REVISED BASELINE RISK ASSESSMENT

Rohm and Haas Chemicals LLC
Reading, Ohio

EPA ID No. OHD. 000 724 138

Prepared by

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TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1
1.1 OBJECTIVES 1
1.2 APPROACH 1
1.3 REPORT ORGANIZATION 2
2.0 SITE CHARACTERIZATION 3
2.1 SITE HISTORY 3
2.2 PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS 5
2.3 SITE GEOLOGY AND HYDROGEOLOGY 7
2.4 CHEMICAL CHARACTERIZATION 8
2.4.1 Soil 9
2.4.2 Groundwater 10
2.4.3 Surface Water/Seeps 11
2.4.4 Sediment 12
3.0 DATA EVALUATION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN 13
3.1 DATA QUALITY 13
3.2 SELECTION OF CHEMICALS OF POTENTIAL CONCERN 15
3.2.1 Soil 15
3.2.2 Groundwater 17
3.2.3 Surface Water 18
3.2.4 Sediment 19
4.0 EXPOSURE ASSESSMENT 20
4.1 CHARACTERIZATION OF EXPOSURE SETTING 21
4.1.1 Physical Setting 21
4.1.2 Land and Water Use 21
4.1.3 Potential Receptors 23
4.1.3.1 On-Site Receptors 23
4.1.3.2 Off-Site Receptors 23
4.2 IDENTIFICATION OF EXPOSURE PATHWAYS 24
4.2.1 Sources, Mechanisms of Releases, and Mechanisms of Transport 24
4.2.2 Exposure Points and Routes 26
4.2.3 Exposure Pathways 27
4.3 EXPOSURE QUANTIFICATION 29
4.3.1 Exposure Point Concentrations 29
4.3.1.1 Soil 30
4.3.1.2 Groundwater 31
4.3.1.3 Surface Water 31
4.3.1.4 Sediment 31
4.3.1.5 Indoor Air 31
4.3.1.6 Ambient Air 32
4.3.1.7 Fish 32
4.3.2 Exposure Equations 33

TABLE OF CONTENTS
(Continued)

Page

4.3.3 Exposure Parameters 33

5.0 TOXICITY ASSESSMENT 33
5.1 TOXICITY CRITERIA FOR NONCARCINOGENIC HEALTH RISKS 34
5.2 TOXICITY CRITERIA FOR CARCINOGENIC HEALTH RISKS 35
5.3 TOXICITY CRITERIA USED IN HUMAN HEALTH RISK ASSESSMENT 35

6.0 RISK CHARACTERIZATION 37
6.1 NONCARCINOGENIC HEALTH EFFECTS 37
6.2 CARCINOGENIC EFFECTS 40
6.3 UNCERTAINTY ANALYSIS 44
6.3.1 Data Evaluation and Selection of Chemicals of Potential Concern 44
6.3.2 Exposure Assessment 47
6.3.3 Toxicity Assessment 50
6.3.4 Uncertainty Associated with Risk Characterization 52
6.3.5 Conclusions of Uncertainty Analysis 53
6.4 THE POTENTIAL RISK ASSOCIATED WITH MIGRATION OF IMPACTED GROUNDWATER TO SURFACE WATER 53

7.0 SCREENING ECOLOGICAL RISK ASSESSMENT 55
7.1 PROBLEM FORMULATION 56
7.1.1 Environmental Setting 56
7.1.1.1 Terrestrial 56
7.1.1.2 Freshwater Wetlands 58
7.1.1.3 Mill Creek 58
7.1.1.4 Fish and Wildlife Resources 60
7.1.2 Source Areas 62
7.1.3 Fate and Transport 62
7.1.3.1 Physicochemical Properties 64
7.1.3.2 Fate and Transport Mechanisms for Chemicals Detected at the Site 66
7.1.4 Mechanisms of Ecotoxicity and Potential Receptors 71
7.1.5 Exposure Pathways 72
7.1.6 Ecological Receptors 73
7.1.7 Screening Endpoints 74
7.2 CHEMICAL SCREENING 75
7.2.1 Sediment 76
7.2.2 Seep and Surface Water 77
7.2.4 Groundwater to Surface Water 79
7.3 COPEC REFINEMENT 80
7.3.1 Analysis 81
7.3.2 Characterization of Exposure Pathways 82
7.3.2.1 Surface Water and Sediment Exposure Pathways 82
7.3.2.2 Biota Exposure Pathways 83
7.3.3 Exposure Assessment 83

TABLE OF CONTENTS
(Continued)

Page

7.3.4 Assessment of Toxicity of COPECs to Receptors 86
7.4 RISK CHARACTERIZATION AND DISCUSSION 88
7.4.1 Sediment 88
7.4.2 Surface Water 93
7.5 UNCERTAINTIES 94
7.5.1 Preliminary Problem Formulation Analysis of Uncertainty 94
7.5.1.1 Uncertainty Concerning the Selection of COPECs 94
7.5.1.2 Uncertainty Concerning Selection of Exposure Pathways 96
7.5.1.3 Uncertainty Concerning Selection of Ecological Receptors 97
7.5.2 Ecological Effects Evaluation Analysis of Uncertainty 97
7.5.3 Preliminary Exposure Assessment Analysis of Uncertainty 98
7.5.4 Preliminary Risk Characterization Analysis of Uncertainty 99
7.6 ECOLOGICAL SIGNIFICANCE 100
7.7 SCIENTIFIC MANAGEMENT DECISION POINT (SMDP) 103
8.0 CONCLUSIONS 103
9.0 REFERENCES 106

TABLES

Table 1.1 Occurrence, Distribution and Selection of Chemicals of Potential Concern – Soil
Table 1.2 Occurrence, Distribution and Selection of Chemicals of Potential Concern – Groundwater
Table 1.3 Occurrence, Distribution and Selection of Chemicals of Potential Concern – Surface Water
Table 1.4 Occurrence, Distribution and Selection of Chemicals of Potential Concern – Sediment
Table 2 Selection of Exposure Pathways
Table 3.1 Exposure Point Concentration Summary – Soil
Table 3.2 Exposure Point Concentration Summary – Groundwater
Table 3.3 Exposure Point Concentration Summary – Surface Water
Table 3.4 Exposure Point Concentration Summary – Sediment
Table 3.5 Exposure Point Concentration Summary – Soil to Indoor Air
Table 3.6 Exposure Point Concentration Summary – Groundwater to Indoor Air
Table 3.7 Exposure Point Concentration Summary – Soil to Ambient Air
Table 3.8 Exposure Point Concentration Summary – Groundwater to Ambient Air
Table 3.9 Exposure Point Concentration Summary – Fish
Table 4.1 Values Used for Daily Intake Calculations, Soil – Outdoor Worker
Table 4.2 Values Used for Daily Intake Calculations, Soil – Construction Worker
Table 4.3 Values Used for Daily Intake Calculations, Soil to Ambient Air – Outdoor Worker

TABLE OF CONTENTS
(Continued)

