P	NA	NA	NA	NA	–	3.8E-04	–	NA	3.8E-04	<0.1%
Chromium, Hexavalent	1.12E+00		1.32E+09	P	NA	NA	1.0E-08	1.0E-08	<0.1%	2.4E-03	–	4.1E-06	2.4E-03	0.1%
Cobalt	1.40E+01		1.32E+09	P	NA	NA	7.9E-09	7.9E-09	<0.1%	3.0E-01	–	1.7E-03	3.0E-01	14.9%
Copper	7.51E+01		1.32E+09	P	NA	NA	NA	NA	–	1.2E-02	–	NA	1.2E-02	0.6%
Lead	4.52E+02		1.32E+09	P	NA	NA	3.4E-10	3.4E-10	<0.1%	NA	NA	NA	NA	–
Mercury	2.03E+00		1.32E+09	P	NA	NA	NA	NA	–	4.3E-02	–	4.9E-05	4.3E-02	2.1%
Molybdenum	2.73E+00		1.32E+09	P	NA	NA	NA	NA	–	3.5E-03	–	NA	3.5E-03	0.2%
Nickel	2.36E+01		1.32E+09	P	NA	NA	3.8E-10	3.8E-10	<0.1%	7.5E-03	–	3.4E-04	7.9E-03	0.4%
Selenium	9.93E-01		1.32E+09	P	NA	NA	NA	NA	–	1.3E-03	–	3.6E-08	1.3E-03	<0.1%
Silver	9.33E-01	m	1.32E+09	P	NA	NA	NA	NA	–	1.2E-03	–	NA	1.2E-03	<0.1%
Thallium	8.41E-01	m	1.32E+09	P	NA	NA	NA	NA	–	8.3E-02	–	NA	8.3E-02	4.1%
Vanadium	5.00E+01		1.32E+09	P	NA	NA	NA	NA	–	4.6E-02	–	NA	4.6E-02	2.3%
Zinc	1.66E+02		1.32E+09	P	NA	NA	NA	NA	–	3.5E-03	–	NA	3.5E-03	0.2%

Table F-27
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Total Risk or Hazard			Total ELCR			5E-05	100%	Total HI **			2	100%
Total Risk or Hazard from Arsenic						3E-05					0.1	
Total Risk or Hazard without Arsenic						2E-05					2	

** HI Segregated by Target Site/Critical Effect:	HI (liver, kidney) =	0.2	HI (forestomach, gastrointestinal tract) =	0.01
CNS - Central nervous system	HI (CNS, whole body, immune system) =	0.07	HI (nasal, lung) =	0.009
NA - Not available	HI (blood) =	0.1	HI (eyes, nails, hair, skin) =	1
NR - None reported	HI (fetus, developmental) =	0 0002	HI (NA, NR) =	0.12

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 100 × 350 × 6 × CSFo) / (1,000,000 × 15 × 25,550)
ELCRd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6 × CSFa) / (1,000,000 × 15 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 100 × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDo)
HQd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / ([VF or PEF] × 2,190 × RfC)

Table F-28
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,1-Trichloroethane	3.80E-03	m	2.17E+03	V	NA	NA	NA	NA	–	1.3E-09	–	1.7E-06	1.7E-06	<0.1%
1,1,2-Trichloroethane	2.60E-03	m	6.36E+03	V	4.4E-11	–	2.2E-09	2.2E-09	<0.1%	4.5E-07	–	NA	4.5E-07	<0.1%
1,2,3-Trichloropropane	5.50E-01	m	1.14E+04	V	9.0E-07	–	NA	9.0E-07	3.5%	6.3E-05	–	NA	6.3E-05	<0.1%
1,2,4-Trichlorobenzene	1.70E-01	m	4.23E+04	V	1.4E-10	–	NA	1.4E-10	<0.1%	1.2E-05	–	9.6E-04	9.7E-04	0.3%
1,2,4-Trimethylbenzene	1.05E+01		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	4.9E-02	4.9E-02	14.3%
1,2-Dichlorobenzene	2.90E+00	m	1.43E+04	V	NA	NA	NA	NA	–	2.2E-05	–	9.7E-04	9.9E-04	0.3%
1,2-Dichloropropane	2.20E-02	m	3.52E+03	V	1.9E-10	–	2.1E-08	2.1E-08	<0.1%	NA	NA	1.5E-03	1.5E-03	0.4%
1,3,5-Trimethylbenzene	1.60E+00		1.15E+04	V	NA	NA	NA	NA	–	2.2E-05	–	2.2E-02	2.2E-02	6.4%
1,4-Dichlorobenzene	4.00E-01	m	1.28E+04	V	5.1E-10	–	1.1E-07	1.1E-07	0.4%	NA	NA	3.8E-05	3.8E-05	<0.1%
Benzene	6.62E-01		2.68E+03	V	1.6E-08	–	2.4E-06	2.4E-06	9.2%	1.1E-04	–	3.9E-03	4.1E-03	1.2%
Bromodichloromethane	1.40E-01	m	8.10E+03	V	4.3E-09	–	2.1E-07	2.1E-07	0.8%	4.8E-06	–	NA	4.8E-06	<0.1%
c-1,2-Dichloroethene	1.75E-02	m	2.85E+03	V	NA	NA	NA	NA	–	1.2E-06	–	NA	1.2E-06	<0.1%
Carbon Disulfide	3.26E-03		1.17E+03	V	NA	NA	NA	NA	–	2.2E-08	–	3.3E-06	3.4E-06	<0.1%
Chloroform	5.91E-03		2.61E+03	V	4.3E-11	–	3.9E-09	4.0E-09	<0.1%	4.0E-07	–	7.2E-06	7.6E-06	<0.1%
Ethylbenzene	2.52E+00		5.29E+03	V	6.5E-09	–	3.9E-07	4.0E-07	1.5%	1.7E-05	–	2.3E-04	2.5E-04	<0.1%
Iodomethane	5.00E-03	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropylbenzene	9.90E-01		1.65E+03	V	NA	NA	NA	NA	–	6.8E-06	–	1.4E-03	1.4E-03	0.4%
Methylene Chloride	5.80E-01	m	2.45E+03	V	1.9E-09	–	7.8E-08	8.0E-08	0.3%	6.6E-06	–	5.7E-04	5.7E-04	0.2%
Methyl-t-Butyl Ether (MTBE)	5.15E-03		4.07E+03	V	2.2E-12	–	1.1E-10	1.1E-10	<0.1%	NA	NA	1.5E-07	1.5E-07	<0.1%
n-Butylbenzene	4.53E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	1.75E+00		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	3.48E+00		5.16E+03	V	NA	NA	NA	NA	–	1.2E-06	–	9.2E-04	9.3E-04	0.3%
p/m-Xylene	7.96E+00		3.79E+03	V	NA	NA	NA	NA	–	2.7E-05	–	2.0E-02	2.0E-02	5.8%
p-Isopropyltoluene	4.15E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	5.65E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
t-1,2-Dichloroethene	2.00E-03	m	2.28E+03	V	NA	NA	NA	NA	–	6.8E-08	–	1.4E-05	1.4E-05	<0.1%
Tert-Butyl Alcohol (TBA)	4.14E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	1.22E-02		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	1.53E-01	m	2.50E+03	V	1.9E-08	–	1.2E-07	1.4E-07	0.5%	1.0E-05	–	1.7E-03	1.7E-03	0.5%
Toluene	8.93E-01		3.90E+03	V	NA	NA	NA	NA	–	7.6E-06	–	7.3E-04	7.4E-04	0.2%
Trichloroethene	5.63E-02	m	3.20E+03	V	1.7E-10	–	1.2E-08	1.2E-08	<0.1%	NA	NA	2.8E-05	2.8E-05	<0.1%
Vinyl Chloride	1.50E-03	m	1.02E+03	V	9.5E-11	–	3.8E-08	3.8E-08	0.1%	3.4E-07	–	1.4E-05	1.4E-05	<0.1%
Xylenes, total	1.14E+01		4.39E+03	V	NA	NA	NA	NA	–	3.9E-05	–	3.5E-03	3.6E-03	1.0%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	1.92E+01		1.63E+05	V	1.3E-07	–	NA	1.3E-07	0.5%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.70E+01		1.13E+05	V	NA	NA	NA	NA	–	4.6E-03	–	NA	4.6E-03	1.3%
Acenaphthene	5.01E-01		2.12E+05	V	NA	NA	NA	NA	–	5.7E-06	5.9E-06	NA	1.2E-05	<0.1%
Acenaphthylene	1.50E-01		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.75E-01		7.70E+05	V	NA	NA	NA	NA	–	4.0E-07	4.1E-07	NA	8.1E-07	<0.1%

Table F-28
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)anthracene	2.33E-01		1.32E+09	P	6.6E-08	6.8E-08	6.4E-12	1.3E-07	0.5%	NA	NA	NA	NA	–
Benzo(a)pyrene	1.73E-01		1.32E+09	P	4.9E-07	5.0E-07	4.7E-11	9.9E-07	3.8%	NA	NA	NA	NA	–
Benzo(b)fluoran hene	1.51E-01		1.32E+09	P	4.3E-08	4.4E-08	4.1E-12	8.7E-08	0.3%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.34E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	1.41E-01		1.32E+09	P	4.0E-08	4.1E-08	3.8E-12	8.1E-08	0.3%	NA	NA	NA	NA	–
Chrysene	3.67E-01		1.32E+09	P	1.0E-08	1.1E-08	1.0E-12	2.1E-08	<0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	4.10E-02		1.32E+09	P	3.9E-08	4.1E-08	1.2E-11	8.0E-08	0.3%	NA	NA	NA	NA	–
Fluoranthene	3.49E-01		1.32E+09	P	NA	NA	NA	NA	–	6.0E-06	6.2E-06	NA	1.2E-05	<0.1%
Fluorene	1.47E+00		5.02E+05	V	NA	NA	NA	NA	–	2.5E-05	2.6E-05	NA	5.1E-05	<0.1%
Indeno(1,2,3-cd)pyrene	1.08E-01		1.32E+09	P	3.0E-08	3.2E-08	3.0E-12	6.2E-08	0.2%	NA	NA	NA	NA	–
Naphthalene	3.59E+00		5.49E+04	V	NA	NA	7.3E-07	7.3E-07	2.8%	1.2E-04	1.3E-04	7.0E-03	7.2E-03	2.1%
Phenanthrene	2.13E+00		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	5.58E-01		1.32E+09	P	NA	NA	NA	NA	–	1.3E-05	1.3E-05	NA	2.6E-05	<0.1%
Pesticides and Herbicides														
4,4-DDE	1.30E-02	m	1.32E+09	P	1.0E-09	8.3E-10	3.1E-13	1.9E-09	<0.1%	NA	NA	NA	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	7.2E-07	5.7E-07	2.2E-10	1.3E-06	5.0%	4.1E-03	3.3E-03	NA	7.4E-03	2.1%
Chlordane	1.50E+00	m	1.32E+09	P	4.6E-07	1.5E-07	1.3E-10	6.0E-07	2.3%	2.1E-03	6.6E-04	1.6E-06	2.7E-03	0.8%
Dieldrin	2.50E-02	m	1.32E+09	P	9.4E-08	7.5E-08	2.9E-11	1.7E-07	0.7%	3.4E-04	2.7E-04	NA	6.2E-04	0.2%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	1.90E+00	m	1.32E+09	P	8.9E-07	1.0E-06	2.7E-10	1.9E-06	7.3%	6.5E-02	7.3E-02	NA	1.4E-01	39.9%
PCB-1260	3.06E-01	m	1.32E+09	P	1.4E-07	1.6E-07	4.3E-11	3.0E-07	1.2%	NA	NA	NA	NA	–
norganic Compounds														
Antimony	1.79E+00		1.32E+09	P	NA	NA	NA	NA	–	3.1E-03	–	NA	3.1E-03	0.9%
Arsenic	5.40E+00		1.32E+09	P	1.2E-05	2.9E-06	4.4E-09	1.5E-05	57.6%	1.2E-02	3.0E-03	2.6E-04	1.6E-02	4.5%
Barium	2.06E+02		1.32E+09	P	NA	NA	NA	NA	–	7.1E-04	–	3.0E-04	1.0E-03	0.3%
Beryllium	8.67E-01		1.32E+09	P	NA	NA	5.2E-10	5.2E-10	<0.1%	3.0E-04	–	9.0E-05	3.9E-04	0.1%
Cadmium	4.53E-01		1.32E+09	P	NA	NA	4.7E-10	4.7E-10	<0.1%	3.1E-04	9.9E-05	1.6E-05	4.3E-04	0.1%
Chromium	8.92E+01		1.32E+09	P	NA	NA	NA	NA	–	4.1E-05	–	NA	4.1E-05	<0.1%
Chromium, Hexavalent	1.12E+00		1.32E+09	P	NA	NA	4.2E-08	4.2E-08	0.2%	2.6E-04	–	4.1E-06	2.6E-04	<0.1%
Cobalt	1.40E+01		1.32E+09	P	NA	NA	3.1E-08	3.1E-08	0.1%	3.2E-02	–	1.7E-03	3.4E-02	9.8%
Copper	7.51E+01		1.32E+09	P	NA	NA	NA	NA	–	1.3E-03	–	NA	1.3E-03	0.4%
Lead	4.52E+02		1.32E+09	P	NA	NA	1.4E-09	1.4E-09	<0.1%	NA	NA	NA	NA	–
Mercury	2.03E+00		1.32E+09	P	NA	NA	NA	NA	–	4.6E-03	–	4.9E-05	4.7E-03	1.4%
Molybdenum	2.73E+00		1.32E+09	P	NA	NA	NA	NA	–	3.7E-04	–	NA	3.7E-04	0.1%
Nickel	2.36E+01		1.32E+09	P	NA	NA	1.5E-09	1.5E-09	<0.1%	8.1E-04	–	3.4E-04	1.1E-03	0.3%
Selenium	9.93E-01		1.32E+09	P	NA	NA	NA	NA	–	1.4E-04	–	3.6E-08	1.4E-04	<0.1%
Silver	9.33E-01	m	1.32E+09	P	NA	NA	NA	NA	–	1.3E-04	–	NA	1.3E-04	<0.1%
Thallium	8.41E-01	m	1.32E+09	P	NA	NA	NA	NA	–	8.9E-03	–	NA	8.9E-03	2.6%
Vanadium	5.00E+01		1.32E+09	P	NA	NA	NA	NA	–	4.9E-03	–	NA	4.9E-03	1.4%
Zinc	1.66E+02		1.32E+09	P	NA	NA	NA	NA	–	3.8E-04	–	NA	3.8E-04	0.1%

Table F-28
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK				Percent Total ELCR	NON-CANCER HAZARD INDEX				Percent Total HI
			Route-Specific Risk			Calculated Risk		Route-Specific Hazard Quotient			Calculated Hazard Index	
			Oral	Dermal	Inhalation			Oral	Dermal	Inhalation		
			ELCRo	ELCRd	ELCRi	ELCR		HQo	HQd	HQi	HI	
Total Risk or Hazard			Total ELCR			3E-05	100%	Total HI			0.3	100%
Total Risk or Hazard from Arsenic						1E-05					0.02	
Total Risk or Hazard without Arsenic						1E-05					0.3	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 350 × 24 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDo)
HQd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / ([VF or PEF] × 8,760 × RfC)