Table 4.4 Values Used for Daily Intake Calculations, Soil to Ambient Air – Construction Worker
Table 4.5 Values Used for Daily Intake Calculations, Soil to Indoor Air – Indoor Worker
Table 4.6 Values Used for Daily Intake Calculations, Groundwater – Construction Worker
Table 4.7 Values Used for Daily Intake Calculations, Groundwater to Ambient Air – Outdoor Worker
Table 4.8 Values Used for Daily Intake Calculations, Groundwater to Ambient Air – Construction Worker
Table 4.9 Values Used for Daily Intake Calculations, Groundwater to Indoor Air – Indoor Worker
Table 4.10a Values Used for Daily Intake Calculations, Surface Water– Adult Recreational Wader
Table 4.10b Values Used for Daily Intake Calculations, Surface Water– Child Recreational Wader
Table 4.11a Values Used for Daily Intake Calculations, Sediment - Adult Recreational Wader
Table 4.11b Values Used for Daily Intake Calculations, Sediment - Child Recreational Wader
Table 4.12a Values Used for Daily Intake Calculations, Soil – Ball Field Recreational User (Age 6-13)
Table 4.12b Values Used for Daily Intake Calculations, Soil – Ball Field Recreational User (Age 13-17)
Table 4.13a Values Used for Daily Intake Calculations, Soil to Ambient Air – Ball Field Recreational User (Age 6-13)
Table 4.13b Values Used for Daily Intake Calculations, Soil to Ambient Air – Ball Field Recreational User (Age 13-17)
Table 4.14 Values Used for Daily Intake Calculations, Fish – Adult Recreational Fisherman
Table 5.1 Non-Cancer Toxicity Data – Oral/Dermal
Table 5.2 Non-Cancer Toxicity Data – Inhalation
Table 6.1 Cancer Toxicity Data -- Oral/Dermal
Table 6.2 Cancer Toxicity Data – Inhalation
Table 7.1 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Indoor Worker
Table 7.2 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Outdoor Worker
Table 7.3 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Construction Worker
Table 7.4 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Adult Recreational Wader
Table 7.5 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Child Recreational Wader

TABLE OF CONTENTS
(Continued)

Table 7.6 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Ball Field Recreational User (Age 6-13)
Table 7.7 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Ball Field Recreational User (Age 13-17)
Table 7.8 Calculation of Chemical Cancer Risks and Non-Cancer Hazards, Reasonable Maximum Exposure – Adult Recreational Fisherman
Table 8.1 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Indoor Worker
Table 8.2 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Outdoor Worker
Table 8.3 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Construction Worker
Table 8.4 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Adult Recreational Wader
Table 8.5 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Child Recreational Wader
Table 8.6 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Ball Field Recreational User (Age 6-13)
Table 8.7 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Ball Field Recreational User (Age 13-17)
Table 8.8 Summary of Receptor Risks and Hazards for COPCs, Reasonable Maximum Exposure – Adult Recreational Fisherman
Table 8.9 Comparison of Seep Water Analytical Results and Human Health Surface Water Screening Values
Table 8.10 Comparison of Surface Water Analytical Results and Human Health Surface Water Screening Values
Table 8.11 Comparison of Groundwater Analytical Results and Human Health Surface Water Screening Values
Table 9.1 Plants Identified by Cover Type During Site Reconnaissance
Table 9.2 Reptiles and Amphibians that May Potentially Occur On or Adjacent to the Site Based on Habitat Types Present
Table 9.3 Bird Species that May Potentially Occur On or Adjacent to the Site Based on Habitat Types Present
Table 9.4 Mammal Species that May Potentially Occur On or Adjacent to the Site Based on Habitat Types Present
Table 10.1 Comparison of Sediment and Seep Soil Data to ESLs
Table 10.2 Comparison of Seep and Surface Water Data to ESLs
Table 10.3 Comparison of November 2006 Groundwater Data in the Upper Aquifer to Ohio Surface Water Criteria and Region 5 ESLs
Table 11.1 Determination of Aquatic Plant Tissue Concentrations
Table 11.2 Determination of Benthos Tissue Concentrations
Table 11.3 Determination of Fish Tissue Concentrations

TABLE OF CONTENTS
(Continued)

Table 12 Intake Parameters for the Key Receptor Species
Table 13.1 Estimated Exposure Intake and Hazard Quotient Calculations for the Mallard
Table 13.2 Estimated Exposure Intake and Hazard Quotient Calculations for the Muskrat
Table 13.3 Estimated Exposure Intake and Hazard Quotient Calculations for the Mink
Table 13.4 Estimated Exposure Intake and Hazard Quotient Calculations for the Great Blue Heron
Table 13.5 Estimated Exposure Intake and Hazard Quotient Calculations for the Spotted Sandpiper
Table 14 Toxicity Reference Values (TRVs)
Table 15.1 Toxicity Assessment for Sediment Invertebrates Living in Mill Creek
Table 15.2 Toxicity Assessment for Aquatic Life Living in Mill Creek
Table 16 Comparison of Seep Data to Ohio OMZA and Region 5 ESLs

FIGURES

Figure 1 Site Location Map
Figure 2 On-Site Monitoring Well and Soil Sample Location Map
Figure 3 Mill Creek Sample Location Map
Figure 4 Site Conceptual Model
Figure 5 Conceptual Ecological Site Model

APPENDICES

Appendix A Data Summary for Chemicals Detected in Soil and Sediment Samples
Appendix B Data Summary for Chemicals Detected in Groundwater and Seep Samples
Appendix C Data Summary for Chemicals Detected in Surface Water and Seep Samples
Appendix D Summary of Geotechnical Results
Appendix E Surrogate Compound List
Appendix F Zoning Information and Ohio EPA Source Drinking Water Protection Map
Appendix G Calculation of Exposure Point Concentrations in Soil
Appendix H Chemical/Physical Constants for Chemicals of Potential Concern
Appendix I Vapor Migration Modeling (Johnson and Ettinger Model)
Appendix J Human Health Risk Assessment Calculations
Appendix K Background Sample Information
Appendix L Correspondence With Agencies Concerning Endangered and Threatened Species
Appendix M Aerial Photographs of the Site and Surrounding Vicinity
Appendix N Ecological Effects of Chemicals of Potential Ecological Concern

TABLE OF CONTENTS
(Continued)

ACRONYMS AND ABBREVIATIONS

AADD	annual average daily dose
AO	Administrative Order
AOC	Area of Concern
AST	aboveground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
BCF	bioconcentration factor
BERA	baseline ecological risk assessment
bgs	below ground surface
BSAF	biota-sediment accumulation factor
COPCs	chemicals of potential concern
COPECs	chemicals of potential ecological concern
CSO	combined sewer outfall
CSS	combined sewer system
DERA	detailed ecological risk assessment
DPT	direct push technique
EI	environmental indicator
EPC	exposure point concentration
ESLs	ecological screening levels
FI	Facility Investigation
GI	gastrointestinal
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IRIS	USEPA Integrated Risk Information System
LADD	lifetime average daily dose
LOAEL	lowest observable adverse effect level
MATC	Maximum Acceptable Toxicant Concentration
MCLs	maximum contaminant levels
MRLs	minimum risk levels
µg/l	micrograms per liter
mg/kg	milligrams per kilogram
MSD	Metropolitan Sewer District
NOAA	National Oceanic and Atmospheric Administration

TABLE OF CONTENTS
(Continued)

NOAEC	no observable adverse effect concentration
NOAEL	no observable adverse effect level
OEPA	Ohio Environmental Protection Agency
OMZA	outside the mixing zone average
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
PEC	probable effects concentration
PPRTV	provisional peer reviewed toxicity values
PRGs	USEPA Region 9 Preliminary Remediation Goals
RA	risk assessment
RAGS	Risk Assessment Guidance for Superfund
RBSLs	USEPA Region 5 Risk-Based Screening Levels
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RfCs	reference concentrations
RfDs	reference doses
RFI	RCRA Facility Investigation
RI	remedial investigation
RM	River Mile
RME	reasonable maximum exposure
ROD	Record of Decision
RSL	Regional Screening Level
SCM	site conceptual model
SED-TAL	sediment target analyte list
SERA	screening-level ecological risk assessment
SFs	cancer slope factors
SMDP	scientific management decision point
SQuiRTs	Screening Quick Reference Tables
SQL	sample quantitation limit
SRV	Sediment Reference Value
STSC	Superfund Health Risk Technical Support Center
SVOCs	semivolatile organic compounds
SWMU	solid waste management unit
SW-TAL	surface water target analyte list
TEC	threshold effects concentration
TOC	total organic carbon