Table F-29
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	2.33E-01		1.32E+09	P	1.6E-12	<0.1%	NA	–
Benzo(a)pyrene	1.73E-01		1.32E+09	P	1.2E-11	<0.1%	NA	–
Benzo(b)fluoranthene	1.51E-01		1.32E+09	P	1.0E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.34E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	1.41E-01		1.32E+09	P	9.6E-13	<0.1%	NA	–
Chrysene	3.67E-01		1.32E+09	P	2.5E-13	<0.1%	NA	–
Dibenzo(a,h)an hracene	4.10E-02		1.32E+09	P	3.1E-12	<0.1%	NA	–
Fluoranthene	3.49E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	1.08E-01		1.32E+09	P	7.4E-13	<0.1%	NA	–
Pyrene	5.58E-01		1.32E+09	P	NA	–	NA	–
Pesticides and Herbicides								
4,4-DDE	1.30E-02	m	1.32E+09	P	7.9E-14	<0.1%	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	5.5E-11	0.3%	NA	–
Chlordane	1 50E+00	m	1.32E+09	P	3.2E-11	0.2%	1.6E-06	<0.1%
Dieldrin	2.50E-02	m	1.32E+09	P	7.2E-12	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	1 90E+00	m	1.32E+09	P	6.7E-11	0.3%	NA	–
PCB-1260	3.06E-01	m	1.32E+09	P	1.1E-11	<0.1%	NA	–
Inorganic Compounds								
Antimony	1.79E+00		1.32E+09	P	NA	–	NA	–
Arsenic	5.40E+00		1.32E+09	P	1.1E-09	5.4%	2.6E-04	9.5%
Barium	2 06E+02		1.32E+09	P	NA	–	3.0E-04	10.8%
Beryllium	8.67E-01		1.32E+09	P	1.3E-10	0.6%	9.0E-05	3.3%
Cadmium	4.53E-01		1.32E+09	P	1.2E-10	0.6%	1.6E-05	0.6%
Chromium	8 92E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	1.12E+00		1.32E+09	P	1.0E-08	50.8%	4.1E-06	0.1%
Cobalt	1.40E+01		1.32E+09	P	7.9E-09	38.2%	1.7E-03	61.5%
Copper	7 51E+01		1.32E+09	P	NA	–	NA	–
Lead	4 52E+02		1.32E+09	P	3.4E-10	1.6%	NA	–
Mercury	2 03E+00		1.32E+09	P	NA	–	4.9E-05	1.8%
Molybdenum	2.73E+00		1.32E+09	P	NA	–	NA	–
Nickel	2 36E+01		1.32E+09	P	3.8E-10	1.9%	3.4E-04	12.4%
Selenium	9.93E-01		1.32E+09	P	NA	–	3.6E-08	<0.1%
Silver	9.33E-01	m	1.32E+09	P	NA	–	NA	–
Thallium	8.41E-01	m	1.32E+09	P	NA	–	NA	–
Vanadium	5 00E+01		1.32E+09	P	NA	–	NA	–
Zinc	1.66E+02		1.32E+09	P	NA	–	NA	–
Total Risk or Hazard			Total ELCR		2E-08	Total HI	0.003	

Table F-29
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation	Percent Total HI
			ELCRi		HQi	
Total Risk or Hazard from Arsenic			1E-09		0 0003	
Total Risk or Hazard without Arsenic			2E-08		0.003	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on he Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-30
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	2.33E-01		1.32E+09	P	6.4E-12	<0.1%	NA	–
Benzo(a)pyrene	1.73E-01		1.32E+09	P	4.7E-11	<0.1%	NA	–
Benzo(b)fluoranthene	1.51E-01		1.32E+09	P	4.1E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.34E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	1.41E-01		1.32E+09	P	3.8E-12	<0.1%	NA	–
Chrysene	3.67E-01		1.32E+09	P	1.0E-12	<0.1%	NA	–
Dibenzo(a,h)an hracene	4.10E-02		1.32E+09	P	1.2E-11	<0.1%	NA	–
Fluoranthene	3.49E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	1.08E-01		1.32E+09	P	3.0E-12	<0.1%	NA	–
Pyrene	5.58E-01		1.32E+09	P	NA	–	NA	–
Pesticides and Herbicides								
4,4-DDE	1.30E-02	m	1.32E+09	P	3.1E-13	<0.1%	NA	–
Aldrin	1.80E-01	m	1.32E+09	P	2.2E-10	0.3%	NA	–
Chlordane	1 50E+00	m	1.32E+09	P	1.3E-10	0.2%	1.6E-06	<0.1%
Dieldrin	2.50E-02	m	1.32E+09	P	2.9E-11	<0.1%	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	1 90E+00	m	1.32E+09	P	2.7E-10	0.3%	NA	–
PCB-1260	3.06E-01	m	1.32E+09	P	4.3E-11	<0.1%	NA	–
Inorganic Compounds								
Antimony	1.79E+00		1.32E+09	P	NA	–	NA	–
Arsenic	5.40E+00		1.32E+09	P	4.4E-09	5.4%	2.6E-04	9.5%
Barium	2 06E+02		1.32E+09	P	NA	–	3.0E-04	10.8%
Beryllium	8.67E-01		1.32E+09	P	5.2E-10	0.6%	9.0E-05	3.3%
Cadmium	4.53E-01		1.32E+09	P	4.7E-10	0.6%	1.6E-05	0.6%
Chromium	8 92E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	1.12E+00		1.32E+09	P	4.2E-08	50.8%	4.1E-06	0.1%
Cobalt	1.40E+01		1.32E+09	P	3.1E-08	38.2%	1.7E-03	61.5%

Table F-30
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 3

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Copper	7 51E+01	1.32E+09 P	NA	–	NA	–
Lead	4 52E+02	1.32E+09 P	1.4E-09	1.6%	NA	–
Mercury	2 03E+00	1.32E+09 P	NA	–	4.9E-05	1.8%
Molybdenum	2.73E+00	1.32E+09 P	NA	–	NA	–
Nickel	2 36E+01	1.32E+09 P	1.5E-09	1.9%	3.4E-04	12.4%
Selenium	9.93E-01	1.32E+09 P	NA	–	3.6E-08	<0.1%
Silver	9.33E-01 m	1.32E+09 P	NA	–	NA	–
Thallium	8.41E-01 m	1.32E+09 P	NA	–	NA	–
Vanadium	5 00E+01	1.32E+09 P	NA	–	NA	–
Zinc	1.66E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	8E-08	Total HI	0.003	
Total Risk or Hazard from Arsenic			4E-09		0 0003	
Total Risk or Hazard without Arsenic			8E-08		0.003	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on he Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

Table F-31
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethy benzene	9.31E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	1.0E-02	1.0E-02	5.4%
1,2-Dichlorobenzene	7.40E-03	m	1.43E+04	V	NA	NA	NA	NA	–	4.0E-08	–	5.9E-07	6.3E-07	<0.1%
1,2-Dichloropropane	–		–		–	–	–	–	–	–	–	–	–	–
1,3,5-Trimethy benzene	2.10E+00	m	1.15E+04	V	NA	NA	NA	NA	–	2.1E-05	–	6.9E-03	7.0E-03	3.6%
1,4-Dichlorobenzene	5.20E-03	m	1.28E+04	V	4.9E-12	–	3.7E-10	3.7E-10	<0.1%	NA	NA	1.2E-07	1.2E-07	<0.1%
Benzene	5.84E-01		2.68E+03	V	1.0E-08	–	5.1E-07	5.3E-07	2.5%	7.1E-05	–	8.3E-04	9.0E-04	0.5%
Carbon Disulfide	1.90E-02	m	1.17E+03	V	NA	NA	NA	NA	–	9.3E-08	–	4.6E-06	4.7E-06	<0.1%
Chloroform	2.65E-01		2.61E+03	V	1.4E-09	–	4.4E-08	4.5E-08	0.2%	1.3E-05	–	7.7E-05	9.0E-05	<0.1%
Ethylbenzene	5.96E-01		5.29E+03	V	1.1E-09	–	2.3E-08	2.4E-08	0.1%	2.9E-06	–	1.3E-05	1.6E-05	<0.1%
Isopropylbenzene	1.74E-01		1.65E+03	V	NA	NA	NA	NA	–	8.5E-07	–	6.0E-05	6.1E-05	<0.1%
n-Buty benzene	4.97E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propy benzene	2.89E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	1.97E-01		5.16E+03	V	NA	NA	NA	NA	–	4.8E-08	–	1.2E-05	1.3E-05	<0.1%
p/m-Xylene	4.35E-01		3.79E+03	V	NA	NA	NA	NA	–	1.1E-06	–	2.6E-04	2.6E-04	0.1%
p-Isopropyltoluene	3.20E+00	m	8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Buty benzene	1.91E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Styrene	–		–		–	–	–	–	–	–	–	–	–	–
Tert-Butyl Alcohol (TBA)	8.20E-02	m	1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Buty benzene	2.80E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	4.00E-02	m	2.50E+03	V	3.8E-09	–	7.7E-09	1.1E-08	<0.1%	2.0E-06	–	1.0E-04	1.1E-04	<0.1%
Toluene	2.24E-01		3.90E+03	V	NA	NA	NA	NA	–	1.4E-06	–	4.4E-05	4.5E-05	<0.1%
Xylenes, total	6.27E-01		4.39E+03	V	NA	NA	NA	NA	–	1.5E-06	–	4.7E-05	4.8E-05	<0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.73E+01		1.63E+05	V	1.4E-07	–	NA	1.4E-07	0.7%	NA	NA	NA	NA	–
2-Methylnaphthalene	3.56E+01		1.13E+05	V	NA	NA	NA	NA	–	4.4E-03	–	NA	4.4E-03	2.3%
Acenaphthene	3.85E+00		2.12E+05	V	NA	NA	NA	NA	–	3.1E-05	5.4E-05	NA	8.5E-05	<0.1%
Acenaphthylene	3.80E-01	m	1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.52E-01		7.70E+05	V	NA	NA	NA	NA	–	2.5E-07	4.3E-07	NA	6.7E-07	<0.1%
Benzo(a)anthracene	1.69E-01		1.32E+09	P	3.5E-08	6.1E-08	1.1E-12	9.6E-08	0.5%	NA	NA	NA	NA	–
Benzo(a)pyrene	2.32E-01		1.32E+09	P	4.9E-07	8.3E-07	1.6E-11	1.3E-06	6.2%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	1.54E-01		1.32E+09	P	3.2E-08	5.5E-08	1.0E-12	8.8E-08	0.4%	NA	NA	NA	NA	–
Benzo(ghi)perylene	2.77E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	5.20E-01	m	1.32E+09	P	1.1E-07	1.9E-07	3.5E-12	3.0E-07	1.4%	NA	NA	NA	NA	–

Table F-31
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Chrysene	3.71E-01		1.32E+09	P	7.8E-09	1.3E-08	2.5E-13	2.1E-08	<0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	6.20E-01	m	1.32E+09	P	4.4E-07	7.6E-07	4.6E-11	1.2E-06	5.7%	NA	NA	NA	NA	–
Fluoranthene	4.01E-01		1.32E+09	P	NA	NA	NA	NA	–	4.9E-06	8.4E-06	NA	1.3E-05	<0.1%
Fluorene	4.24E+00		5.02E+05	V	NA	NA	NA	NA	–	5.2E-05	8.9E-05	NA	1.4E-04	<0.1%
Indeno(1,2,3-cd)pyrene	1.23E-01		1.32E+09	P	2.6E-08	4.4E-08	8.4E-13	7.0E-08	0.3%	NA	NA	NA	NA	–
Naphthalene	2.47E-01		5.49E+04	V	NA	NA	1.2E-08	1.2E-08	<0.1%	6.0E-06	1.0E-05	1.1E-04	1.3E-04	<0.1%
Phenanthrene	5.86E+01		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	5.54E+00		1.32E+09	P	NA	NA	NA	NA	–	9.0E-05	1.5E-04	NA	2.5E-04	0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	7.40E-01	m	1.32E+09	P	2.6E-07	4.8E-07	2.6E-11	7.4E-07	3.5%	1.8E-02	3.3E-02	NA	5.2E-02	26.7%
Inorganic Compounds														
Antimony	2.09E+00		1.32E+09	P	NA	NA	NA	NA	–	2.6E-03	–	NA	2.6E-03	1.3%
Arsenic	7.19E+00		1.32E+09	P	1.2E-05	4.7E-06	1.5E-09	1.7E-05	78.3%	1.2E-02	4.6E-03	8.3E-05	1.6E-02	8.5%
Barium	2.00E+02		1.32E+09	P	NA	NA	NA	NA	–	4.9E-04	–	6.9E-05	5.6E-04	0.3%
Beryllium	6.43E-01		1.32E+09	P	NA	NA	9.5E-11	9.5E-11	<0.1%	1.6E-04	–	1.6E-05	1.7E-04	<0.1%
Cadmium	7.40E-01		1.32E+09	P	NA	NA	1.9E-10	1.9E-10	<0.1%	3.6E-04	1.9E-04	6.4E-06	5.6E-04	0.3%
Chromium	6.60E-02		1.32E+09	P	NA	NA	NA	NA	–	2.2E-08	–	NA	2.2E-08	<0.1%
Cobalt	1.23E+01		1.32E+09	P	NA	NA	6.9E-09	6.9E-09	<0.1%	2.0E-02	–	3.6E-04	2.0E-02	10.6%
Copper	1.02E+02		1.32E+09	P	NA	NA	NA	NA	–	1.2E-03	–	NA	1.2E-03	0.6%
Lead	2.16E+02		1.32E+09	P	NA	NA	1.6E-10	1.6E-10	<0.1%	NA	NA	NA	NA	–
Mercury	2.63E+01		1.32E+09	P	NA	NA	NA	NA	–	4.3E-02	–	1.5E-04	4.3E-02	22.3%
Molybdenum	2.68E+00		1.32E+09	P	NA	NA	NA	NA	–	2.6E-04	–	NA	2.6E-04	0.1%
Nickel	2.24E+01		1.32E+09	P	NA	NA	3.6E-10	3.6E-10	<0.1%	5.5E-04	–	7.8E-05	6.3E-04	0.3%
Selenium	1.22E+00	m	1.32E+09	P	NA	NA	NA	NA	–	1.2E-04	–	1.1E-08	1.2E-04	<0.1%
Thallium	3.48E+00		1.32E+09	P	NA	NA	NA	NA	–	2.6E-02	–	NA	2.6E-02	13.6%
Vanadium	4.45E+01		1.32E+09	P	NA	NA	NA	NA	–	3.1E-03	–	NA	3.1E-03	1.6%
Zinc	1.30E+03		1.32E+09	P	NA	NA	NA	NA	–	2.1E-03	–	NA	2.1E-03	1.1%

Table F-31
Risk and Hazard Index Calculations for Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface Soil (0- to 2-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral (ELCRo)	Dermal (ELCRd)	Inhalation (ELCRi)	Calculated Risk (ELCR)	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral (HQo)	Dermal (HQd)	Inhalation (HQi)	Calculated Hazard Index (HI)	Percent Total HI
Total Risk or Hazard			Total ELCR			2E-05	100%	Total HI			0.2	100%
Total Risk or Hazard from Arsenic						2E-05					0.02	
Total Risk or Hazard without Arsenic						5E-06					0.2	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-32
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	1.69E-01		1.32E+09	P	1.2E-12	<0.1%	NA	–
Benzo(a)pyrene	2.32E-01		1.32E+09	P	1.6E-11	0.2%	NA	–
Benzo(b)fluoranthene	1.54E-01		1.32E+09	P	1.1E-12	<0.1%	NA	–
Benzo(ghi)perylene	2.77E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	5.20E-01	m	1.32E+09	P	3.6E-12	<0.1%	NA	–
Chrysene	3.71E-01		1.32E+09	P	2.5E-13	<0.1%	NA	–
Dibenzo(a,h)anthracene	6.20E-01	m	1.32E+09	P	4.6E-11	0.5%	NA	–
Fluoranthene	4.01E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	1.23E-01		1.32E+09	P	8.4E-13	<0.1%	NA	–
Pyrene	5.54E+00		1.32E+09	P	NA	–	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	7.40E-01	m	1.32E+09	P	2.6E-11	0.3%	NA	–
Inorganic Compounds								
Antimony	2.09E+00		1.32E+09	P	NA	–	NA	–
Arsenic	7.19E+00		1.32E+09	P	1.5E-09	15.9%	3.5E-04	10.9%
Barium	2.00E+02		1.32E+09	P	NA	–	2.9E-04	9.1%
Beryllium	6.43E-01		1.32E+09	P	9.6E-11	1.0%	6.7E-05	2.1%
Cadmium	7.40E-01		1.32E+09	P	1.9E-10	2.1%	2.7E-05	0.8%
Chromium	6.60E-02		1.32E+09	P	NA	–	NA	–
Cobalt	1.23E+01		1.32E+09	P	6.9E-09	74.3%	1.5E-03	46.9%
Copper	1.02E+02		1.32E+09	P	NA	–	NA	–
Lead	2.16E+02		1.32E+09	P	1.6E-10	1.7%	NA	–
Mercury	2.63E+01		1.32E+09	P	NA	–	6.4E-04	19.9%
Molybdenum	2.68E+00		1.32E+09	P	NA	–	NA	–