TABLE OF CONTENTS
(Continued)

TRV	toxicity reference value
UCL	upper confidence limit
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VOCs	volatile organic compounds
VROM	Dutch Ministry of Housing, Spatial Planning and the Environment

1.0 INTRODUCTION

This updated baseline risk assessment (RA) has been prepared by Parsons on behalf of Rohm and Haas Company (Rohm and Haas) for the Rohm and Haas Chemicals LLC facility (the facility or the Rohm and Haas Facility) at 2000 West Street in Reading, Ohio (formerly known as the Morton International, Inc. Facility; Figure 1). The updated baseline RA was performed to address the United States Environmental Protection Agency's (USEPA's) comments on the June 2002 baseline RA performed by Geomatrix Consultants, Inc. (Geomatrix) and the Revised BRAs performed by Parsons in June 2005 and August 2007. This updated BRA incorporates data collected from additional investigations performed subsequent to the original and revised BRAs. The additional site investigations were performed to further define the nature and extent of impact to seeps in the east bank of Mill Creek, and to surface water and sediments within the creek; the nature and extent of impacts to on-site shallow (<15 feet) soils and groundwater; the nature and extent of any buried wastes; and the presence and location of human and ecological receptors.

The site has engaged in the manufacture of chemical products since approximately 1950, and has been operated by Rohm and Haas Chemicals LLC, a wholly owned subsidiary of Rohm and Haas Company, or a related entity from the 1980s to the present. This baseline RA has been prepared to meet the requirements of a Section 3013 Administrative Order (AO) issued to Rohm and Haas on August 18, 2000.

1.1 OBJECTIVES

The purpose of this baseline RA is to provide an analysis of the potential for adverse human health and ecological effects as a result of potential exposure to chemicals in soil and ground-water at the facility and in sediment and seeps at Mill Creek, which is adjacent to the facility. As a baseline RA, it presents an assessment of potential adverse human health effects and a screening evaluation of potential ecological effects under the no-action alternative; that is, the potential effects that may result if no further corrective action of the Rohm and Haas Facility were to take place. The results of this assessment will indicate if further evaluation, controls, or remediation may be necessary.

1.2 APPROACH

A quantitative human health risk assessment (HHRA) and screening ecological risk assessment (SERA) were conducted to evaluate chemicals detected in soil and groundwater at the Rohm and Haas Facility and chemicals detected in seeps and the surface water and sediments of the

Mill Creek. This baseline RA follows standard and customary practice according to USEPA guidelines for the performance of risk assessments as specified in the following documents:

> Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). (USEPA, 1989a).
>
> Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part D: Standardized Planning, Reporting, and Review of Superfund Risk Assessments), Final. (USEPA, 2001a).
>
> Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment), Final. (USEPA, 2004a).
>
> Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments "ERAGS" (USEPA, 1997d).
>
> Guidelines for Ecological Risk Assessments. (USEPA, 1998b).
>
> Guidelines for Characterizing Background Chemicals in Soil at Superfund Sites. (USEPA, 2001b); and
>
> Role of Screening Level Ecological Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments (USEPA, 2001c).

These documents were supplemented by additional USEPA guidance as necessary. Other guidance documents that were consulted are referenced in appropriate sections and presented in Section 9.0.

1.3 REPORT ORGANIZATION

This report is organized in a manner consistent with the referenced guidance documents. The remaining sections of the report are as follows:

- Section 2.0 – Site Characterization summarizes background information for the site, including location and description, geology and hydrogeology, land and water use, and previous investigations.
- Section 3.0 – Data Evaluation – Human Health Risk Assessment presents an evaluation of the data and the selection of the chemicals of potential concern that are evaluated in the human health risk assessment.
- Section 4.0 – Exposure Assessment – Human Health Risk Assessment presents the analysis of the mechanisms by which human receptors may be exposed to chemicals at this site.

- Section 5.0 – Toxicity Assessment – Human Health Risk Assessment presents the quantitative criteria developed by USEPA to evaluate potential adverse health effects of chemicals.
- Section 6.0 – Risk Characterization – Human Health Risk Assessment presents the results of the quantitative analysis of potential carcinogenic and non-carcinogenic risks to human health and a description of the uncertainty associated with those estimates.
- Section 7.0 – Screening Ecological Risk Assessment presents the process for identification of potential ecological receptors and exposure pathways, screening of chemicals detected at the site, and identification of potential ecological receptors at the site.
- Section 8.0 – Conclusions presents the results of the baseline RA.
- Section 9.0 – References presents the sources of information cited in the text.

2.0 SITE CHARACTERIZATION

Information summarized in this section is based on the Current Conditions Report (Geomatrix, 2000a), the Facility Investigation (FI) Work Plan (Geomatrix, 2000b), the FI Report (Geomatrix, 2002), the Supplemental FI Work Plan (Geomatrix, 2003), and the revised FI report (Geomatrix, 2004). More detailed information is available in these reports.

The Rohm and Haas Facility consists of a single tract of land totaling 34 acres. Approximately 27 acres comprise the fenced, operational area of the facility and the remaining 7 acres contain baseball fields used by the City of Reading. Chemical products continue to be manufactured at the site 24 hours per day, 7 days per week. The operational portion of the facility consists of approximately 28 buildings, including process, warehouse, office, laboratory, and waste treatment operational structures. The facility also includes approximately 70 aboveground storage tanks (ASTs) for feedstock, product, and waste storage. There are no active underground storage tanks (USTs) at the facility; three previous USTs have been removed or closed in place. The layout of the facility is presented on Figure 2.

2.1 SITE HISTORY

The Rohm and Haas Facility was constructed in 1949 and commenced chemical manufacture operations in 1950. Prior to 1949, the northern portion of the property was used as a winery or distillery, and reportedly as a smokehouse and fireworks manufacturer. The southern portion of the property was a dairy, farm, and milk bottling facility.

Cincinnati Milling Machine Co., Inc. originally developed the Rohm and Haas Facility for chemical operations associated with the Carlisle Chemical Works, which was acquired in 1948. The operation retained the Carlisle Chemical Works name from 1949 to 1970. The name was changed to Cincinnati Milacron Chemicals, Inc. in 1970 as part of the division of Cincinnati Milling Machine Co., Inc. into separate business entities. It operated under that name until 1980, when Carstab, a subsidiary of Thiokol, Inc. (Thiokol), purchased it. Morton International, Inc. and Thiokol merged in 1982, but separated in 1989, at which time Morton retained the ownership and operation of the facility. In 1999, Rohm and Haas purchased all of Morton's assets, and Morton became a wholly-owned subsidiary of Rohm and Haas.

The following chemical products have been manufactured at the Rohm and Haas Facility since approximately 1950:

- Synthetic waxes, used as lubricants in plastic extrusion processes and defoamers in the paper industry;
- Asphalt additives, specifically anti-stripping agents;
- Antioxidants (this process has been sold to another manufacturer and is anticipated to be terminated at the facility);
- Phosphonium salts, used as catalysts for epoxy and powder coatings; and
- Plastic stabilizers, specifically organotin and cyoglycolate organotin stabilizers.

The raw materials used to manufacture these products include metallic tin, methylene chloride, chlorine, ammonia, 2-mercaptyl ethanol, tall oil fatty acid, 2-ethyl hexanol, thioglycolic acid, ethylene diamine, stearic acid, paraffin waxes, ethyl chloride, benzyl chloride, triphenyl phosphene, and others. Chemical intermediates produced on-site include stannic chloride, dimethyl tin dichloride, esters, and glycolates. The Rohm and Haas facility has never been involved in the manufacture, blending, or compounding of pesticides or herbicides, mercury, methyl mercury or tributyltin (oxide). The pesticides and herbicides, which have been detected at low concentrations at and near the site, are likely associated with activities pre-dating chemical manufacture at the site (i.e., dairy farming) or the result of surface water run-off and aerial drift from surrounding industrial use and commercial and/or residential applications of these chemicals. This conclusion is based on the scattered and low concentrations of these compounds that have been detected at the site and the fact that there are no site records indicating manufacture, storage or spills of such compounds at the Site. In addition, it is

known that pesticides have been stored and handled at the adjacent Pristine and Cincinnati Drum facilities.

For a more detailed discussion of the chemical products used and manufactured at the facility, please refer to the Supplemental Remedial Investigation (RI) report (Geomatrix, 2004).

2.2 PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

As described in the Current Conditions Report, several investigations were conducted at the facility between 1976 and 1992. These investigations included:

- Interviews with plant personnel;
- Collection and analysis of soil samples;
- Collection and analysis of samples from the Mill Creek bank;
- Collection and analysis of samples from Mill Creek seeps;
- Collection and analysis of surface water samples from Mill Creek;
- Installation of monitoring wells and collection and analysis of groundwater samples; and
- Collection and analysis of sediment samples from Mill Creek and its tributary streams.

TechLaw conducted a "Preliminary Assessment/Visual Site Inspection" in 1998 (TechLaw, 1998), but no samples were collected at the site at that time.

In 2001 and 2002, Geomatrix conducted a facility-wide investigation based on the scope of work outlined in the "Facility Investigation (FI) Work Plan" (Geomatrix, 2000b). The FI was performed to comply with the AO objective to "ascertain the nature and extent of the hazard posed by the hazardous wastes that are present at or that may have been released from the study areas at the facility." Comprehensive sampling and analysis was implemented to provide current information on the concentrations of chemicals in soil and groundwater at the operational 27 acres, and in sediments and seep water at Mill Creek. The results of the FI are summarized in Section 2.4 and presented in detail in the FI Report.

In October 2002 and November 2003, Rohm and Haas performed groundwater monitoring of the Upper Aquifer wells. In October 2002, a pumping test was performed to evaluate the effectiveness of the French drain. Both the monitoring and the pumping test were performed

proactively by Rohm and Haas (i.e., these monitoring events were not required by the USEPA or the AO).

In March, April, and May 2004, Geomatrix performed additional site investigation activities based on the scope of work outlined in the "Supplemental FI Work Plan with Addendum 1" (Geomatrix, 2003). The revised FI was performed to "evaluate whether the migration of impacted groundwater is under control", and to "evaluate whether current risks to human health and the environment are within acceptable limits". The Supplemental FI consisted of the following field investigation activities:

- Installation of two on-site Upper Aquifer wells completed in the Deep Upper Aquifer Sands;
- Advancement of 3 on-site stratigraphic borings into the Deep Upper Sands, or through these sands to the Lower Aquifer;
- Advancement of 42 on-site direct push technique (DPT) borings, and 10 on-site shallow hand auger borings;
- Analysis of 6 creek bed sediment samples from Mill Creek (excluding duplicates and QA/QC samples);
- Analysis of 6 surface water samples from Mill Creek (excluding duplicates and QA/QC samples);
- Analysis of 38 soil samples (excluding duplicates and QA/QC samples);
- Analysis of one DPT groundwater sample, and 39 groundwater samples (excluding duplicates and QA/QC samples).

The results of the Supplemental FI are summarized in Section 2.4 and presented in detail in the Revised FI Report.

Concurrent with the Supplemental FI, soils exhibiting elevated metal levels at the T-1 trench location, which had been identified during the initial FI activities, were excavated and removed. This Interim Measure was performed proactively by Rohm and Haas to remove soils exhibiting the highest known levels of metals at the Rohm and Haas Facility, thereby mitigating potential

risks to construction or on-site workers. As a result, the soil data from within the excavated area has been removed from the sample set for the purpose of this Baseline RA.

Based on negotiations in the early 1980s between Thiokol and the Ohio Environmental Protection Agency (OEPA), Thiokol agreed to install a hydraulic control system in the western portion of the facility. The purpose of this system was to reduce or eliminate the volume of impacted shallow groundwater migrating to seeps on the eastern bank of Mill Creek. The system became operational at full scale in 1985, and consists of the following:

- an approximately 500-foot long French drain extending to a depth of 21 feet along the western property boundary starting at the northwest corner of the facility;
- a collection sump at the southern end of the French drain;
- an Upper Aquifer extraction well in the west-central portion of the facility; and
- an approximately 350-foot long slurry wall that extends along the northern property boundary starting at the northwest corner of the facility.

2.3 SITE GEOLOGY AND HYDROGEOLOGY

The shallow transmissive strata at the Rohm and Haas Facility consist of interbedded sand, gravel, silt, and clay outwash, till, and lacustrine deposits present within a buried valley. The valley is oriented generally north-south, along the course of Mill Creek; its boundaries comprise relatively non-transmissive shale and limestone bedrock. The outwash deposits range from approximately 130 to 160 feet thick, but pinch out to the east and west of the site, at the margins of the buried valley.

Parties historically performing investigation and remediation activities in the site vicinity have divided the glacial deposits into two aquifers: the Upper and the Lower. This classification has continued to be utilized for the FI and other activities performed in compliance with the AO.

The Upper Aquifer consists of transmissive interbeds within the shallow lacustrine deposits. The overall thickness of this aquifer is typically 50 to over 100 feet in the vicinity of the facility. For any given location within the Rohm and Haas Facility, from one to four sand or gravelly sand interbeds may be present. Communication between deeper interbeds and the Lower Aquifer is generally good; little to no direct communication is present between the shallow interbeds and the Lower Aquifer (Geomatrix, 2002). A portion of the Upper Aquifer crops out in the Mill Creek bank west of the facility. Given that Upper Aquifer groundwater flow at the facility is predominantly to the west (i.e., toward the creek), groundwater underlying

the Rohm and Haas Facility is historically believed to have formed seeps along this outcrop. A groundwater collection system installed along the west facility boundary in 1985 reduces groundwater flow. There is no known use of the Upper Aquifer for water supply purposes in the vicinity of the facility.

The Lower Aquifer is generally divided into an upper and lower portion based on lithology. The upper portion predominately is comprised of silty sand and is reportedly not used for local water supply. The lower portion is typically screened by local production wells, and predominantly comprised of sands and gravels (CDM, 1986). The City of Reading formerly utilized local wells screened in this zone to produce their municipal water supply. Use of these wells has been discontinued due to environmental impact to Lower Aquifer groundwater. There are currently no known active supply wells at or in the immediate vicinity of the Rohm and Haas Facility. Lower Aquifer groundwater continues to be used, however, by municipalities within three miles of the Rohm and Haas Facility.

The thickness of the Lower Aquifer varies from approximately 17 to 122 feet in the immediate vicinity of the Rohm and Haas Facility, with a mean thickness of approximately 80 feet (Conestoga-Rovers, 1996). The overall groundwater gradient within the Lower Aquifer is to the south (E&E, 1991), along the Mill Creek valley. Its gradient and groundwater flow direction are strongly affected, however, by local pumping. In the vicinity of the Rohm and Haas Facility, the pumping of remediation wells for the Pristine Superfund Site [Pristine], located immediately north of the Rohm and Haas Facility, predominantly controls the gradient. The capture zone from these wells encompasses the entire Rohm and Haas Facility property (Conestoga-Rovers, 2000).