Table F-32
Risk and Hazard Index Calculations for Hypothetical Current Offsite Child Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Nickel	2.24E+01	1.32E+09 P	3.6E-10	3.9%	3.3E-04	10.2%
Selenium	1.22E+00 m	1.32E+09 P	NA	–	4.4E-08	<0.1%
Thallium	3.48E+00	1.32E+09 P	NA	–	NA	–
Vanadium	4.45E+01	1.32E+09 P	NA	–	NA	–
Zinc	1.30E+03	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	9E-09	Total HI	0.003	
Total Risk or Hazard from Arsenic			1E-09		0.0003	
Total Risk or Hazard without Arsenic			8E-09		0.003	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-33
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	1.69E-01		1.32E+09	P	4.6E-12	<0.1%	NA	–
Benzo(a)pyrene	2.32E-01		1.32E+09	P	6.4E-11	0.2%	NA	–
Benzo(b)fluoranthene	1.54E-01		1.32E+09	P	4.2E-12	<0.1%	NA	–
Benzo(ghi)perylene	2.77E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	5.20E-01	m	1.32E+09	P	1.4E-11	<0.1%	NA	–
Chrysene	3.71E-01		1.32E+09	P	1.0E-12	<0.1%	NA	–
Dibenzo(a,h)anthracene	6.20E-01	m	1.32E+09	P	1.9E-10	0.5%	NA	–
Fluoranthene	4.01E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	1.23E-01		1.32E+09	P	3.4E-12	<0.1%	NA	–
Pyrene	5.54E+00		1.32E+09	P	NA	–	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	7.40E-01	m	1.32E+09	P	1.1E-10	0.3%	NA	–
Inorganic Compounds								
Antimony	2.09E+00		1.32E+09	P	NA	–	NA	–
Arsenic	7.19E+00		1.32E+09	P	5.9E-09	15.9%	3.5E-04	10.9%
Barium	2.00E+02		1.32E+09	P	NA	–	2.9E-04	9.1%
Beryllium	6.43E-01		1.32E+09	P	3.8E-10	1.0%	6.7E-05	2.1%
Cadmium	7.40E-01		1.32E+09	P	7.7E-10	2.1%	2.7E-05	0.8%
Chromium	6.60E-02		1.32E+09	P	NA	–	NA	–
Cobalt	1.23E+01		1.32E+09	P	2.8E-08	74.3%	1.5E-03	46.9%
Copper	1.02E+02		1.32E+09	P	NA	–	NA	–
Lead	2.16E+02		1.32E+09	P	6.5E-10	1.7%	NA	–
Mercury	2.63E+01		1.32E+09	P	NA	–	6.4E-04	19.9%
Molybdenum	2.68E+00		1.32E+09	P	NA	–	NA	–

Table F-33
Risk and Hazard Index Calculations for Hypothetical Current Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Surface Soil (0- to 2-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Nickel	2.24E+01	1.32E+09 P	1.5E-09	3.9%	3.3E-04	10.2%
Selenium	1.22E+00 m	1.32E+09 P	NA	–	4.4E-08	<0.1%
Thallium	3.48E+00	1.32E+09 P	NA	–	NA	–
Vanadium	4.45E+01	1.32E+09 P	NA	–	NA	–
Zinc	1.30E+03	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	4E-08	Total HI	0.003	
Total Risk or Hazard from Arsenic			6E-09		0.0003	
Total Risk or Hazard without Arsenic			3E-08		0.003	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

Table F-34
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	7.33E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	8.2E-03	8.2E-03	0.6%
1,2-Dichlorobenzene	7.40E-03	m	1.43E+04	V	NA	NA	NA	NA	–	2.7E-08	–	5.9E-08	8.6E-08	<0.1%
1,2-Dichloropropane	2.00E+00	m	3.52E+03	V	3.3E-09	–	1.9E-08	2.2E-08	0.6%	NA	NA	1.0E-02	1.0E-02	0.7%
1,3,5-Trimethylbenzene	1.05E+00		1.15E+04	V	NA	NA	NA	NA	–	6.8E-05	–	3.5E-03	3.5E-03	0.3%
1,4-Dichlorobenzene	5.20E-03	m	1.28E+04	V	1.3E-12	–	1.5E-11	1.6E-11	<0.1%	NA	NA	1.2E-07	1.2E-07	<0.1%
2-Hexanone	1.63E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzene	1.14E+00		2.68E+03	V	5.3E-09	–	4.0E-08	4.5E-08	1.2%	3.1E-04	–	1.6E-03	1.9E-03	0.1%
Carbon Disulfide	1.90E-02	m	1.17E+03	V	NA	NA	NA	NA	–	6.1E-07	–	4.6E-06	5.3E-06	<0.1%
Chloroform	1.14E-01		2.61E+03	V	1.6E-10	–	7.6E-10	9.2E-10	<0.1%	3.7E-05	–	3.3E-05	7.0E-05	<0.1%
Ethylbenzene	1.16E+00		5.29E+03	V	5.9E-10	–	1.8E-09	2.4E-09	<0.1%	3.8E-06	–	2.5E-05	2.9E-05	<0.1%
Iodomethane	2.25E-03	m	1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.94E-01		1.65E+03	V	NA	NA	NA	NA	–	3.2E-06	–	1.4E-04	1.4E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.85E+00	m	4.07E+03	V	2.4E-10	–	5.9E-10	8.3E-10	<0.1%	NA	NA	2.0E-05	2.0E-05	<0.1%
n-Butylbenzene	3.65E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	4.95E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.33E-01		5.16E+03	V	NA	NA	NA	NA	–	1.2E-06	–	4.6E-05	4.7E-05	<0.1%
p/m-Xylene	8.96E+00		3.79E+03	V	NA	NA	NA	NA	–	1.4E-04	–	1.8E-03	1.9E-03	0.1%
p-Isopropyltoluene	3.74E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.33E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Styrene	2.50E-01	m	1.32E+04	V	NA	NA	NA	NA	–	4.0E-07	–	4.8E-06	5.2E-06	<0.1%
Tert-Butyl Alcohol (TBA)	2.09E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	2.80E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	4.00E-02	m	2.50E+03	V	1.0E-09	–	3.1E-10	1.3E-09	<0.1%	1.3E-06	–	1.0E-04	1.1E-04	<0.1%
Toluene	4.58E-01		3.90E+03	V	NA	NA	NA	NA	–	1.9E-06	–	8.9E-05	9.1E-05	<0.1%
Vinyl Acetate	9.80E-03	m	4.69E+03	V	NA	NA	NA	NA	–	3.2E-08	–	2.4E-06	2.4E-06	<0.1%
Xylenes, total	9.19E+00		4.39E+03	V	NA	NA	NA	NA	–	1.5E-04	–	6.8E-04	8.3E-04	<0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+01		1.63E+05	V	2.9E-08	–	NA	2.9E-08	0.8%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.93E+01		1.13E+05	V	NA	NA	NA	NA	–	2.4E-02	–	NA	2.4E-02	1.7%
Acenaphthene	3.97E+00		2.12E+05	V	NA	NA	NA	NA	–	2.1E-05	9.8E-06	NA	3.1E-05	<0.1%
Acenaphthylene	6.62E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.39E-01		7.70E+05	V	NA	NA	NA	NA	–	1.5E-07	6.9E-08	NA	2.2E-07	<0.1%
Benzo(a)anthracene	1.26E-01		1.00E+06	P	7.0E-09	3.2E-09	4.5E-11	1.0E-08	0.3%	NA	NA	NA	NA	–

Table F-34
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard Index	Percent Total HI
					ELCRo	ELCRd	ELCRi	ELCR		HQo	HQd	HQi	HI	
Benzo(a)pyrene	7.23E-02		1.00E+06	P	4.0E-08	1.8E-08	2.6E-10	5.9E-08	1.5%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	4.25E-02		1.00E+06	P	2.4E-09	1.1E-09	1.5E-11	3.4E-09	<0.1%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.10E-01		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	3.70E-02		1.00E+06	P	2.0E-09	9.4E-10	1.3E-11	3.0E-09	<0.1%	NA	NA	NA	NA	–
Chrysene	4.69E-01		1.00E+06	P	2.6E-09	1.2E-09	1.7E-11	3.8E-09	<0.1%	NA	NA	NA	NA	–
D benzo(a,h)anthracene	5.91E-02		1.00E+06	P	1.1E-08	5.1E-09	2.3E-10	1.7E-08	0.4%	NA	NA	NA	NA	–
Fluoranthene	1.56E-01		1.00E+06	P	NA	NA	NA	NA	–	1.3E-06	5.7E-07	NA	1.8E-06	<0.1%
Fluorene	4.70E+00		5.02E+05	V	NA	NA	NA	NA	–	3.8E-05	1.7E-05	NA	5.5E-05	<0.1%
Indeno(1,2,3-cd)pyrene	3.55E-02		1.00E+06	P	2.0E-09	9.0E-10	1.3E-11	2.9E-09	<0.1%	NA	NA	NA	NA	–
Naphthalene	1.80E+00		5.49E+04	V	NA	NA	3.6E-09	3.6E-09	<0.1%	2.9E-05	1.3E-05	8.3E-04	8.8E-04	<0.1%
Phenanthrene	1.60E+01		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	2.41E+00		1.00E+06	P	NA	NA	NA	NA	–	2.6E-05	1.2E-05	NA	3.8E-05	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	7.40E-01	m	1.00E+06	P	6.8E-08	3.4E-08	1.4E-09	1.0E-07	2.7%	4.8E-02	2.4E-02	NA	7.1E-02	5.1%
Inorganic Compounds														
Antimony	2.44E+00		1.00E+06	P	NA	NA	NA	NA	–	2.0E-02	–	NA	2.0E-02	1.4%
Arsenic	5.55E+00		1.00E+06	P	2.4E-06	2.6E-07	6.0E-08	2.7E-06	70.8%	6.0E-02	6.3E-03	8.4E-02	1.5E-01	10.7%
Barium	1.86E+02		1.00E+06	P	NA	NA	NA	NA	–	3.0E-03	–	8.5E-03	1.1E-02	0.8%
Beryllium	9.90E-01		1.00E+06	P	NA	NA	7.7E-09	7.7E-09	0.2%	6.4E-04	–	3.2E-02	3.3E-02	2.3%
Cadmium	4.71E-01		1.00E+06	P	NA	NA	6.5E-09	6.5E-09	0.2%	1.5E-03	2.1E-04	5.4E-03	7.1E-03	0.5%
Chromium	4.70E+01		1.00E+06	P	NA	NA	NA	NA	–	1.0E-04	–	NA	1.0E-04	<0.1%
Chromium, Hexavalent	7.40E-01	m	1.00E+06	P	NA	NA	3.6E-07	3.6E-07	9.4%	1.2E-04	–	8.4E-04	9.6E-04	<0.1%
Cobalt	1.43E+01		1.00E+06	P	NA	NA	4.2E-07	4.2E-07	10.9%	1.5E-01	–	5.4E-01	7.0E-01	49.6%
Copper	7.59E+01		1.00E+06	P	NA	NA	NA	NA	–	6.1E-03	–	NA	6.1E-03	0.4%
Lead	1.60E+02		1.00E+06	P	NA	NA	6.3E-09	6.3E-09	0.2%	NA	NA	NA	NA	–
Mercury	1.08E+01		1.00E+06	P	NA	NA	NA	NA	–	1.2E-01	–	8.2E-02	2.0E-01	14.0%
Molybdenum	1.73E+00		1.00E+06	P	NA	NA	NA	NA	–	1.1E-03	–	NA	1.1E-03	<0.1%
Nickel	2.37E+01		1.00E+06	P	NA	NA	2.0E-08	2.0E-08	0.5%	3.8E-03	–	1.1E-01	1.1E-01	8.0%
Selenium	2.14E+00	m	1.00E+06	P	NA	NA	NA	NA	–	1.4E-03	–	2.4E-05	1.4E-03	<0.1%
Thallium	3.32E+00		1.00E+06	P	NA	NA	NA	NA	–	1.3E-02	–	NA	1.3E-02	1.0%
Vanadium	5.42E+01		1.00E+06	P	NA	NA	NA	NA	–	2.5E-02	–	NA	2.5E-02	1.8%
Zinc	7.54E+02		1.00E+06	P	NA	NA	NA	NA	–	8.1E-03	–	NA	8.1E-03	0.6%

Table F-34
Risk and Hazard Index Calculations for Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Total Risk or Hazard			Total ELCR			4E-06	100%	Total HI			1	100%
Total Risk or Hazard from Arsenic						3E-06					0.2	
Total Risk or Hazard without Arsenic						1E-06					1	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 250 × 1 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 250 × 1 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 1 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 250 × 1) / (1,000,000 × 70 × 365 × RfDo)
HQd = (EPCs × 5,800 × 0.2 × ABSd × 250 × 1) / (1,000,000 × 70 × 365 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 1) / ([VF or PEF] × 365 × RfC)

Table F-35
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	7.33E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	6.6E-04	6.6E-04	0.6%
1,2-Dichlorobenzene	7.40E-03	m	1.43E+04	V	NA	NA	NA	NA	–	2.1E-09	–	4.7E-09	6.8E-09	<0.1%
1,2-Dichloropropane	2.00E+00	m	3.52E+03	V	1.9E-09	–	1.0E-08	1.2E-08	0.6%	NA	NA	8.0E-04	8.0E-04	0.7%
1,3,5-Trimethylbenzene	1.05E+00		1.15E+04	V	NA	NA	NA	NA	–	5.4E-06	–	2.8E-04	2.8E-04	0.3%
1,4-Dichlorobenzene	5.20E-03	m	1.28E+04	V	7.3E-13	–	8.2E-12	8.9E-12	<0.1%	NA	NA	9.3E-09	9.3E-09	<0.1%
2-Hexanone	1.63E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzene	1.14E+00		2.68E+03	V	2.9E-09	–	2.2E-08	2.5E-08	1.2%	2.5E-05	–	1.3E-04	1.5E-04	0.1%
Carbon Disulfide	1.90E-02	m	1.17E+03	V	NA	NA	NA	NA	–	4.9E-08	–	3.7E-07	4.2E-07	<0.1%
Chloroform	1.14E-01		2.61E+03	V	9.1E-11	–	4.2E-10	5.1E-10	<0.1%	2.9E-06	–	2.7E-06	5.6E-06	<0.1%
Ethylbenzene	1.16E+00		5.29E+03	V	3.3E-10	–	1.0E-09	1.3E-09	<0.1%	3.0E-07	–	2.0E-06	2.3E-06	<0.1%
Iodomethane	2.25E-03	m	1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.94E-01		1.65E+03	V	NA	NA	NA	NA	–	2.5E-07	–	1.1E-05	1.1E-05	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.85E+00	m	4.07E+03	V	1.3E-10	–	3.3E-10	4.7E-10	<0.1%	NA	NA	1.6E-06	1.6E-06	<0.1%
n-Butylbenzene	3.65E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	4.95E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.33E-01		5.16E+03	V	NA	NA	NA	NA	–	9.5E-08	–	3.7E-06	3.8E-06	<0.1%
p/m-Xylene	8.96E+00		3.79E+03	V	NA	NA	NA	NA	–	1.2E-05	–	1.4E-04	1.6E-04	0.1%
p-Isopropyltoluene	3.74E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.33E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Styrene	2.50E-01	m	1.32E+04	V	NA	NA	NA	NA	–	3.2E-08	–	3.9E-07	4.2E-07	<0.1%
Tert-Butyl Alcohol (TBA)	2.09E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	2.80E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	4.00E-02	m	2.50E+03	V	5.6E-10	–	1.7E-10	7.3E-10	<0.1%	1.0E-07	–	8.3E-06	8.4E-06	<0.1%
Toluene	4.58E-01		3.90E+03	V	NA	NA	NA	NA	–	1.5E-07	–	7.2E-06	7.3E-06	<0.1%
Vinyl Acetate	9.80E-03	m	4.69E+03	V	NA	NA	NA	NA	–	2.5E-09	–	1.9E-07	1.9E-07	<0.1%
Xylenes, total	9.19E+00		4.39E+03	V	NA	NA	NA	NA	–	1.2E-05	–	5.5E-05	6.6E-05	<0.1%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+01		1.63E+05	V	1.6E-08	–	NA	1.6E-08	0.8%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.93E+01		1.13E+05	V	NA	NA	NA	NA	–	1.9E-03	–	NA	1.9E-03	1.7%
Acenaphthene	3.97E+00		2.12E+05	V	NA	NA	NA	NA	–	1.7E-06	7.8E-07	NA	2.5E-06	<0.1%
Acenaphthylene	6.62E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.39E-01		7.70E+05	V	NA	NA	NA	NA	–	1.2E-08	5.5E-09	NA	1.7E-08	<0.1%
Benzo(a)anthracene	1.26E-01		1.00E+06	P	3.9E-09	1.8E-09	2.5E-11	5.7E-09	0.3%	NA	NA	NA	NA	–