2.4 CHEMICAL CHARACTERIZATION

This section briefly summarizes the nature and extent of chemicals detected in each medium at the site for purposes of providing context to the human health risk assessment. Five categories of compounds were analyzed during the FI and revised facility investigation: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides and polychlorinated biphenyls (PCBs), chlorinated dioxin/furans, and inorganics. No chlorinated dioxins were detected in any samples, soil or groundwater. Summary tables of the chemicals detected in each medium are provided (Tables 1.1 through 1.4). These tables include the chemical name, the total number of samples analyzed, the total number of detections, the frequency of detection, the range of detection limits, and the range of concentrations detected. USEPA (1989a) states, “Chemicals that are infrequently detected may be artifacts in the data

due to sampling, analytical, or other problems...." For the purpose of discussing the data, chemicals detected in less than five percent of the samples were eliminated from further consideration in the quantitative risk calculations in accordance with USEPA guidance (USEPA, 1989a); however, chemicals that were detected at a frequency of <5% but had one or more detections that were above applicable screening criteria are also discussed in the Uncertainty Section (Section 6.3) of this report.

2.4.1 Soil

Table 1.1 presents a summary of the soil data used in the human health portion of the risk assessment for the Rohm and Haas Facility. Soil samples were collected from the surface to the groundwater table [up to 24 feet below ground surface (bgs)]. Soil samples collected below these depths are not included in this summary because they are below the water table, which is not relevant for the purpose of risk assessment. Up to 137 soil samples on site were analyzed, depending upon the analyte. An additional 20 samples were collected from off-site locations to develop site-specific background concentrations; however, the background samples are not included in Table 1.1 since background was not used for risk screening. The locations of soil samples are illustrated in Figure 2. Note that two samples that are shown are Figure 2 (DP21 and DP22) were part of the 10 exploratory borings that were completed in the northeast portion of the facility. These two borings were installed to gain a better understanding of the shallow (<25 feet bgs) site stratigraphy, particularly the upper boundaries of the shallowest Upper Aquifer sand. No chemical data were collected from DP21 and DP22. The soil analytical results are presented in Appendix A.

Twenty-eight VOCs were detected in soil; however, only thirteen VOCs were detected at a frequency greater than 5 percent. Acetone, toluene, chlorobenzene, methylene chloride and xylenes were the most frequently detected compounds (detected in 53, 42, 36, 26 and 24 samples, respectively, out of a total of 126 samples). The maximum concentrations of 1,2-dichlorobenzene (2,800 milligrams per kilogram [mg/kg]), toluene (240 mg/kg) and 1,4-dichlorobenzene (170 mg/kg) were detected in samples between 9 and 10.5 feet bgs.

Twenty-nine SVOCs were detected in soil; however, only ten SVOCs were detected at a frequency greater than 5 percent of 126 soil samples collected. Bis(2-ethylhexyl)phthalate, fluoranthene, pyrene, phenanthrene and benzo(b)fluoranthene were the most frequently detected (in 20, 15, 13, 11 and 11 samples, respectively). The maximum concentration of bis(2-ethylhexyl)phthalate (150 mg/kg) was detected at 12.5 bgs.

Five PCB mixtures were detected in soil; however only one (Aroclor-1254) was detected in more than five percent of the 126 soil samples. The maximum detected concentration was 0.98 mg/kg at location UAW17-40, at a depth of 1.5 feet bgs.

Of the twenty-two pesticides detected, only gamma-Chlordane, 4,4'-DDE, endosulfan sulfate, endrin, endrin ketone, and methoxychlor were detected in more than five percent of the samples analyzed. Maximum concentrations of gamma-Chlordane (1.7 mg/kg), 4.4'-DDE (0.2 mg/kg), endosulfan sulfate (0.48 mg/kg), endrin (3.1 mg/kg), endrin ketone (1 mg/kg) and methoxychlor (5.5 mg/kg) were detected in samples between 9.5 and 13.5 feet bgs.

Twenty-four of twenty-five inorganics were detected at a frequency greater than five percent of the samples analyzed. Only silver was detected at a frequency of less than five percent. Inorganics are expected as they occur naturally in soil. Maximum observed concentrations of arsenic (16.2 mg/kg), lead (780 mg/kg), and tin (12,700 mg/kg) were detected in samples at a depth of 1.5 feet bgs.

Four additional soil samples were collected in March-April 2004 and analyzed for hexavalent chromium. The soil sample results (Appendix A) confirmed that the chromium observed at the facility is present almost exclusively in the trivalent form. Hexavalent chromium was observed in only two samples, DP-54-1-1.5' and DP55-9', at qualified low concentrations (0.35 [B] mg/kg and 0.56 [B] mg/kg, respectively). Trivalent chromium concentrations in the same samples were measured at 217 (J) mg/kg and 6.3 (J) mg/kg. Therefore, total chromium is assumed to consist primarily of trivalent chromium for purposes of assessing risks.

2.4.2 Groundwater

Only shallow groundwater data from the Upper Aquifer were considered in the risk assessment (wells with screened intervals designated at or less than 30 feet bgs). Water in Upper Aquifer wells screened more than 30 feet bgs was not considered a potential source of vapors or direct contact (Section 4.1.2). Chemicals associated with the Rohm and Haas Facility were not detected in the Lower Aquifer as discussed in the FI Report and the RCRA Facility Investigation (RFI). Groundwater data generally represent eight monitoring events at approximately 25 shallow wells (over 190 samples), conducted between May 2001 through November 2006. The groundwater data are presented in Table 1.2 and discussed below by chemical category. The locations of monitoring wells are illustrated in Figure 2. The groundwater analytical results are presented in Appendix B.

Thirty VOCs were detected in groundwater and twenty-four VOCs were detected at a frequency greater than 5 percent of the samples analyzed. The most frequently detected compounds were chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, and toluene. The chemicals that had the highest detected concentrations among VOCs are as follows: acetone (45,000 micrograms per liter [µg/l]), toluene (24,000 µg/l), chlorobenzene (4,500 µg/l), 1,2-dichlorobenzene (1,900 µg/l) and 2-butanone (750 µg/l). Maximum concentrations of other VOCs detected were less than 1,000 µg/l.

Eighteen SVOCs were detected in shallow groundwater; however, only four SVOCs were detected at a frequency greater than 5 percent of the samples analyzed. Aniline, caprolactam, bis(2-ethylhexyl)phthalate and 4-methylphenol were detected in 57, 31, 23 and 12 samples, respectively. Except for aniline (12,000 µg/l), the maximum concentrations of SVOCs detected were all less than 400 µg/l.

One PCB, Aroclor 1242, was detected in shallow groundwater; however, it was detected at a frequency less than 5 percent of a total of 123 samples. The maximum concentration of Aroclor 1242 was 130 µg/l.

Twenty pesticides were detected in shallow groundwater and nine pesticides of these were detected at a frequency greater than 5 percent of the samples analyzed. Beta-BHC, heptachlor epoxide, Endosulfan II, heptachlor, and 4,4'-DDD were the most frequently detected compounds (detected in 29, 14, 17, 14, and 14 samples, respectively. Except for beta-BHC (12 µg/l), heptachlor (6 µg/l) and dieldrin (2.7 µg/l), the detections of pesticides were equal or less than 1 µg/l.

Twenty-four out of twenty-six inorganics were detected in shallow groundwater samples at a frequency greater than five percent of the samples analyzed. Hexavalent chromium was only analyzed in seven samples but it was not detected in any of those samples. Silver was detected in only three of 170 samples analyzed. The maximum detected concentrations of the metals are presented in Table 1.2.