Table F-35
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)pyrene	7.23E-02		1.00E+06	P	2.2E-08	1.0E-08	1.5E-10	3.3E-08	1.5%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	4.25E-02		1.00E+06	P	1.3E-09	6.0E-10	8.5E-12	1.9E-09	<0.1%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.10E-01		1.00E+06	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	3.70E-02		1.00E+06	P	1.1E-09	5.2E-10	7.4E-12	1.7E-09	<0.1%	NA	NA	NA	NA	–
Chrysene	4.69E-01		1.00E+06	P	1.5E-09	6.6E-10	9.4E-12	2.1E-09	<0.1%	NA	NA	NA	NA	–
D benzo(a,h)anthracene	5.91E-02		1.00E+06	P	6.3E-09	2.9E-09	1.3E-10	9.3E-09	0.4%	NA	NA	NA	NA	–
Fluoranthene	1.56E-01		1.00E+06	P	NA	NA	NA	NA	–	1.0E-07	4.6E-08	NA	1.5E-07	<0.1%
Fluorene	4.70E+00		5.02E+05	V	NA	NA	NA	NA	–	3.0E-06	1.4E-06	NA	4.4E-06	<0.1%
Indeno(1,2,3-cd)pyrene	3.55E-02		1.00E+06	P	1.1E-09	5.0E-10	7.1E-12	1.6E-09	<0.1%	NA	NA	NA	NA	–
Naphthalene	1.80E+00		5.49E+04	V	NA	NA	2.0E-09	2.0E-09	<0.1%	2.3E-06	1.1E-06	6.7E-05	7.0E-05	<0.1%
Phenanthrene	1.60E+01		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	2.41E+00		1.00E+06	P	NA	NA	NA	NA	–	2.1E-06	9.5E-07	NA	3.0E-06	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	7.40E-01	m	1.00E+06	P	3.8E-08	1.9E-08	7.7E-10	5.8E-08	2.7%	3.8E-03	1.9E-03	NA	5.7E-03	5.1%
Inorganic Compounds														
Antimony	2.44E+00		1.00E+06	P	NA	NA	NA	NA	–	1.6E-03	–	NA	1.6E-03	1.4%
Arsenic	5.55E+00		1.00E+06	P	1.4E-06	1.4E-07	3.3E-08	1.5E-06	70.8%	4.8E-03	5.0E-04	6.8E-03	1.2E-02	10.7%
Barium	1.86E+02		1.00E+06	P	NA	NA	NA	NA	–	2.4E-04	–	6.8E-04	9.2E-04	0.8%
Beryllium	9.90E-01		1.00E+06	P	NA	NA	4.3E-09	4.3E-09	0.2%	5.1E-05	–	2.6E-03	2.6E-03	2.3%
Cadmium	4.71E-01		1.00E+06	P	NA	NA	3.6E-09	3.6E-09	0.2%	1.2E-04	1.7E-05	4.3E-04	5.7E-04	0.5%
Chromium	4.70E+01		1.00E+06	P	NA	NA	NA	NA	–	8.1E-06	–	NA	8.1E-06	<0.1%
Chromium, Hexavalent	7.40E-01	m	1.00E+06	P	NA	NA	2.0E-07	2.0E-07	9.4%	9.6E-06	–	6.8E-05	7.7E-05	<0.1%
Cobalt	1.43E+01		1.00E+06	P	NA	NA	2.4E-07	2.4E-07	10.9%	1.2E-02	–	4.4E-02	5.6E-02	49.6%
Copper	7.59E+01		1.00E+06	P	NA	NA	NA	NA	–	4.9E-04	–	NA	4.9E-04	0.4%
Lead	1.60E+02		1.00E+06	P	NA	NA	3.5E-09	3.5E-09	0.2%	NA	NA	NA	NA	–
Mercury	1.08E+01		1.00E+06	P	NA	NA	NA	NA	–	9.3E-03	–	6.6E-03	1.6E-02	14.0%
Molybdenum	1.73E+00		1.00E+06	P	NA	NA	NA	NA	–	9.0E-05	–	NA	9.0E-05	<0.1%
Nickel	2.37E+01		1.00E+06	P	NA	NA	1.1E-08	1.1E-08	0.5%	3.1E-04	–	8.7E-03	9.0E-03	8.0%
Selenium	2.14E+00	m	1.00E+06	P	NA	NA	NA	NA	–	1.1E-04	–	2.0E-06	1.1E-04	<0.1%
Thallium	3.32E+00		1.00E+06	P	NA	NA	NA	NA	–	1.1E-03	–	NA	1.1E-03	1.0%
Vanadium	5.42E+01		1.00E+06	P	NA	NA	NA	NA	–	2.0E-03	–	NA	2.0E-03	1.8%
Zinc	7.54E+02		1.00E+06	P	NA	NA	NA	NA	–	6.5E-04	–	NA	6.5E-04	0.6%

Table F-35
Risk and Hazard Index Calculations for Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Utility/Trench Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral (ELCRo)	Dermal (ELCRd)	Inhalation (ELCRi)	Calculated Risk (ELCR)	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral (HQo)	Dermal (HQd)	Inhalation (HQi)	Calculated Hazard Index (HI)	Percent Total HI
Total Risk or Hazard			Total ELCR			2E-06	100%	Total HI			0.1	100%
Total Risk or Hazard from Arsenic						2E-06					0.01	
Total Risk or Hazard without Arsenic						6E-07					0.1	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 330 × 20 × 7 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,800 × 0.2 × ABSd × 20 × 7 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×20 × 7 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 330 × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDo)
HQd = (EPCs × 5,800 × 0.2 × ABSd × 20 × 7) / (1,000,000 × 70 × 2,555 × RfDa)
HQi = (EPCs × 8 × 0.042 × 20 × 7) / ([VF or PEF] × 2,555 × RfC)

Table F-36
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethy benzene	7.33E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	8.2E-03	8.2E-03	4.1%
1,2-Dichlorobenzene	7.40E-03	m	1.43E+04	V	NA	NA	NA	NA	–	4.0E-08	–	5.9E-07	6.3E-07	<0.1%
1,2-Dichloropropane	2.00E+00	m	3.52E+03	V	1.3E-08	–	4.6E-07	4.8E-07	3.0%	NA	NA	3.2E-02	3.2E-02	16.3%
1,3,5-Trimethy benzene	1.05E+00		1.15E+04	V	NA	NA	NA	NA	–	1.0E-05	–	3.5E-03	3.5E-03	1.7%
1,4-Dichlorobenzene	5.20E-03	m	1.28E+04	V	4.9E-12	–	3.7E-10	3.7E-10	<0.1%	NA	NA	1.2E-07	1.2E-07	<0.1%
2-Hexanone	1.63E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzene	1.14E+00		2.68E+03	V	2.0E-08	–	1.0E-06	1.0E-06	6.4%	1.4E-04	–	1.6E-03	1.8E-03	0.9%
Carbon Disulfide	1.90E-02	m	1.17E+03	V	NA	NA	NA	NA	–	9.3E-08	–	4.6E-06	4.7E-06	<0.1%
Chloroform	1.14E-01		2.61E+03	V	6.2E-10	–	1.9E-08	2.0E-08	0.1%	5.6E-06	–	3.3E-05	3.9E-05	<0.1%
Ethylbenzene	1.16E+00		5.29E+03	V	2.2E-09	–	4.5E-08	4.7E-08	0.3%	5.7E-06	–	2.5E-05	3.1E-05	<0.1%
Iodomethane	2.25E-03	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropylbenzene	3.94E-01		1.65E+03	V	NA	NA	NA	NA	–	1.9E-06	–	1.4E-04	1.4E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.85E+00	m	4.07E+03	V	9.0E-10	–	1.5E-08	1.6E-08	<0.1%	NA	NA	2.0E-05	2.0E-05	<0.1%
n-Buty benzene	3.65E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propy benzene	4.95E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.33E-01		5.16E+03	V	NA	NA	NA	NA	–	1.8E-07	–	4.6E-05	4.6E-05	<0.1%
p/m-Xylene	8.96E+00		3.79E+03	V	NA	NA	NA	NA	–	2.2E-05	–	5.4E-03	5.4E-03	2.7%
p-Isopropyltoluene	3.74E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Buty benzene	2.33E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Styrene	2.50E-01	m	1.32E+04	V	NA	NA	NA	NA	–	6.1E-07	–	4.8E-06	5.4E-06	<0.1%
Tert-Butyl Alcohol (TBA)	2.09E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Buty benzene	2.80E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	4.00E-02	m	2.50E+03	V	3.8E-09	–	7.7E-09	1.1E-08	<0.1%	2.0E-06	–	1.0E-04	1.1E-04	<0.1%
Toluene	4.58E-01		3.90E+03	V	NA	NA	NA	NA	–	2.8E-06	–	8.9E-05	9.2E-05	<0.1%
Vinyl Acetate	9.80E-03	m	4.69E+03	V	NA	NA	NA	NA	–	4.8E-09	–	2.4E-06	2.4E-06	<0.1%
Xylenes, total	9.19E+00		4.39E+03	V	NA	NA	NA	NA	–	2.2E-05	–	6.8E-04	7.0E-04	0.4%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+01		1.63E+05	V	1.1E-07	–	NA	1.1E-07	0.7%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.93E+01		1.13E+05	V	NA	NA	NA	NA	–	3.6E-03	–	NA	3.6E-03	1.8%
Acenaphthene	3.97E+00		2.12E+05	V	NA	NA	NA	NA	–	3.2E-05	5.5E-05	NA	8.8E-05	<0.1%
Acenaphthylene	6.62E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.39E-01		7.70E+05	V	NA	NA	NA	NA	–	2.3E-07	3.9E-07	NA	6.2E-07	<0.1%
Benzo(a)anthracene	1.26E-01		1.32E+09	P	2.6E-08	4.5E-08	8.5E-13	7.2E-08	0.4%	NA	NA	NA	NA	–

Table F-36
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)pyrene	7.23E-02		1.32E+09	P	1.5E-07	2.6E-07	4.9E-12	4.1E-07	2.6%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	4.25E-02		1.32E+09	P	8.9E-09	1.5E-08	2.9E-13	2.4E-08	0.2%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.10E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	3.70E-02		1.32E+09	P	7.8E-09	1.3E-08	2.5E-13	2.1E-08	0.1%	NA	NA	NA	NA	–
Chrysene	4.69E-01		1.32E+09	P	9.8E-09	1.7E-08	3.2E-13	2.7E-08	0.2%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	5.91E-02		1.32E+09	P	4.2E-08	7.3E-08	4.4E-12	1.2E-07	0.7%	NA	NA	NA	NA	–
Fluoranthene	1.56E-01		1.32E+09	P	NA	NA	NA	NA	–	1.9E-06	3.3E-06	NA	5.2E-06	<0.1%
Fluorene	4.70E+00		5.02E+05	V	NA	NA	NA	NA	–	5.7E-05	9.9E-05	NA	1.6E-04	<0.1%
Indeno(1,2,3-cd)pyrene	3.55E-02		1.32E+09	P	7.4E-09	1.3E-08	2.4E-13	2.0E-08	0.1%	NA	NA	NA	NA	–
Naphthalene	1.80E+00		5.49E+04	V	NA	NA	9.1E-08	9.1E-08	0.6%	4.4E-05	7.6E-05	8.3E-04	9.5E-04	0.5%
Phenanthrene	1.60E+01		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	2.41E+00		1.32E+09	P	NA	NA	NA	NA	–	3.9E-05	6.7E-05	NA	1.1E-04	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	7.40E-01	m	1.32E+09	P	2.6E-07	4.8E-07	2.6E-11	7.4E-07	4.6%	1.8E-02	3.3E-02	NA	5.2E-02	25.9%
Inorganic Compounds														
Antimony	2.44E+00		1.32E+09	P	NA	NA	NA	NA	–	3.0E-03	–	NA	3.0E-03	1.5%
Arsenic	5.55E+00		1.32E+09	P	9.2E-06	3.6E-06	1.1E-09	1.3E-05	79.8%	9.0E-03	3.6E-03	6.4E-05	1.3E-02	6.4%
Barium	1.86E+02		1.32E+09	P	NA	NA	NA	NA	–	4.5E-04	–	6.4E-05	5.2E-04	0.3%
Beryllium	9.90E-01		1.32E+09	P	NA	NA	1.5E-10	1.5E-10	<0.1%	2.4E-04	–	2.4E-05	2.7E-04	0.1%
Cadmium	4.71E-01		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	2.3E-04	1.2E-04	4.1E-06	3.6E-04	0.2%
Chromium	4.70E+01		1.32E+09	P	NA	NA	NA	NA	–	1.5E-05	–	NA	1.5E-05	<0.1%
Chromium, Hexavalent	7.40E-01	m	1.32E+09	P	NA	NA	6.9E-09	6.9E-09	<0.1%	1.2E-04	–	6.4E-07	1.2E-04	<0.1%
Cobalt	1.43E+01		1.32E+09	P	NA	NA	8.0E-09	8.0E-09	<0.1%	2.3E-02	–	4.1E-04	2.4E-02	11.9%
Copper	7.59E+01		1.32E+09	P	NA	NA	NA	NA	–	9.3E-04	–	NA	9.3E-04	0.5%
Lead	1.60E+02		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	NA	NA	NA	NA	–
Mercury	1.08E+01		1.32E+09	P	NA	NA	NA	NA	–	1.8E-02	–	6.2E-05	1.8E-02	8.8%
Molybdenum	1.73E+00		1.32E+09	P	NA	NA	NA	NA	–	1.7E-04	–	NA	1.7E-04	<0.1%
Nickel	2.37E+01		1.32E+09	P	NA	NA	3.8E-10	3.8E-10	<0.1%	5.8E-04	–	8.2E-05	6.6E-04	0.3%
Selenium	2.14E+00	m	1.32E+09	P	NA	NA	NA	NA	–	2.1E-04	–	1.9E-08	2.1E-04	0.1%
Thallium	3.32E+00		1.32E+09	P	NA	NA	NA	NA	–	2.5E-02	–	NA	2.5E-02	12.5%
Vanadium	5.42E+01		1.32E+09	P	NA	NA	NA	NA	–	3.8E-03	–	NA	3.8E-03	1.9%
Zinc	7.54E+02		1.32E+09	P	NA	NA	NA	NA	–	1.2E-03	–	NA	1.2E-03	0.6%