2.4.3 Surface Water/Seeps

Chemicals potentially migrating from the site to surface water were assessed based on surface water samples (WS-1A to WS-6A) collected from Mill Creek in March 2004. Based on the industrial nature of the surrounding area, known impacts to Mill Creek from multiple sources, and the numerous sewer discharges to Mill Creek, samples from the creek may not be

representative of potential discharges from the site. Based on the small sample set, any chemical detected was characterized as being detected frequently. As shown on Table 1.3, six VOCs, two SVOCs, no pesticides, and 8 inorganics were detected in surface water samples collected from Mill Creek. Concentrations of VOCs, and SVOCs were low, less than 2 µg/l, except for acetone, which was detected at 6.3 µg/l. The locations of surface water samples are illustrated in Figure 3. The surface water analytical results are presented in Appendix C.

Two seep samples (SS-1 and SS-5) were collected along Mill Creek's bank in November 2001. For the Mill Creek seeps, both the physical extent (maximum of a few feet across) and the volume of water being discharged (no apparent flow) are small. These seeps were only present during portions of the year, were very localized, and were volumetrically insignificant compared to the volume of water passing them in Mill Creek. Therefore, direct human exposure to these seeps was considered an incomplete exposure pathway. The seep analytical results are presented in Appendix B. Previously, seep data were used to evaluate the surface water impact due to the lack of direct surface water data for the human health portion of the risk assessment. In this revised human health risk assessment, direct surface water data from the Mill Creek are used for the evaluation because of the limited physical areal extent of the seeps and low to no visible flow.

2.4.4 Sediment

Table 1.4 presents a summary of the sediment data for the Rohm and Haas Facility collected from along Mill Creek. In general, 26 sediment samples were collected and analyzed for all constituents except SVOCs. SVOCs were analyzed in all six samples collected in 2004 and only analyzed in one sample (SS-12) in 2001 and 2002. Based on the small sample set, any chemical detected was included for evaluation in the risk assessment. The locations of sediment samples are illustrated in Figure 3. The sediment analytical results are presented in Appendix A.

Ten VOCs were detected in 26 sediment samples collected from Mill Creek. Acetone (8 samples) and chlorobenzene (5 samples) were detected most frequently, both at a maximum concentration of 0.018 mg/kg. Maximum detected concentrations of VOCs were primarily in samples SS-1 and SS-4.

Twenty-four SVOCs were detected in seven sediment samples. The highest concentration polycyclic aromatic hydrocarbons (PAHs) were anthracene (1.3 mg/kg), benzo(a)anthracene (1.4 mg/kg), benzo(a)pyrene (1.2 mg/kg), benzo(b)fluoranthene (1.3 mg/kg), chrysene (1.7

mg/kg), fluoranthene (4.6 mg/kg), phenanthrene (4.8 mg/kg) and pyrene (3.1 mg/kg). These PAHs were all detected in the sample from the CS-2A location.

Nine pesticides and two PCB mixtures were detected in at least one of 26 samples collected from Mill Creek. 4,4'-DDE was detected most frequently, in 7 samples. The maximum concentration of 4,4'-DDE detected was 0.023 mg/kg.

Twenty-three inorganics were detected in 26 sediment samples collected from Mill Creek. Maximum concentrations occurred at SS-12 for 10 of the inorganics and at SS-4 for five of the inorganics.

3.0 DATA EVALUATION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Data evaluation is the process of analyzing site characteristics and analytical data to identify chemicals of potential concern (COPCs) to be evaluated in the HHRA. This section of the report identifies data of sufficient quality for use in the risk assessment, summarizes the chemical characterization of each environmental medium at the site, and provides a summary of all COPCs identified at the site by medium.

3.1 DATA QUALITY

The first step in this process is to identify and evaluate all of the available data to determine if they are of sufficient quality for inclusion in the risk assessment. Analytical data collected as part of the FI conducted in 2001 and 2002, the RFI conducted in 2003 and 2004 and additional groundwater monitoring conducted in November 2004, November 2005 and November 2006 were considered in this evaluation. Samples from previous Rohm and Haas Facility investigations are between 10 and 26 years old; many were collected prior to implementation of the groundwater remediation system. The more recent Pristine data does not address the Upper Aquifer groundwater. These data were not considered a valid representation of current site conditions. The FI was designed to provide comprehensive sampling results for the facility, and as such, were the only data considered in the baseline RA.

The following criteria were considered in evaluating analytical data collected as part of the FI.

- **Blank contamination** is evaluated based on the results of field and laboratory blank data. Typically, common laboratory contaminants [e.g., acetone and bis(2-ethyl-hexyl)phthalate] are eliminated if detected concentrations are within ten times the associated blank concentrations (USEPA, 1989a). All other chemicals are elimi-

nated if detected concentrations are within five times blank concentrations (USEPA, 1989a).

- **Sample quantitation limits (SQLs)** must be sufficiently low such that chemicals can be detected at levels of potential concern. All data are reviewed to determine if SQLs are sufficiently low.

Blank contamination, as designated by the laboratory, occurred in soil, groundwater, seeps, and sediments. Typically, detections in blank samples correlated with chemicals that are known or expected to be COPCs at the site (e.g., acetone and methylene chloride). For these chemicals, chemical data were used in the risk assessment without qualification; these detections were considered to be representative of site conditions. One exception was the detection of tetra-chloroethene (PCE) in trench samples (T-6-7.5 and T-6-10) and in associated blank samples. PCE was detected at concentrations comparable to those in the method blank; these detections of PCE were not considered valid representations of site conditions and were not evaluated in the risk assessment.

SQLs varied with analyses and samples. In general, at least 50 percent of the nondetect results met the SQLs for the project for each analyte detected. The detection limits exceeded the SQLs in a majority of samples for the following chemicals detected at the site:

- benzo(a)pyrene, dibenz(a,h)anthracene, and thallium in soil;
- 1,3-dichlorobenzene, 2-methylphenol, bis(2-ethylhexyl)phthalate, aldrin, alpha-BHC, beta-BHC, dieldrin, Aroclor1242, antimony, beryllium and thallium in groundwater;
- beta-BHC and thallium in sediment; and
- dieldrin and heptachlor epoxide in seep samples.

These exceedances represent a limitation on the analytical method to consistently quantify the sampling results. Detection limits, whether or not they were elevated, were used to characterize representative concentrations for COPCs in soil.

Soils data collected between 0 and 15 ft bgs ("mixed soil") were incorporated into the COPC evaluation. It was assumed that intrusive construction workers could be exposed to COPCs in the mixed soils (0-15 ft bgs); however, nonintrusive commercial/industrial workers were assumed to be exposed to COPCs in surface soils (0-2 ft bgs) only. Three samples (STR-01-21, STR-04-17.5, and STR-07-18) that were collected between 15 feet bgs and the maximum

reported depth to groundwater (24 feet bgs) were not considered in the analysis. All soil samples detected within the vadose zone were evaluated for the indoor air exposure pathway. Also, as discussed in Section 2.4, groundwater samples from wells screened at depths greater than 30 feet bgs were not considered in development of representative concentrations in groundwater. Groundwater greater than 30 feet bgs would not be the first water encountered so it would not be a significant source of VOCs to indoor air or the first source for direct contact.

3.2 SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Not all chemicals detected at a site warrant a quantitative evaluation. In many cases, chemicals are detected at such low concentrations as to pose negligible risk, and may be eliminated from further consideration. Chemicals posing negligible risk were identified for each environmental medium by comparing detected concentrations to risk-based screening criteria. The following sections summarize the selection of COPCs for each medium. For the purpose of identifying COPCs, the maximum chemical concentration detected in each media was used as the point of comparison. At the request of USEPA, chemicals exceeding screening criteria were not eliminated as COPCs even if they were thought to be associated with off-site sources or were consistent with chemicals in background soil, however, the impact on the risk assessment from the inclusion of these chemicals is discussed in the risk characterization and/or uncertainty section of this report (i.e., pesticides, PAHs and PCBs).