Table F-36
Risk and Hazard Index Calculations for Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Total Risk or Hazard			Total ELCR			2E-05	100%	Total HI			0.2	100%
Total Risk or Hazard from Arsenic						1E-05					0.01	
Total Risk or Hazard without Arsenic						3E-06					0.2	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 250 × 25 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 8 × 0.042 ×250 × 25 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDo)
HQd = (EPCs × 3,300 × 0.2 × ABSd × 250 × 25) / (1,000,000 × 70 × 9,125 × RfDa)
HQi = (EPCs × 8 × 0.042 × 250 × 25) / ([VF or PEF] × 9,125 × RfC)

Table F-37
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	7.33E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	3.5E-02	3.5E-02	1.9%
1,2-Dichlorobenzene	7.40E-03	m	1.43E+04	V	NA	NA	NA	NA	–	5.3E-07	–	2.5E-06	3.0E-06	<0.1%
1,2-Dichloropropane	2.00E+00	m	3.52E+03	V	3.9E-08	–	4.7E-07	5.1E-07	1.3%	NA	NA	1.4E-01	1.4E-01	7.4%
1,3,5-Trimethylbenzene	1.05E+00		1.15E+04	V	NA	NA	NA	NA	–	1.3E-04	–	1.5E-02	1.5E-02	0.8%
1,4-Dichlorobenzene	5.20E-03	m	1.28E+04	V	1.5E-11	–	3.7E-10	3.8E-10	<0.1%	NA	NA	4.9E-07	4.9E-07	<0.1%
2-Hexanone	1.63E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzene	1.14E+00		2.68E+03	V	6.2E-08	–	1.0E-06	1.1E-06	2.8%	1.8E-03	–	6.8E-03	8.6E-03	0.5%
Carbon Disulfide	1.90E-02	m	1.17E+03	V	NA	NA	NA	NA	–	1.2E-06	–	1.9E-05	2.1E-05	<0.1%
Chloroform	1.14E-01		2.61E+03	V	1.9E-09	–	1.9E-08	2.1E-08	<0.1%	7.3E-05	–	1.4E-04	2.1E-04	<0.1%
Ethylbenzene	1.16E+00		5.29E+03	V	7.0E-09	–	4.5E-08	5.2E-08	0.1%	7.4E-05	–	1.1E-04	1.8E-04	<0.1%
Iodomethane	2.25E-03	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.94E-01		1.65E+03	V	NA	NA	NA	NA	–	2.5E-05	–	5.7E-04	6.0E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.85E+00	m	4.07E+03	V	2.8E-09	–	1.5E-08	1.8E-08	<0.1%	NA	NA	8.4E-05	8.4E-05	<0.1%
n-Butylbenzene	3.65E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	4.95E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.33E-01		5.16E+03	V	NA	NA	NA	NA	–	2.3E-06	–	1.9E-04	2.0E-04	<0.1%
p/m-Xylene	8.96E+00		3.79E+03	V	NA	NA	NA	NA	–	2.9E-04	–	2.3E-02	2.3E-02	1.2%
p-Isopropyltoluene	3.74E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.33E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Styrene	2.50E-01	m	1.32E+04	V	NA	NA	NA	NA	–	8.0E-06	–	2.0E-05	2.8E-05	<0.1%
Tert-Butyl Alcohol (TBA)	2.09E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	2.80E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	4.00E-02	m	2.50E+03	V	1.2E-08	–	7.8E-09	2.0E-08	<0.1%	2.6E-05	–	4.4E-04	4.6E-04	<0.1%
Toluene	4.58E-01		3.90E+03	V	NA	NA	NA	NA	–	3.7E-05	–	3.8E-04	4.1E-04	<0.1%
Vinyl Acetate	9.80E-03	m	4.69E+03	V	NA	NA	NA	NA	–	6.3E-08	–	1.0E-05	1.0E-05	<0.1%
Xylenes, total	9.19E+00		4.39E+03	V	NA	NA	NA	NA	–	2.9E-04	–	2.9E-03	3.2E-03	0.2%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+01		1.63E+05	V	3.5E-07	–	NA	3.5E-07	0.9%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.93E+01		1.13E+05	V	NA	NA	NA	NA	–	4.7E-02	–	NA	4.7E-02	2.5%
Acenaphthene	3.97E+00		2.12E+05	V	NA	NA	NA	NA	–	4.2E-04	3.1E-04	NA	7.3E-04	<0.1%
Acenaphthylene	6.62E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.39E-01		7.70E+05	V	NA	NA	NA	NA	–	3.0E-06	2.2E-06	NA	5.1E-06	<0.1%
Benzo(a)anthracene	1.26E-01		1.32E+09	P	8.3E-08	6.0E-08	8.6E-13	1.4E-07	0.4%	NA	NA	NA	NA	–

Table F-37
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)pyrene	7.23E-02		1.32E+09	P	4.8E-07	3.5E-07	4.9E-12	8.2E-07	2.1%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	4.25E-02		1.32E+09	P	2.8E-08	2.0E-08	2.9E-13	4.8E-08	0.1%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.10E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	3.70E-02		1.32E+09	P	2.4E-08	1.8E-08	2.5E-13	4.2E-08	0.1%	NA	NA	NA	NA	–
Chrysene	4.69E-01		1.32E+09	P	3.1E-08	2.2E-08	3.2E-13	5.3E-08	0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	5.91E-02		1.32E+09	P	1.3E-07	9.7E-08	4.4E-12	2.3E-07	0.6%	NA	NA	NA	NA	–
Fluoranthene	1.56E-01		1.32E+09	P	NA	NA	NA	NA	–	2.5E-05	1.8E-05	NA	4.3E-05	<0.1%
Fluorene	4.70E+00		5.02E+05	V	NA	NA	NA	NA	–	7.5E-04	5.5E-04	NA	1.3E-03	<0.1%
Indeno(1,2,3-cd)pyrene	3.55E-02		1.32E+09	P	2.3E-08	1.7E-08	2.4E-13	4.0E-08	0.1%	NA	NA	NA	NA	–
Naphthalene	1.80E+00		5.49E+04	V	NA	NA	9.2E-08	9.2E-08	0.2%	5.8E-04	4.2E-04	3.5E-03	4.5E-03	0.2%
Phenanthrene	1.60E+01		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	2.41E+00		1.32E+09	P	NA	NA	NA	NA	–	5.1E-04	3.7E-04	NA	8.9E-04	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	7.40E-01	m	1.32E+09	P	8.1E-07	6.4E-07	2.6E-11	1.4E-06	3.8%	2.4E-01	1.9E-01	NA	4.2E-01	22.9%
Inorganic Compounds														
Antimony	2.44E+00		1.32E+09	P	NA	NA	NA	NA	–	3.9E-02	–	NA	3.9E-02	2.1%
Arsenic	5.55E+00		1.32E+09	P	2.9E-05	4.8E-06	1.1E-09	3.4E-05	87.1%	1.2E-01	2.0E-02	2.7E-04	1.4E-01	7.5%
Barium	1.86E+02		1.32E+09	P	NA	NA	NA	NA	–	5.9E-03	–	2.7E-04	6.2E-03	0.3%
Beryllium	9.90E-01		1.32E+09	P	NA	NA	1.5E-10	1.5E-10	<0.1%	3.2E-03	–	1.0E-04	3.3E-03	0.2%
Cadmium	4.71E-01		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	3.0E-03	6.7E-04	1.7E-05	3.7E-03	0.2%
Chromium	4.70E+01		1.32E+09	P	NA	NA	NA	NA	–	2.0E-04	–	NA	2.0E-04	<0.1%
Chromium, Hexavalent	7.40E-01	m	1.32E+09	P	NA	NA	6.9E-09	6.9E-09	<0.1%	1.6E-03	–	2.7E-06	1.6E-03	<0.1%
Cobalt	1.43E+01		1.32E+09	P	NA	NA	8.0E-09	8.0E-09	<0.1%	3.0E-01	–	1.7E-03	3.1E-01	16.6%
Copper	7.59E+01		1.32E+09	P	NA	NA	NA	NA	–	1.2E-02	–	NA	1.2E-02	0.7%
Lead	1.60E+02		1.32E+09	P	NA	NA	1.2E-10	1.2E-10	<0.1%	NA	NA	NA	NA	–
Mercury	1.08E+01		1.32E+09	P	NA	NA	NA	NA	–	2.3E-01	–	2.6E-04	2.3E-01	12.4%
Molybdenum	1.73E+00		1.32E+09	P	NA	NA	NA	NA	–	2.2E-03	–	NA	2.2E-03	0.1%
Nickel	2.37E+01		1.32E+09	P	NA	NA	3.8E-10	3.8E-10	<0.1%	7.6E-03	–	3.4E-04	7.9E-03	0.4%
Selenium	2.14E+00	m	1.32E+09	P	NA	NA	NA	NA	–	2.7E-03	–	7.8E-08	2.7E-03	0.1%
Thallium	3.32E+00		1.32E+09	P	NA	NA	NA	NA	–	3.3E-01	–	NA	3.3E-01	17.7%
Vanadium	5.42E+01		1.32E+09	P	NA	NA	NA	NA	–	4.9E-02	–	NA	4.9E-02	2.7%
Zinc	7.54E+02		1.32E+09	P	NA	NA	NA	NA	–	1.6E-02	–	NA	1.6E-02	0.9%

Table F-37
Risk and Hazard Index Calculations for Hypothetical Future Onsite Child Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral (ELCRo)	Dermal (ELCRd)	Inhalation (ELCRi)	Calculated Risk (ELCR)	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral (HQo)	Dermal (HQd)	Inhalation (HQi)	Calculated Hazard Index (HI)	Percent Total HI
Total Risk or Hazard			Total ELCR			4E-05	100%	Total HI **			2	100%
Total Risk or Hazard from Arsenic						3E-05					0.1	
Total Risk or Hazard without Arsenic						5E-06					2	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 100 × 350 × 6 × CSFo) / (1,000,000 × 15 × 25,550)
ELCRd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6 × CSFa) / (1,000,000 × 15 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 100 × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDo)
HQd = (EPCs × 2,800 × 0.2 × ABSd × 350 × 6) / (1,000,000 × 15 × 2,190 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / ([VF or PEF] × 2,190 × RfC)

Table F-38
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,2,4-Trimethylbenzene	7.33E+00		2.90E+04	V	NA	NA	NA	NA	–	NA	NA	3.5E-02	3.5E-02	8.5%
1,2-Dichlorobenzene	7.40E-03	m	1.43E+04	V	NA	NA	NA	NA	–	5.6E-08	–	2.5E-06	2.5E-06	<0.1%
1,2-Dichloropropane	2.00E+00	m	3.52E+03	V	1.7E-08	–	1.9E-06	1.9E-06	8.0%	NA	NA	1.4E-01	1.4E-01	33.3%
1,3,5-Trimethylbenzene	1.05E+00		1.15E+04	V	NA	NA	NA	NA	–	1.4E-05	–	1.5E-02	1.5E-02	3.6%
1,4-Dichlorobenzene	5.20E-03	m	1.28E+04	V	6.6E-12	–	1.5E-09	1.5E-09	<0.1%	NA	NA	4.9E-07	4.9E-07	<0.1%
2-Hexanone	1.63E-03	m	1.53E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzene	1.14E+00		2.68E+03	V	2.7E-08	–	4.0E-06	4.1E-06	17.3%	2.0E-04	–	6.8E-03	7.0E-03	1.7%
Carbon Disulfide	1.90E-02	m	1.17E+03	V	NA	NA	NA	NA	–	1.3E-07	–	1.9E-05	2.0E-05	<0.1%
Chloroform	1.14E-01		2.61E+03	V	8.3E-10	–	7.6E-08	7.7E-08	0.3%	7.8E-06	–	1.4E-04	1.5E-04	<0.1%
Ethylbenzene	1.16E+00		5.29E+03	V	3.0E-09	–	1.8E-07	1.8E-07	0.8%	8.0E-06	–	1.1E-04	1.1E-04	<0.1%
Iodomethane	2.25E-03	m	1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Isopropy benzene	3.94E-01		1.65E+03	V	NA	NA	NA	NA	–	2.7E-06	–	5.7E-04	5.8E-04	0.1%
Methyl-t-Butyl Ether (MTBE)	2.85E+00	m	4.07E+03	V	1.2E-09	–	6.0E-08	6.1E-08	0.3%	NA	NA	8.4E-05	8.4E-05	<0.1%
n-Butylbenzene	3.65E-01		7.83E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	4.95E-01		6.62E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.33E-01		5.16E+03	V	NA	NA	NA	NA	–	2.5E-07	–	1.9E-04	1.9E-04	<0.1%
p/m-Xylene	8.96E+00		3.79E+03	V	NA	NA	NA	NA	–	3.1E-05	–	2.3E-02	2.3E-02	5.6%
p-Isopropyltoluene	3.74E-01		8.17E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.33E-01		7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Styrene	2.50E-01	m	1.32E+04	V	NA	NA	NA	NA	–	8.6E-07	–	2.0E-05	2.1E-05	<0.1%
Tert-Butyl Alcohol (TBA)	2.09E-02		1.95E+04	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	2.80E-01	m	7.06E+03	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	4.00E-02	m	2.50E+03	V	5.1E-09	–	3.1E-08	3.6E-08	0.2%	2.7E-06	–	4.4E-04	4.4E-04	0.1%
Toluene	4.58E-01		3.90E+03	V	NA	NA	NA	NA	–	3.9E-06	–	3.8E-04	3.8E-04	<0.1%
Vinyl Acetate	9.80E-03	m	4.69E+03	V	NA	NA	NA	NA	–	6.7E-09	–	1.0E-05	1.0E-05	<0.1%
Xylenes, total	9.19E+00		4.39E+03	V	NA	NA	NA	NA	–	3.1E-05	–	2.9E-03	2.9E-03	0.7%
Semivolatile Organic Compounds (SVOCs)														
1-Methylnaphthalene	2.19E+01		1.63E+05	V	1.5E-07	–	NA	1.5E-07	0.6%	NA	NA	NA	NA	–
2-Methylnaphthalene	2.93E+01		1.13E+05	V	NA	NA	NA	NA	–	5.0E-03	–	NA	5.0E-03	1.2%
Acenaphthene	3.97E+00		2.12E+05	V	NA	NA	NA	NA	–	4.5E-05	4.7E-05	NA	9.2E-05	<0.1%
Acenaphthylene	6.62E-02		1.63E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Anthracene	1.39E-01		7.70E+05	V	NA	NA	NA	NA	–	3.2E-07	3.3E-07	NA	6.5E-07	<0.1%
Benzo(a)anthracene	1.26E-01		1.32E+09	P	3.5E-08	3.7E-08	3.4E-12	7.2E-08	0.3%	NA	NA	NA	NA	–

Table F-38
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		VF *or* PEF [a] (m^3/kg)		CANCER RISK: Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Benzo(a)pyrene	7.23E-02		1.32E+09	P	2.0E-07	2.1E-07	2.0E-11	4.1E-07	1.8%	NA	NA	NA	NA	–
Benzo(b)fluoranthene	4.25E-02		1.32E+09	P	1.2E-08	1.2E-08	1.2E-12	2.4E-08	0.1%	NA	NA	NA	NA	–
Benzo(ghi)perylene	1.10E-01		1.32E+09	P	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Benzo(k)fluoranthene	3.70E-02		1.32E+09	P	1.0E-08	1.1E-08	1.0E-12	2.1E-08	<0.1%	NA	NA	NA	NA	–
Chrysene	4.69E-01		1.32E+09	P	1.3E-08	1.4E-08	1.3E-12	2.7E-08	0.1%	NA	NA	NA	NA	–
Dibenzo(a,h)anthracene	5.91E-02		1.32E+09	P	5.7E-08	5.9E-08	1.8E-11	1.2E-07	0.5%	NA	NA	NA	NA	–
Fluoranthene	1.56E-01		1.32E+09	P	NA	NA	NA	NA	–	2.7E-06	2.8E-06	NA	5.4E-06	<0.1%
Fluorene	4.70E+00		5.02E+05	V	NA	NA	NA	NA	–	8.0E-05	8.4E-05	NA	1.6E-04	<0.1%
Indeno(1,2,3-cd)pyrene	3.55E-02		1.32E+09	P	1.0E-08	1.0E-08	9.7E-13	2.0E-08	<0.1%	NA	NA	NA	NA	–
Naphthalene	1.80E+00		5.49E+04	V	NA	NA	3.7E-07	3.7E-07	1.6%	6.2E-05	6.4E-05	3.5E-03	3.6E-03	0.9%
Phenanthrene	1.60E+01		9.92E+05	V	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Pyrene	2.41E+00		1.32E+09	P	NA	NA	NA	NA	–	5.5E-05	5.7E-05	NA	1.1E-04	<0.1%
Polychlorinated Biphenyls (PCBs)														
PCB-1254	7.40E-01	m	1.32E+09	P	3.5E-07	3.9E-07	1.1E-10	7.4E-07	3.1%	2.5E-02	2.8E-02	NA	5.4E-02	13.1%
Inorganic Compounds														
Antimony	2.44E+00		1.32E+09	P	NA	NA	NA	NA	–	4.2E-03	–	NA	4.2E-03	1.0%
Arsenic	5.55E+00		1.32E+09	P	1.2E-05	2.9E-06	4.6E-09	1.5E-05	64.7%	1.3E-02	3.0E-03	2.7E-04	1.6E-02	3.9%
Barium	1.86E+02		1.32E+09	P	NA	NA	NA	NA	–	6.4E-04	–	2.7E-04	9.0E-04	0.2%
Beryllium	9.90E-01		1.32E+09	P	NA	NA	5.9E-10	5.9E-10	<0.1%	3.4E-04	–	1.0E-04	4.4E-04	0.1%
Cadmium	4.71E-01		1.32E+09	P	NA	NA	4.9E-10	4.9E-10	<0.1%	3.2E-04	1.0E-04	1.7E-05	4.4E-04	0.1%
Chromium	4.70E+01		1.32E+09	P	NA	NA	NA	NA	–	2.1E-05	–	NA	2.1E-05	<0.1%
Chromium, Hexavalent	7.40E-01	m	1.32E+09	P	NA	NA	2.8E-08	2.8E-08	0.1%	1.7E-04	–	2.7E-06	1.7E-04	<0.1%
Cobalt	1.43E+01		1.32E+09	P	NA	NA	3.2E-08	3.2E-08	0.1%	3.3E-02	–	1.7E-03	3.4E-02	8.4%
Copper	7.59E+01		1.32E+09	P	NA	NA	NA	NA	–	1.3E-03	–	NA	1.3E-03	0.3%
Lead	1.60E+02		1.32E+09	P	NA	NA	4.8E-10	4.8E-10	<0.1%	NA	NA	NA	NA	–
Mercury	1.08E+01		1.32E+09	P	NA	NA	NA	NA	–	2.5E-02	–	2.6E-04	2.5E-02	6.1%
Molybdenum	1.73E+00		1.32E+09	P	NA	NA	NA	NA	–	2.4E-04	–	NA	2.4E-04	<0.1%
Nickel	2.37E+01		1.32E+09	P	NA	NA	1.5E-09	1.5E-09	<0.1%	8.1E-04	–	3.4E-04	1.2E-03	0.3%
Selenium	2.14E+00	m	1.32E+09	P	NA	NA	NA	NA	–	2.9E-04	–	7.8E-08	2.9E-04	<0.1%
Thallium	3.32E+00		1.32E+09	P	NA	NA	NA	NA	–	3.5E-02	–	NA	3.5E-02	8.6%
Vanadium	5.42E+01		1.32E+09	P	NA	NA	NA	NA	–	5.3E-03	–	NA	5.3E-03	1.3%
Zinc	7.54E+02		1.32E+09	P	NA	NA	NA	NA	–	1.7E-03	–	NA	1.7E-03	0.4%

Table F-38
Risk and Hazard Index Calculations for Hypothetical Future Onsite Adult Resident Receptor
from Exposure to Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	VF *or* PEF [a] (m^3/kg)	CANCER RISK: Route-Specific Risk Oral (ELCRo)	Dermal (ELCRd)	Inhalation (ELCRi)	Calculated Risk (ELCR)	Percent Total ELCR	NON-CANCER HAZARD INDEX: Route-Specific Hazard Quotient Oral (HQo)	Dermal (HQd)	Inhalation (HQi)	Calculated Hazard Index (HI)	Percent Total HI
Total Risk or Hazard			Total ELCR			2E-05	100%	Total HI			0.4	100%
Total Risk or Hazard from Arsenic						2E-05					0.02	
Total Risk or Hazard without Arsenic						8E-06					0.4	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor
VF = volatilization factor

Equations:
ELCRo = (EPCs × 1 × 50 × 350 × 24 × CSFo) / (1,000,000 × 70 × 25,550)
ELCRd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24 × CSFa) / (1,000,000 × 70 × 25,550)
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / ([VF or PEF] × 25,550)

HQo = (EPCs × 1 × 50 × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDo)
HQd = (EPCs × 5,700 × 0.07 × ABSd × 350 × 24) / (1,000,000 × 70 × 8,760 × RfDa)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / ([VF or PEF] × 8,760 × RfC)

Table F-39
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	1.26E-01		1.32E+09	P	8.6E-13	<0.1%	NA	–
Benzo(a)pyrene	7.23E-02		1.32E+09	P	4.9E-12	<0.1%	NA	–
Benzo(b)fluoranthene	4.25E-02		1.32E+09	P	2.9E-13	<0.1%	NA	–
Benzo(ghi)perylene	1.10E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	3.70E-02		1.32E+09	P	2.5E-13	<0.1%	NA	–
Chrysene	4.69E-01		1.32E+09	P	3.2E-13	<0.1%	NA	–
Dibenzo(a,h)anthracene	5.91E-02		1.32E+09	P	4.4E-12	<0.1%	NA	–
Fluoranthene	1.56E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	3.55E-02		1.32E+09	P	2.4E-13	<0.1%	NA	–
Pyrene	2.41E+00		1.32E+09	P	NA	–	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	7.40E-01	m	1.32E+09	P	2.6E-11	0.2%	NA	–
Inorganic Compounds								
Antimony	2.44E+00		1.32E+09	P	NA	–	NA	–
Arsenic	5.55E+00		1.32E+09	P	1.1E-09	6.8%	2.7E-04	9.0%
Barium	1.86E+02		1.32E+09	P	NA	–	2.7E-04	9.0%
Beryllium	9.90E-01		1.32E+09	P	1.5E-10	0.9%	1.0E-04	3.4%
Cadmium	4.71E-01		1.32E+09	P	1.2E-10	0.7%	1.7E-05	0.6%
Chromium	4.70E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	7.40E-01	m	1.32E+09	P	6.9E-09	40.9%	2.7E-06	<0.1%
Cobalt	1.43E+01		1.32E+09	P	8.0E-09	47.5%	1.7E-03	57.8%
Copper	7.59E+01		1.32E+09	P	NA	–	NA	–
Lead	1.60E+02		1.32E+09	P	1.2E-10	0.7%	NA	–

Table F-39
Risk and Hazard Index Calculations for Hypothetical Future Offsite Child Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation	Percent Total HI
			ELCRi		HQi	
Mercury	1.08E+01	1.32E+09 P	NA	–	2.6E-04	8.7%
Molybdenum	1.73E+00	1.32E+09 P	NA	–	NA	–
Nickel	2.37E+01	1.32E+09 P	3.8E-10	2.3%	3.4E-04	11.5%
Selenium	2.14E+00 m	1.32E+09 P	NA	–	7.8E-08	<0.1%
Thallium	3.32E+00	1.32E+09 P	NA	–	NA	–
Vanadium	5.42E+01	1.32E+09 P	NA	–	NA	–
Zinc	7.54E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	2E-08	Total HI	0.003	
Total Risk or Hazard from Arsenic			1E-09		0.0003	
Total Risk or Hazard without Arsenic			2E-08		0.003	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 6 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 6) / PEF × 2,190 × RfC)

Table F-40
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)		PEF [a] (m^3/kg)		CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Semivolatile Organic Compounds (SVOCs)								
Benzo(a)anthracene	1.26E-01		1.32E+09	P	3.4E-12	<0.1%	NA	–
Benzo(a)pyrene	7.23E-02		1.32E+09	P	2.0E-11	<0.1%	NA	–
Benzo(b)fluoranthene	4.25E-02		1.32E+09	P	1.2E-12	<0.1%	NA	–
Benzo(ghi)perylene	1.10E-01		1.32E+09	P	NA	–	NA	–
Benzo(k)fluoranthene	3.70E-02		1.32E+09	P	1.0E-12	<0.1%	NA	–
Chrysene	4.69E-01		1.32E+09	P	1.3E-12	<0.1%	NA	–
Dibenzo(a,h)anthracene	5.91E-02		1.32E+09	P	1.8E-11	<0.1%	NA	–
Fluoranthene	1.56E-01		1.32E+09	P	NA	–	NA	–
Indeno(1,2,3-cd)pyrene	3.55E-02		1.32E+09	P	9.7E-13	<0.1%	NA	–
Pyrene	2.41E+00		1.32E+09	P	NA	–	NA	–
Polychlorinated Biphenyls (PCBs)								
PCB-1254	7.40E-01	m	1.32E+09	P	1.1E-10	0.2%	NA	–
Inorganic Compounds								
Antimony	2.44E+00		1.32E+09	P	NA	–	NA	–
Arsenic	5.55E+00		1.32E+09	P	4.6E-09	6.8%	2.7E-04	9.0%
Barium	1.86E+02		1.32E+09	P	NA	–	2.7E-04	9.0%
Beryllium	9.90E-01		1.32E+09	P	5.9E-10	0.9%	1.0E-04	3.4%
Cadmium	4.71E-01		1.32E+09	P	4.9E-10	0.7%	1.7E-05	0.6%
Chromium	4.70E+01		1.32E+09	P	NA	–	NA	–
Chromium, Hexavalent	7.40E-01	m	1.32E+09	P	2.8E-08	40.9%	2.7E-06	<0.1%
Cobalt	1.43E+01		1.32E+09	P	3.2E-08	47.5%	1.7E-03	57.8%
Copper	7.59E+01		1.32E+09	P	NA	–	NA	–
Lead	1.60E+02		1.32E+09	P	4.8E-10	0.7%	NA	–
Mercury	1.08E+01		1.32E+09	P	NA	–	2.6E-04	8.7%

Table F-40
Risk and Hazard Index Calculations for Hypothetical Future Offsite Adult Resident Receptor
from Exposure to Airborne Particles from Subsurface Soil (0- to 10-ft Depth Interval)
Area 4

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCs (mg/kg)	PEF [a] (m^3/kg)	CANCER RISK Inhalation ELCRi	Percent Total ELCR	NON-CANCER HAZARD INDEX Inhalation HQi	Percent Total HI
Molybdenum	1.73E+00	1.32E+09 P	NA	–	NA	–
Nickel	2.37E+01	1.32E+09 P	1.5E-09	2.3%	3.4E-04	11.5%
Selenium	2.14E+00 m	1.32E+09 P	NA	–	7.8E-08	<0.1%
Thallium	3.32E+00	1.32E+09 P	NA	–	NA	–
Vanadium	5.42E+01	1.32E+09 P	NA	–	NA	–
Zinc	7.54E+02	1.32E+09 P	NA	–	NA	–
Total Risk or Hazard		Total ELCR	7E-08	Total HI	0.003	
Total Risk or Hazard from Arsenic			5E-09		0.0003	
Total Risk or Hazard without Arsenic			6E-08		0.003	

Notes:
[a] Minimum of the volatilization factor (identified with [V]) derived in Table 6-19 and the particulate emission factor (identified with [P]).
* EPCs exceeds the soil saturation limit (Csat) (Table 6-19); therefore, volatilization is based on the Csat concentration instead of EPCs.

– = not applicable
ELCR = excess lifetime cancer risk
EPCs = exposure point concentration in soil
HI = hazard index (sum of the HQs)
HQ = hazard quotient
m = EPC based on maximum
m^3/kg = cubic meters per kilogram
mg/kg = milligrams per kilogram
NA = not available
PEF = particulate emission factor

Equations:
ELCRi = (EPCs × 24 × 0.042 ×350 × 24 × URF) / PEF × 25,550)
HQi = (EPCs × 24 × 0.042 × 350 × 24) / PEF × 8,760 × RfC)

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Appendix G

ELCR and Noncancer HI Calculations for the Hypothetical Future Onsite Resident Using Groundwater for Domestic Purposes

Table G-1
Risk and Hazard Index Calculations for the Hypothetical Future Onsite Child Resident Receptor from Exposure to Groundwater
Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCgw (mg/L)		DA [a] (L/cm²/day)		CANCER RISK Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2-Trichloroethane	6.70E-04	m	1.37E-05	[1]	2.6E-07	2.4E-08	1.8E-08	3.1E-07	<0.1%	1.1E-03	9.7E-05	NA	1.2E-03	<0.1%
1,1-Dichloroethane	1.29E-03		1.18E-05	[2]	4.0E-08	3.1E-09	3.5E-09	4.7E-08	<0.1%	4.1E-05	3.2E-06	NA	4.4E-05	<0.1%
1,1-Dichloroethene	2.97E-03		2.08E-05	[2]	NA	NA	NA	NA	–	3.8E-03	5.2E-04	8.5E-04	5.2E-03	<0.1%
1,2,4-Trimethylbenzene	3.10E-02		2.57E-04	[1]	NA	NA	NA	NA	–	NA	NA	8.9E-02	8.9E-02	1%
1,2-Dichlorobenzene	3.20E-04	m	9.55E-05	[1]	NA	NA	NA	NA	–	2.3E-05	1.4E-05	3.2E-06	4.0E-05	<0.1%
1,2-Dichloroethane	8.68E-04		7.38E-06	[2]	2.2E-07	1.1E-08	3.1E-08	2.7E-07	<0.1%	2.8E-03	1.4E-04	4.3E-05	3.0E-03	<0.1%
1,2-Dichloropropane	2.50E-02	m	1.46E-05	[1]	4.9E-06	4.8E-07	4.3E-07	5.8E-06	0.6%	NA	NA	3.8E-02	3.8E-02	0%
1,3,5-Trimethylbenzene	1.46E-02		1.83E-04	[1]	NA	NA	NA	NA	–	1.9E-02	2.3E-02	4.9E-02	9.0E-02	1%
Benzene	1.43E+00		2.34E-05	[2]	7.8E-04	1.2E-04	7.1E-05	9.8E-04	96.2%	7.6E+00	1.2E+00	4.8E-01	9.3E+00	92%
c-1,2-Dichloroethene	1.14E-02		1.33E-05	[2]	NA	NA	NA	NA	–	7.3E-03	6.4E-04	NA	7.9E-03	<0.1%
Chloroethane	2.00E-03	m	8.97E-06	[2]	NA	NA	NA	NA	–	NA	NA	1.3E-06	1.3E-06	<0.1%
Diisopropyl Ether (DIPE)	6.30E-04		0.00E+00	[1]	NA	NA	NA	NA	–	NA	NA	3.1E-05	3.1E-05	<0.1%
Ethylbenzene	9.86E-02		8.78E-05	[1]	5.9E-06	3.4E-06	4.2E-07	9.8E-06	1.0%	6.3E-03	3.7E-03	9.9E-04	1.1E-02	0%
Isopropy benzene	8.37E-03		2.71E-04	[1]	NA	NA	NA	NA	–	1.3E-03	2.4E-03	4.2E-04	4.1E-03	<0.1%
Methylene Chloride	1.72E-03		5.72E-06	[2]	1.3E-07	5.0E-09	3.0E-09	1.4E-07	<0.1%	1.8E-03	6.9E-05	8.6E-05	2.0E-03	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.77E-03		0.00E+00	[1]	2.7E-08	0.0E+00	1.2E-09	2.9E-08	<0.1%	NA	NA	6.9E-06	6.9E-06	<0.1%
n-Butylbenzene	2.08E-03		7.90E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	7.81E-03		2.84E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.44E-02		9.49E-05	[1]	NA	NA	NA	NA	–	2.4E-03	1.5E-03	2.1E-03	6.0E-03	<0.1%
p/m-Xylene	1.75E-01		9.49E-05	[1]	NA	NA	NA	NA	–	5.6E-02	3.5E-02	1.2E-02	1.0E-01	1%
p-Isopropyltoluene	2.11E-03		5.01E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.04E-03		3.39E-04	[2]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
t-1,2-Dichloroethene	1.17E-03		1.33E-05	[2]	NA	NA	NA	NA	–	3.7E-04	3.3E-05	3.9E-04	8.0E-04	<0.1%
Tert-Butyl Alcohol (TBA)	5.71E-02		2.00E-06	[0]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	4.27E-04		5.10E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	3.46E-03		8.70E-05	[1]	1.0E-05	5.9E-06	3.5E-08	1.6E-05	1.6%	2.2E-03	1.3E-03	2.0E-03	5.5E-03	<0.1%
Toluene	1.92E-01		5.20E-05	[2]	NA	NA	NA	NA	–	1.5E-02	5.3E-03	1.3E-02	3.3E-02	0%
Trichloroethene	2.09E-02		2.53E-05	[1]	1.5E-06	2.5E-07	7.1E-08	1.8E-06	0.2%	NA	NA	6.9E-04	6.9E-04	<0.1%
Vinyl Chloride	1.37E-03		8.24E-06	[2]	2.0E-06	1.1E-07	1.8E-07	2.3E-06	0.2%	2.9E-02	1.6E-03	2.7E-04	3.1E-02	0%
Xylenes, total	2.10E-01		9.49E-05	[1]	NA	NA	NA	NA	–	6.7E-02	4.2E-02	6.0E-03	1.2E-01	1%