3.2.1 Soil

Several tiers of screening criteria were used to identify COPCs in soil. These included toxicity, frequency of detection, classification as an essential nutrient, or surrogate toxicity data. Although site-specific background values were established for soil, background concentrations were not used for the purpose of screening chemicals in soil. Table 1.1 summarizes the chemicals detected in soil for the site and the rationale for selecting COPCs.

The toxicity screening criteria used to identify COPCs in soil were outlined in the FI Work Plan (Geomatrix, 2000b). Specifically, the USEPA Region 9 Preliminary Remediation Goals (PRGs) were considered as initial screening criteria (USEPA, 2004b). The USEPA Region 5 Risk-Based Screening Levels (RBSLs; USEPA, 1998b) used in the original risk assessment are soil criteria based on residential land use and the protection of groundwater used as a drinking water source. Region 5 RBSLs were not used for screening in this revised risk assessment since updated Region 9 PRGs were available. Since the re-screening with Region 9 PRGs (USEPA, 2004) was conducted, the Region 9 PRGs have been harmonized with similar risk-

based screening levels used by Regions 3 and 6 into the Regional Screening Levels (RSLs) and are updated periodically (September 2008, April and December 2009, and May 2010). Thus, rather than re-screening the data for a third time, the updated RSLs were used only when additional evaluation of the data was required, such as the groundwater migration to surface water and the surface water exposure pathways. This approach is consistent with the EPA guidelines.

Both the PRGs and RSLs are criteria based on residential or industrial land use. Because the Rohm and Haas Facility will continue to be an active industrial facility, the PRGs/RSLs based on ingestion, dermal contact, and inhalation under residential land use are not appropriate screening criteria for this facility. Thus, industrial land use PRGs/RSLs were used as the screening criteria for selection of COPCs, except for the recreational ball field user. Residential PRGs were used to screen the soil data collected from areas near the ball field for this receptor. Although shallow groundwater is not used (and is not anticipated to be used) as a drinking water source, the lower of the soil leaching-to-groundwater or the risk-based PRGs were selected as the initial screening level.

Using the toxicity screening approach for the industrialized areas of the site, sixty organic chemicals were eliminated as COPCs in soil because these chemicals were not detected above the respective screening criteria. Twelve additional chemicals were eliminated as COPCs in soil based on frequency of detection: acrylonitrile, iodomethane, tetrachloroethene, 2,4-dimethylphenol, dibenz(a,h)anthracene, aldrin, alpha-BHC, beta-BHC, gamma-BHC, chlorobenzilate, dieldrin, and endosulfan II. These chemicals were detected in less than 5 percent of samples and therefore eliminated per USEPA guidance (USEPA, 1989a).

Calcium, magnesium, potassium, and sodium were eliminated as COPCs because they are considered essential nutrients. Surrogate compound screening levels were used for the chemicals without toxicity data based on structural and toxicological similarities of the chemicals. Methylbromide was used as a surrogate compound for iodomethane, acenaphthene was used for acenaphthylene, fluoranthene was used for benzo(ghi)perylene, naphthalene was used for 2-methylnaphthalene, anthracene was used for phenanthrene, chlordane was used for alpha- and gamma-chlordane, endosulfan was used for endosulfan I, endosulfan II, and endosulfan sulfate, endrin was used for endrin aldehyde and endrin ketone, and aldrin was used for isodrin. Detailed discussions on surrogate determinations are included in Appendix E.

With the above compounds eliminated, sixteen COPCs were identified in soil for the industrialized area: acetone, benzene, chlorobenzene, methylene chloride, toluene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, 1,2-dichlorobenzene, 1,4-dichlorobenzene, Aroclor 1254, endrin, antimony, arsenic and chromium. The locations of maximum COPC concentrations are identified in Table 1.1.

The previous risk assessment performed in 2002 included the T-1 trench data. The trench was excavated during the additional site investigation activities; therefore, T-1 trench data were not used in this revised risk assessment. Soil analytical results collected from T-1-4 and T-1-6 were replaced with the confirmatory soil samples (T-1B2-8', T-1E-2-6', T-1N-6', T-1NE-4', and T-1W2-6') collected after the excavation.

For the recreational ball field user, surface soil data (<2 feet) collected near adjacent ball fields including sample location UAW09-20-1.5', and five background soil samples (B01-1.5', B02-1.5', B03-1.5', B04-1.5' and B05-1.5') were used for the selection of COPCs for this receptor. Residential Region 9 PRGs were used as the screening values. Benzo(a)pyrene and arsenic were identified as the COPCs for a recreational ball field user. The surface soil data are included in Appendix A, and the COPC screening table is included in Part E of Appendix J.

3.2.2 Groundwater

Screening criteria used to identify COPCs in groundwater included toxicity, frequency of detection, classification as an essential nutrient, or surrogate toxicity data. Table 1.2 summarizes the chemicals detected in groundwater for the site and the rationale for selecting COPCs.

Chemicals detected in groundwater were compared to 2005 federal Maximum Contaminant Levels (MCLs) for drinking water, or to 2004 USEPA Region 9 PRGs for tap water if an MCL was not available. Chemicals detected in groundwater were considered COPCs if the maximum concentrations exceed the MCL or, in the absence of an MCL, the PRG. Forty-eight chemicals were excluded as COPCs because they were detected below the screening levels. Eight additional chemicals were excluded as COPCs because they were infrequently detected (2-methylnaphthalene, naphthalene, aldrin, Aroclor 1242, alpha-BHC, carbon tetrachloride, 1,1,2-trichloroethane, and isodrin). In addition, some chemicals were excluded as essential nutrients (calcium, manganese, potassium, and sodium). Surrogate compound toxicity values are used for compounds without toxicity data based on structural and toxicological similarities.

Alpha-BHC was used as a surrogate for delta-BHC, chlordane was used for alpha chlordane, endosulfan was used for endosulfan I and II, endrin was used for endrin aldehyde and endrin ketone, and aldrin was used for isodrin. Detailed discussions on surrogate determinations are included in Appendix E.

Table 1.2 presents the 34 COPCs identified in groundwater: acetone, benzene, chlorobenzene, chloroform, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, methylene chloride, tetrachloroethene, toluene, trichloroethene, vinyl chloride, aniline, bis(2-ethylhexyl) phthalate, 4-methylphenol, beta-BHC, delta-BHC, 4,4'-DDE, gamma-BHC, dieldrin, heptachlor, heptachlor epoxide, aluminum, antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, thallium, and vanadium. The locations of maximum COPC concentrations are also identified in Table 1.2.

The potential risk associated with migration of impacted groundwater to surface water was evaluated for the site. Additional screening was performed to determine COPCs for the potential for migration of impacted groundwater to surface water. The concentrations detected in groundwater were compared to the most conservative surface water screening value (2009 NRWQC, 2010 MCL, 2010 RSLs for tap water, or 2009 Ohio EPA Tier I/II surface water screening criteria). The screening results are summarized in Section 6.4 of this report.

3.2.3 Surface Water

Screening criteria used to identify COPCs in surface water included toxicity, and classification as an essential nutrient. Data collected from Mill Creek were used to represent surface water. Since only six samples were collected, frequency of detection was not used to eliminate chemicals as COPCs. In addition, no background concentrations in surface water were used for the purpose of screening chemicals. Table 1.3 summarizes the chemicals detected in surface water for the site and the rationale for selecting COPCs.

Although surface water is not used as a drinking water source, COPCs for surface water were conservatively selected based on a comparison with 2005 federal MCLs or 2004 USEPA Region 9 PRGs for tap water if an MCL was not available. Nineteen chemicals were eliminated as COPCs because they were detected below the screening levels. No pesticides were detected in surface water.