Table G-1
Risk and Hazard Index Calculations for the Hypothetical Future Onsite Child Resident Receptor from Exposure to Groundwater
Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Child

Constituent	EPCgw (mg/L)	DA [a] (L/cm²/day)	CANCER RISK Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard Index	Percent Total HI
Semivolatile Organic Compounds (SVOCs)												
1,4-Dioxane	3.94E-03	5.48E-07 [2]	5.8E-07	2.1E-09	–	5.8E-07	<0.1%	NA	NA	–	NA	–
Naphthalene	2.69E-02	9.72E-05 [1]	NA	NA	1.6E-06	1.6E-06	0.2%	8.6E-03	5.5E-03	6.0E-02	7.4E-02	1%
Inorganic Compounds												
Iron	2.00E+00 m	1.00E-06 [0]	NA	NA	–	NA	–	1.8E-01	1.2E-03	–	1.8E-01	2%
Methane	9.19E-01	8.52E-06 [2]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Total Risk or Hazard			Total ELCR			1E-03	100%	Total HI **			10	100%

** HI Segregated by Target Site/Critical Effect:

HI (blood) =	9	HI (nasal, lung) =	0.1	HI (NA, NR) =	0.2
HI (liver and kidney) =	0.26	HI (fetus, developmental) =	0.001		
HI (CNS, whole body) =	0.3	HI (gastrointestinal tract) =	0.2		

Notes:
[a] The dermal absorption factor was calculated using parameters from Table 6-21.

– = not applicable
ELCR = excess lifetime cancer risk
EPCgw = exposure point concentration in groundwater
HI = hazard index (sum of the HQs)
HQ = hazard quotient
L/cm^2/day = liters per square centimeter per day
mg/L = milligrams per liter
NA = not available
Vfres = volatilization factor for domestic water

Equations:
ELCRo = (EPCgw × 1.000 × 350 × 6 × CSFo) / (15 × 25,550)
ELCRd = (EPCgw × DA × 6,600 × 350 × 6 × CSFa) / (15 × 25,550)
ELCRi = (EPCgw × VFres × 1 × 0.042 x 350 × 6 × URF) / (25,550)

HQo = (EPCgw × 1.000 × 350 × 6) / (15 × 2,190 × RfDo)
HQd = (EPCgw × DA × 6,600 × 350 × 6) / (15 × 2,190 × RfDa)
HQi = (EPCgw × VFres × 1 × 0.042 × 350 × 6) / (2,190 × RfC)

Table G-2
Risk and Hazard Index Calculations for the Hypothetical Future Onsite Adult Resident Receptor from Exposure to Groundwater
Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCgw (mg/L)		DA [a] (L/cm²/day)		CANCER RISK Route-Specific Risk Oral ELCRo	Dermal ELCRd	Inhalation ELCRi	Calculated Risk ELCR	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral HQo	Dermal HQd	Inhalation HQi	Calculated Hazard Index HI	Percent Total HI
Volatile Organic Compounds (VOCs)														
1,1,2-Trichloroethane	6.70E-04	m	1.04E-05	[1]	4.5E-07	4.3E-08	4.3E-08	5.4E-07	<0.1%	4.6E-04	4.3E-05	NA	5.0E-04	<0.1%
1,1-Dichloroethane	1.29E-03		8.69E-06	[1]	6.9E-08	5.4E-09	8.2E-09	8.3E-08	<0.1%	1.8E-05	1.4E-06	NA	1.9E-05	<0.1%
1,1-Dichloroethene	2.97E-03		1.54E-05	[1]	NA	NA	NA	NA	–	1.6E-03	2.3E-04	4.9E-04	2.3E-03	<0.1%
1,2,4-Trimethylbenzene	3.10E-02		1.96E-04	[1]	NA	NA	NA	NA	–	NA	NA	5.1E-02	5.1E-02	1%
1,2-Dichlorobenzene	3.20E-04	m	7.27E-05	[1]	NA	NA	NA	NA	–	9.7E-06	6.4E-06	1.9E-06	1.8E-05	<0.1%
1,2-Dichloroethane	8.68E-04		5.45E-06	[1]	3.8E-07	1.9E-08	7.2E-08	4.7E-07	<0.1%	1.2E-03	5.8E-05	2.5E-05	1.3E-03	<0.1%
1,2-Dichloropropane	2.50E-02	m	1.11E-05	[1]	8.5E-06	8.5E-07	9.9E-07	1.0E-05	0.6%	NA	NA	2.2E-02	2.2E-02	1%
1,3,5-Trimethylbenzene	1.46E-02		1.39E-04	[1]	NA	NA	NA	NA	–	8.0E-03	1.0E-02	2.8E-02	4.6E-02	1%
Benzene	1.43E+00		1.70E-05	[1]	1.3E-03	2.1E-04	1.6E-04	1.7E-03	96.1%	3.3E+00	5.0E-01	2.8E-01	4.0E+00	91%
c-1,2-Dichloroethene	1.14E-02		9.86E-06	[1]	NA	NA	NA	NA	–	3.1E-03	2.8E-04	NA	3.4E-03	<0.1%
Chloroethane	2.00E-03	m	6.29E-06	[1]	NA	NA	NA	NA	–	NA	NA	7.7E-07	7.7E-07	<0.1%
Diisopropyl Ether (DIPE)	6.30E-04		0.00E+00	[1]	NA	NA	NA	NA	–	NA	NA	1.8E-05	1.8E-05	<0.1%
Ethylbenzene	9.86E-02		6.68E-05	[1]	1.0E-05	6.1E-06	9.8E-07	1.7E-05	1.0%	2.7E-03	1.6E-03	5.7E-04	4.9E-03	0%
Isopropylbenzene	8.37E-03		2.06E-04	[1]	NA	NA	NA	NA	–	5.7E-04	1.1E-03	2.4E-04	1.9E-03	<0.1%
Methylene Chloride	1.72E-03		4.17E-06	[1]	2.3E-07	8.5E-09	6.8E-09	2.4E-07	<0.1%	7.9E-04	3.0E-05	5.0E-05	8.7E-04	<0.1%
Methyl-t-Butyl Ether (MTBE)	2.77E-03		0.00E+00	[1]	4.7E-08	0.0E+00	2.9E-09	5.0E-08	<0.1%	NA	NA	4.0E-06	4.0E-06	<0.1%
n-Butylbenzene	2.08E-03		6.01E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
n-Propylbenzene	7.81E-03		2.17E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
o-Xylene	7.44E-02		7.23E-05	[1]	NA	NA	NA	NA	–	1.0E-03	6.6E-04	1.2E-03	2.9E-03	<0.1%
p/m-Xylene	1.75E-01		7.23E-05	[1]	NA	NA	NA	NA	–	2.4E-02	1.6E-02	6.8E-03	4.6E-02	1%
p-Isopropyltoluene	2.11E-03		3.82E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
sec-Butylbenzene	2.04E-03		2.26E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
t-1,2-Dichloroethene	1.17E-03		9.86E-06	[1]	NA	NA	NA	NA	–	1.6E-04	1.4E-05	2.3E-04	4.0E-04	<0.1%
Tert-Butyl Alcohol (TBA)	5.71E-02		1.16E-06	[0]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
tert-Butylbenzene	4.27E-04		3.88E-04	[1]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Tetrachloroethene	3.46E-03		6.63E-05	[1]	1.8E-05	1.0E-05	8.1E-08	2.8E-05	1.6%	9.5E-04	5.6E-04	1.1E-03	2.7E-03	<0.1%
Toluene	1.92E-01		3.86E-05	[1]	NA	NA	NA	NA	–	6.6E-03	2.3E-03	7.4E-03	1.6E-02	0%
Trichloroethene	2.09E-02		1.92E-05	[1]	2.5E-06	4.4E-07	1.7E-07	3.2E-06	0.2%	NA	NA	4.0E-04	4.0E-04	<0.1%
Vinyl Chloride	1.37E-03		5.93E-06	[2]	3.5E-06	1.8E-07	4.2E-07	4.1E-06	0.2%	1.2E-02	6.7E-04	1.6E-04	1.3E-02	0%
Xylenes, total	2.10E-01		7.23E-05	[1]	NA	NA	NA	NA	–	2.9E-02	1.9E-02	3.5E-03	5.1E-02	1%

Table G-2
Risk and Hazard Index Calculations for the Hypothetical Future Onsite Adult Resident Receptor from Exposure to Groundwater
Onsite Groundwater

Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Scenario Timeframe: Current/Future
Receptor Population: Resident
Receptor Age: Adult

Constituent	EPCgw (mg/L)	DA [a] (L/cm²/day)	CANCER RISK Route-Specific Risk Oral	Dermal	Inhalation	Calculated Risk	Percent Total ELCR	NON-CANCER HAZARD INDEX Route-Specific Hazard Quotient Oral	Dermal	Inhalation	Calculated Hazard Index	Percent Total HI
Semivolatile Organic Compounds (SVOCs)												
1,4-Dioxane	3.94E-03	3.99E-07 [1]	1.0E-06	3.6E-09	–	1.0E-06	<0.1%	NA	NA	–	NA	–
Naphthalene	2.69E-02	7.40E-05 [1]	NA	NA	3.6E-06	3.6E-06	0.2%	3.7E-03	2.5E-03	3.5E-02	4.1E-02	1%
Inorganic Compounds												
Iron	2.00E+00 m	5.80E-07 [0]	NA	NA	–	NA	–	7.8E-02	4.1E-04	–	7.9E-02	2%
Methane	9.19E-01	5.69E-06 [2]	NA	NA	NA	NA	–	NA	NA	NA	NA	–
Total Risk or Hazard			Total ELCR			2E-03	100%	Total HI **			4	100%

** HI Segregated by Target Site/Critical Effect:

HI (blood) =	4	HI (nasal, lung) =	0.06	HI (NA, NR) =	0.1
HI (liver and kidney) =	0.11	HI (fetus, developmental) =	0.001		
HI (CNS, whole body) =	0.1	HI (gastrointestinal tract) =	0.08		

Notes:
[a] The dermal absorption factor was calculated using parameters from Table 6-21.

– = not applicable
ELCR = excess lifetime cancer risk
EPCgw = exposure point concentration in groundwater
HI = hazard index (sum of the HQs)
HQ = hazard quotient
L/cm^2/day = liters per square centimeter per day
mg/L = milligrams per liter
NA = not available
Vfres = volatilization factor for domestic water

Equations:
ELCRo = (EPCgw × 2.000 × 350 × 24 × CSFo) / (70 × 25,550)
ELCRd = (EPCgw × DA × 18,000 × 350 × 24 × CSFa) / (70 × 25,550)
ELCRi = (EPCgw × VFres × 1 × 0.042 x 350 × 24 × URF) / (25,550)

HQo = (EPCgw × 2.000 × 350 × 24) / (70 × 8,760 × RfDo)
HQd = (EPCgw × DA × 18,000 × 350 × 24) / (70 × 8,760 × RfDa)
HQi = (EPCgw × VFres × 1 × 0.042 × 350 × 24) / (8,760 × RfC)

Table G-3
Summary of Calculated Human Health Risks and Hazard Indices
Onsite Groundwater
Former CENCO Refinery
Santa Fe Springs, California

Excess Lifetime Cancer Risk and Total non-cancer Hazard Index [a, b]

RECEPTOR Exposure Medium - Scenario	Calculation Table	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
Hypothetical Future Onsite Child Resident Receptor			
Direct Contact with Groundwater	Table G-1	**1E-03**	**10**
Hypothetical Future Onsite Adult Resident Receptor			
Direct Contact with Groundwater	Table G-2	**2E-03**	**4**

[a] Cancer risk estimates exceeding $1x10^{-6}$ and non-cancer hazard estimates exceeding 1 are in bold.
[b] For HIs exceeding 1, target organ HIs were calculated.

ARCADIS

Appendix H

Receptor-Specific Lead Exposure Tables

ARCADIS

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Table H-1
Blood Lead Levels Estimated for the Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface (0-2 ft bgs) Soil Using the USEPA Adult Lead Model
Area 1
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	217	217	217	217
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
$IR_{S\ D}$		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.8**	**2.0**	**1.8**	**2.0**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.5**	**7.1**	**5.5**	**7.1**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.7%**	**2.0%**	**0.7%**	**2.0%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S\ D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S\ D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_S) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq.htm#soil%20ingestion%20rate.

Table H-2
Blood Lead Levels Estimated for the Hypothetical Current Offsite Adult and Child Resident Receptor from Exposure to Surface (0-2 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 1
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0282
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142802	224536

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

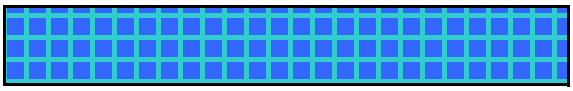
Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-3
Blood Lead Levels Estimated for the Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 1
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	145	145	145	145
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.9**	**2.1**	**1.9**	**2.1**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.8**	**7.5**	**5.8**	**7.5**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0 9%**	**2.3%**	**0.9%**	**2.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day = gram(s) per day
GSDi = Individual Geometric Standard Deviations
Het = Heterogeneous population
Hom = Homogeneous population
PbB = blood lead
ppm = part(s) per million
µg/day = microgram(s) per day
µg/dl = microgram(s) per deciliter
µg/g = microgram(s) per gram
yr = year

References:

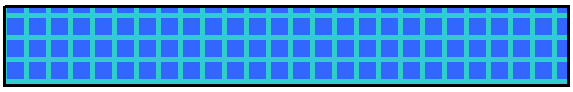
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-4
Blood Lead Levels Estimated for the Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 1
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	145	145	145	145
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	20	20	20	20
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.5**	**1.7**	**1.5**	**1.7**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**4.7**	**6.2**	**4.7**	**6.2**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.4%**	**1.3%**	**0.4%**	**1.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-5
Blood Lead Levels Estimated for the Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 1
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	145	145	145	145
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.7**	**1.9**	**1.7**	**1.9**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.2**	**6.8**	**5.2**	**6.8**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.6%**	**1.7%**	**0.6%**	**1.7%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day = gram(s) per day
GSDi = Individual Geometric Standard Deviations
Het = Heterogeneous population
Hom = Homogeneous population
PbB = blood lead
ppm = part(s) per million
µg/day = microgram(s) per day
µg/dl = microgram(s) per deciliter
µg/g = microgram(s) per gram
yr = year

References:
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-6
Blood Lead Levels Estimated for the Hypothetical Future Offsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 1
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0281
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142806	224540

EXPOSURE PARAMETERS	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

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PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contr bution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contr bution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-7
Blood Lead Levels Estimated for the Hypothetical Future Onsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 1
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.028
Lead in Soil/Dust (ug/g)	145.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.5	2.7	3.1	3.8	4.4	921	1447
BLOOD Pb, CHILD	2.3	4.2	5.0	6.1	6.9	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142814	224549

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.082	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	65.3	

Click here for REFERENCES

PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contr bution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.01	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.00	0%	6.3E-4	0.00	0%
Inhalation, bkgrnd		0.05	3%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	58%		0.84	76%
Food Ingestion, bkgrnd		0.22	15%		0.23	21%
Food Ingestion	2.4E-3	0.35	24%			0%

CHILDREN	typical			with pica		
	Pathway contr bution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.00	0%
Soil Ingestion	7.0E-3	0.00	0%	1.4E-2	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	42%		0.96	64%
Food Ingestion, bkgrnd		0.50	22%		0.50	34%
Food Ingestion	5.5E-3	0.80	35%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

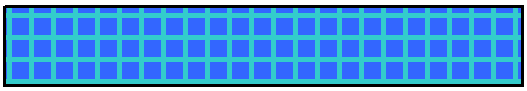
Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-8
Blood Lead Levels Estimated for the Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface (0-2 ft bgs) Soil Using the USEPA Adult Lead Model
Area 2
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	137	137	137	137
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.7**	**1.9**	**1.7**	**1.9**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.2**	**6.7**	**5.2**	**6.7**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.6%**	**1.7%**	**0.6%**	**1.7%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http //www.epa.gov/superfund/lead/almfaq.htm#soil%20ingestion%20rate.

Table H-9
Blood Lead Levels Estimated for the Hypothetical Current Offsite Adult and Child Resident Receptor from Exposure to Surface (0-2 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 2
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0280
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142814	224549

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

Click here for REFERENCES

PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

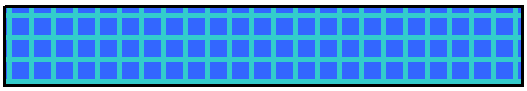
Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:
cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-10
Blood Lead Levels Estimated for the Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 2
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	93 8	93 8	93 8	93 8
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.8**	**2.0**	**1.8**	**2.0**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.4**	**7.0**	**5.4**	**7.0**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.7%**	**1.9%**	**0.7%**	**1 9%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

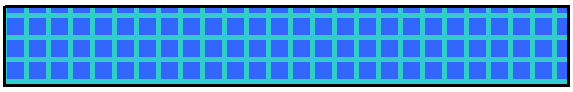
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http //www.epa.gov/superfund/lead/almfaq.htm#soil%20ingestion%20rate.

Table H-11
Blood Lead Levels Estimated for the Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 2
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	93 8	93 8	93 8	93 8
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	20	20	20	20
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.5**	**1.7**	**1.5**	**1.7**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**4.7**	**6.1**	**4.7**	**6.1**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.4%**	**1.3%**	**0.4%**	**1.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day = gram(s) per day
GSDi = Individual Geometric Standard Deviations
Het = Heterogeneous population
Hom = Homogeneous population
PbB = blood lead
ppm = part(s) per million
µg/day = microgram(s) per day
µg/dl = microgram(s) per deciliter
µg/g = microgram(s) per gram
yr = year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-12
Blood Lead Levels Estimated for the Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 2
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	93 8	93 8	93 8	93 8
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.6**	**1.8**	**1.6**	**1.8**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.0**	**6.5**	**5.0**	**6.5**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0 5%**	**1.5%**	**0.5%**	**1.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-13
Blood Lead Levels Estimated for the Hypothetical Future Offsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 2
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0281
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONA	1.1	2.0	2.4	2.9	3.3	142809	224543

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-14
Blood Lead Levels Estimated for the Hypothetical Future Onsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 2
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.028
Lead in Soil/Dust (ug/g)	93.8
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.3	2.4	2.9	3.5	4.0	921	1447
BLOOD Pb, CHILD	2.0	3.7	4.4	5.3	6.1	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142814	224549

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	42.2	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.00	0%	6.3E-4	0.00	0%
Inhalation, bkgrnd		0.05	3%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	63%		0.84	76%
Food Ingestion, bkgrnd		0.22	16%		0.23	21%
Food Ingestion	2.4E-3	0.22	17%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.00	0%
Soil Ingestion	7.0E-3	0.00	0%	1.4E-2	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	47%		0.96	64%
Food Ingestion, bkgrnd		0.50	25%		0.50	34%
Food Ingestion	5.5E-3	0.52	26%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

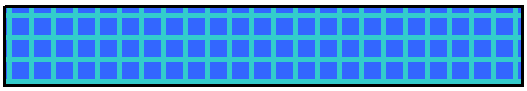
Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-15
Blood Lead Levels Estimated for the Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface (0-2 ft bgs) Soil Using the USEPA Adult Lead Model
Area 3
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	687	687	687	687
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**2.5**	**2.7**	**2.5**	**2.7**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**7.6**	**9.5**	**7.6**	**9.5**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**2.2%**	**4.4%**	**2.2%**	**4.4%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http //www.epa.gov/superfund/lead/almfaq.htm#soil%20ingestion%20rate.

Table H-16
Blood Lead Levels Estimated for the Hypothetical Current Offsite Adult and Child Resident Receptor from Exposure to Surface (0-2 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 3
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0285
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	329	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	329	558
BLOOD Pb, OCCUPATIONA	1.1	2.0	2.4	2.9	3.3	142775	224510

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day	0.082	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

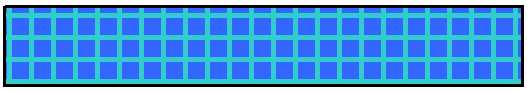
Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:
cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-17
Blood Lead Levels Estimated for the Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 3
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	452	452	452	452
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**2.8**	**3.0**	**2.8**	**3.0**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**8.5**	**10.6**	**8.5**	**10.6**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**3.2%**	**5.8%**	**3.2%**	**5 8%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

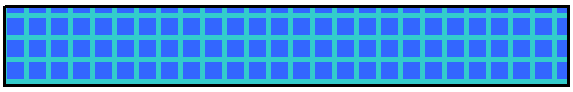
U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http //www.epa.gov/superfund/lead/almfaq.htm#soil%20ingestion%20rate.

Table H-18
Blood Lead Levels Estimated for the Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 3
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03



Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	452	452	452	452
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	20	20	20	20
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.6**	**1.8**	**1.6**	**1.8**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**4.9**	**6.4**	**4.9**	**6.4**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0 5%**	**1.5%**	**0.5%**	**1.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day = gram(s) per day
GSDi = Individual Geometric Standard Deviations
Het = Heterogeneous population
Hom = Homogeneous population
PbB = blood lead
ppm = part(s) per million
µg/day = microgram(s) per day
µg/dl = microgram(s) per deciliter
µg/g = microgram(s) per gram
yr = year

References:
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-19
Blood Lead Levels Estimated for the Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 3
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	452	452	452	452
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**2.2**	**2.4**	**2.2**	**2.4**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**6.6**	**8.3**	**6.6**	**8.3**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**1 3%**	**3.1%**	**1.3%**	**3.1%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-20
Blood Lead Levels Estimated for the Hypothetical Future Offsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 3
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0283
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142788	224523

EXPOSURE PARAMETERS

	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:
cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-21
Blood Lead Levels Estimated for the Hypothetical Future Onsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 3
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.028
Lead in Soil/Dust (ug/g)	452.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	2.2	4.0	4.8	5.8	6.6	921	1447
BLOOD Pb, CHILD	4.0	7.4	8.7	10.6	12.1	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142814	224549

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	203.4	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.02	1%	1.4E-5	0.01	1%
Soil Ingestion	8.8E-4	0.00	0%	6.3E-4	0.00	0%
Inhalation, bkgrnd		0.05	2%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	38%		0.84	75%
Food Ingestion, bkgrnd		0.22	10%		0.23	21%
Food Ingestion	2.4E-3	1.08	49%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.03	1%		0.00	0%
Soil Ingestion	7.0E-3	0.00	0%	1.4E-2	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	1%		0.04	2%
Water Ingestion		0.96	24%		0.96	64%
Food Ingestion, bkgrnd		0.50	12%		0.50	34%
Food Ingestion	5.5E-3	2.51	62%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-22
Blood Lead Levels Estimated for the Hypothetical Current Onsite Commercial/Industrial Worker Receptor
from Exposure to Surface (0-0.5 ft bgs) Using the USEPA Adult Lead Model
Area 4
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	244	244	244	244
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.9**	**2.1**	**1 9**	**2.1**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.6**	**7.3**	**5.6**	**7.3**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.8%**	**2 1%**	**0.8%**	**2.1%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq.htm#soil%20ingestion%20rate.

Table H-23
Blood Lead Levels Estimated for the Hypothetical Current Offsite Adult and Child Resident Receptor from Exposure to Surface (0-0.5 ft bgs) Using the DTSC LEADSPREAD Model
Area 4
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0282
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	329	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	329	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142800	224535

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day	0.082	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contr bution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contr bution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

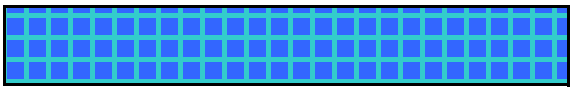
Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-24
Blood Lead Levels Estimated for the Hypothetical Future Onsite Construction Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 4
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	160	160	160	160
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**2.0**	**2.2**	**2.0**	**2.2**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**6.0**	**7.7**	**6.0**	**7.7**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**1.0%**	**2.5%**	**1.0%**	**2.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:

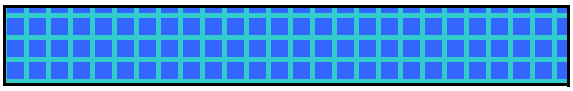
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-25
Blood Lead Levels Estimated for the Hypothetical Future Onsite Utility/Trench Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 4
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	160	160	160	160
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 1	0 1	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 1	0 1
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	20	20	20	20
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.5**	**1.7**	**1.5**	**1.7**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**4.7**	**6.2**	**4.7**	**6.2**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.4%**	**1.3%**	**0.4%**	**1.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day = gram(s) per day
GSDi = Individual Geometric Standard Deviations
Het = Heterogeneous population
Hom = Homogeneous population
PbB = blood lead
ppm = part(s) per million
µg/day = microgram(s) per day
µg/dl = microgram(s) per deciliter
µg/g = microgram(s) per gram
yr = year

References:

U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-26
Blood Lead Levels Estimated for the Hypothetical Future Onsite Commercial/Industrial Worker Receptor
from Exposure to Subsurface (0-10 ft bgs) Soil Using the USEPA Adult Lead Model
Area 4
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	160	160	160	160
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0 9	0 9	0 9	0 9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0 4	0 4	0 4	0 4
GSD_i	X	X	Geometric standard deviation PbB	--	2 1	2 3	2 1	2 3
PbB_0	X	X	Baseline PbB	ug/dL	1 5	1 7	1 5	1 7
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0 050	0 050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0 050	0 050
W_S		X	Weighting factor; fraction of $IR_{S\ D}$ ingested as outdoor soil	--	--	--	1 0	1 0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0 7	0 7
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0 12	0 12	0 12	0 12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**			**ug/dL**	**1.7**	**1.9**	**1.7**	**1.9**
$PbB_{fetal,\ 0.95}$	**95th percentile PbB among fetuses of adult workers**			**ug/dL**	**5.3**	**6.8**	**5.3**	**6.8**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**			**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**			**%**	**0.6%**	**1.8%**	**0.6%**	**1.8%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD})
When $IR_S = IR_{S\ D}$ and $W_S = 1\ 0$, the equations yield the same $PbB_{fetal,0.95}$

***Equation 1, based on Eq. 1, 2 in USEPA (2003).**

PbB_{adult} =	$(PbS*BKSF*IR_{S\ D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (2003).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S\ D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S\ D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,\ 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Notes:
USEPA Adult Lead Model (2003) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.
Soil Ingestion rate (IR_s) from USEPA (2008)

Abbreviations:

g/day =	gram(s) per day	ppm =	part(s) per million
GSDi =	Individual Geometric Standard Deviations	µg/day =	microgram(s) per day
Het =	Heterogeneous population	µg/dl =	microgram(s) per deciliter
Hom =	Homogeneous population	µg/g =	microgram(s) per gram
PbB =	blood lead	yr =	year

References:
U.S. Environmental Protection Agency (USEPA). 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. EPA-540-R-03-001. January.

U.S. Environmental Protection Agency (USEPA), 2008. Internet web page, Addressing Lead at Superfund Sites, Frequently Asked Questions from Risk Assessors on the Adult Lead Methodology (ALM), Accessed April 23, 2008 at: http://www.epa.gov/superfund/lead/almfaq htm#soil%20ingestion%20rate.

Table H-27
Blood Lead Levels Estimated for the Hypothetical Future Offsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 4
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT

MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0281
Lead in Soil/Dust (ug/g)	0.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT

	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.1	2.0	2.4	2.9	3.3	921	1447
BLOOD Pb, CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONA	1.1	2.0	2.4	2.9	3.3	142805	224540

EXPOSURE PARAMETERS

	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day	0.0001	
Soil ingestion	mg/day	0	0
Soil ingestion, pica	mg/day		0
Ingestion constant	(ug/dl)/(ug/day	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	0.0	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation, bkgrnd		0.05	4%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	76%		0.84	76%
Food Ingestion, bkgrnd		0.22	20%		0.23	21%
Food Ingestion	2.4E-3	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contr bution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.00	0%		0.00	0%
Soil Ingestion	0.0E+0	0.00	0%	0.0E+0	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	64%		0.96	64%
Food Ingestion, bkgrnd		0.50	34%		0.50	34%
Food Ingestion	5.5E-3	0.00	0%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week

Table H-28
Blood Lead Levels Estimated for the Hypothetical Future Onsite Adult and Child Resident Receptor from Exposure to Subsurface (0-10 ft bgs) Soil Using the DTSC LEADSPREAD Model
Area 4
Baseline Human Health Risk Assessment
Former CENCO Refinery
Santa Fe Springs, California

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.028
Lead in Soil/Dust (ug/g)	160.0
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.5	2.7	3.2	3.9	4.5	921	1447
BLOOD Pb, CHILD	2.4	4.4	5.2	6.3	7.2	330	558
BLOOD Pb, PICA CHILD	1.5	2.7	3.2	3.9	4.5	330	558
BLOOD Pb, OCCUPATIONAL	1.1	2.0	2.4	2.9	3.3	142814	224549

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.08	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	72.0	

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PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.01	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.00	0%	6.3E-4	0.00	0%
Inhalation, bkgrnd		0.05	3%		0.03	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	56%		0.84	76%
Food Ingestion, bkgrnd		0.22	15%		0.23	21%
Food Ingestion	2.4E-3	0.38	26%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.00	0%
Soil Ingestion	7.0E-3	0.00	0%	1.4E-2	0.00	0%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	2%		0.04	2%
Water Ingestion		0.96	40%		0.96	64%
Food Ingestion, bkgrnd		0.50	21%		0.50	34%
Food Ingestion	5.5E-3	0.89	37%		0.00	0%

Notes:
DTSC Lead Risk Assessment Spreadsheet (version 7, 1999) was used to assess exposure to lead.
Highlighted input values were receptor- and site-specific.

Abbreviations:

cm^2 = square centimeter(s)
dl = deciliter(s)
g = gram(s)
kg = kilogram(s)
l = liter
m^3 = cubic meter(s)
mg = milligram(s)
Pb = lead
PEF = Particular Emission Factor
PRG = Preliminary Remediation Goal
µg = microgram(s)
wk = week