Table 1.3 presents the two COPCs detected in surface water that exceeded drinking water screening values: dibromochloromethane and thallium. Additional, potential site-related

bioaccumulative inorganic compounds that were detected in surface water below drinking water screening levels were retained as COPCs for a fish ingestion pathway scenario. Thus, arsenic, copper and zinc retained as COPCs for the fish ingestion pathway (Table 15.2). Surface water sample locations are presented on Figure 3.

Additional screening was also performed to determine COPCs in surface water (including seep water) associated with potential surface water direct contact exposure pathways (including drinking water). The concentrations detected in surface water were compared to the most conservative surface water screening value (2009 NRWQC, 2010 MCL, 2010 RSLs for tap water, or 2009 Ohio EPA Tier I/II surface water screening criteria) available in the literature. The screening results for the potential surface water direct contact exposure pathways are summarized in Section 6.3.1 and on Tables 8.9 and 8.10. As shown in Table 8.9 (Comparison of Seep Water Analytical Results and Human Health Surface Water Screening Values), only two compounds (chlorobenzene and mercury) have lower Ohio EPA screening levels than that used previously to evaluate the data. Of these two compounds, only the maximum detection of mercury exceeds the Ohio EPA criterion. For compounds detected in surface water samples (Table 8.10), only the mercury Ohio EPA screening value was lower than that previously used to evaluate the data. The maximum detected concentration of mercury in the surface water exceeds the Ohio EPA criterion. Although mercury was identified as a potential additional compound of concern in seeps and surface water, it is eliminated as a compound of potential concern for the fish ingestion pathway because mercury is not a major site-related constituent of concern.

3.2.4 Sediment

Screening criteria used to identify COPCs in sediment included toxicity, and classification as an essential nutrient. Since only 29 samples were collected, frequency of detection was not used to eliminate chemicals as COPCs. Table 1.4 summarizes the chemicals detected in sediment for the site and the rationale for selecting COPCs.

Since there are no human health risk-based screening criteria for sediment, the 2004 PRGs discussed in Section 3.2.1 for soil were used to identify COPCs in sediment. Given the off-site location of the sediment in Mill Creek and the local residential area, industrial screening criteria were not considered appropriate for sediments. Therefore, any chemical detected in sediment was considered a COPC if its maximum detected concentration exceeded the PRG for residential land use or the soil screening level for groundwater protection. Residential PRGs represent a conservative approach for identifying COPCs in sediment because the degree of

potential human exposure to sediments in a stream is significantly lower than for soil. Fifty-six chemicals were excluded as COPCs because they were detected below the screening levels. Calcium, magnesium, potassium, and sodium were eliminated as COPCs because they are considered essential nutrients. Surrogate compound screening levels were used for the chemicals without toxicity data based on structural and toxicological similarities of the chemicals. Acenaphthene was used for acenaphthylene, fluoranthene was used for benzo(ghi)perylene, naphthalene was used for 2-methylnaphthalene, anthracene was used for phenanthrene, and endrin was used for endrin ketone. Detailed discussions on surrogate determinations are included in Appendix E.

As presented in Table 1.4, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a)anthracene, beta-BHC, dieldrin and arsenic were considered COPCs in sediment. In addition, potentially bioaccumulative organic compounds in sediment were identified as COPCs for a fish ingestion pathway scenario. Thus, any bioaccumulative organic compound that was detected in sediment was retained as a COPC for the fish ingestion pathway. Sediment sample locations are presented on Figure 3.

4.0 EXPOSURE ASSESSMENT

Exposure assessment is the process of describing, measuring or estimating the intensity, frequency, and duration of potential human exposure COPCs in environmental media (e.g., soil, water and air) at a site. This section of the report discusses the mechanisms by which people (receptors) might come in contact with COPCs at the Rohm and Haas Facility. The exposure assessment follows the recommendations for conducting an exposure assessment provided in the USEPA's "Risk Assessment Guidance for Superfund" (USEPA, 1989a), and the more recent guidance in USEPA's "Guidelines for Exposure Assessment" (USEPA, 1992b), and associated guidance. In accordance with USEPA (1989a), an exposure assessment consists of three basic steps:

- Characterization of the exposure setting (physical environment and potential receptors).
- Identification of exposure pathways (potential sources, points of release, and exposure routes).
- Quantification of pathway-specific exposures (exposure point concentrations and intake (dose) assumptions).

The purpose of the first step is to characterize the salient features of the site that might influence current or future human exposure to COPCs, and to identify potential receptors. Potential pathways of human exposure are identified in the second step by characterizing the sources of COPCs released to the environment, points of release, and potential exposure routes. In the third step, the qualitative information from the first two steps is integrated with estimates of exposure concentrations and intake assumptions to quantitatively estimate exposure (dose).

Exposure assessment is conducted within the context of a site conceptual model (SCM). As described in USEPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (USEPA, 1988a), the purpose of the SCM is to describe what is known about chemical sources, migration pathways, exposure routes, and possible exposure scenarios. Figure 4 and Table 2 present the SCM developed for the Rohm and Haas Facility.

4.1 CHARACTERIZATION OF EXPOSURE SETTING

Potential exposure to COPCs at a site depends on a number of factors related to the physical characteristics of a site and its surroundings. These factors include location, surrounding land use, surface topography, hydrogeology, meteorology, and vegetation. They also include factors related to the current and possible future site uses of the property, which determine the types of activities that might occur at the site, the degree to which the site is accessible to the general public, and the mechanisms that might result in migration of COPCs to on-site and off-site populations.

4.1.1 Physical Setting

The Rohm and Haas Facility is located on approximately 34 acres in Reading, Ohio. Approximately 27 acres lie within the fenced operational area. The remaining 7 acres comprise baseball fields used by the City of Reading. A description of the physical setting is provided in Section 2.0 of this report, and in greater detail in the Current Conditions Report (Geomatrix, 2000a). The nearest residents are located approximately 350 feet south of the facility, immediately south of the swimming pool and recreation center.

4.1.2 Land and Water Use

Potential exposures to COPCs at a site are a function of the current and probable future land uses, both for the site and its surrounding area. USEPA guidance requires the evaluation of potential risks to human health under both current and foreseeable future land uses. Aside from the ball fields, the Rohm and Haas Facility is an active industrial facility, and is anticipated to remain such for the foreseeable future. Rohm and Haas intends to retain ownership and will

continue to operate as an industrial facility. In addition, Rohm and Haas will place a deed restriction on the property to preclude future residential use even though the site is zoned in a heavy industry district (Appendix F). The surrounding properties are also zoned HI. The City of Reading has no plan to rezone the area. Based on the historical industrial use and zoning of the site and surrounding area, the reasonable future land use for the site should be industrial. Therefore, future residential development of the facility is not considered.

In addition to land use, water use also contributes to the degree of potential exposure to COPCs at a site. Groundwater beneath the facility occurs in two aquifers referred to as the Upper and Lower Aquifers. The Upper Aquifer begins between 5 and 24 feet bgs. A portion of the Upper Aquifer apparently outcrops to Mill Creek west of the facility. The Upper Aquifer is not known to be used as a source of potable water.

The Lower Aquifer consists of an upper and a lower portion. Regionally, the lower portion is widely used as a source of potable water. However, there are no known active supply wells at or in the immediate vicinity of the Rohm and Haas Facility. Although there is a connection between the Upper and Lower Aquifers, the groundwater analytical results show that groundwater contamination from the facility has not migrated to the lower aquifer.

Until 1994, the City of Reading derived its municipal water supply from two well fields near the Rohm and Haas Facility; one approximately 500 feet to the north, the other approximately 1600 feet south-southwest. These well fields were closed after chlorinated solvents attributable to off-site sources were detected. Since 1994, Reading has obtained potable water from the City of Cincinnati.

The cities of Glendale, Lockland, and Wyoming, which are all within three miles of the Rohm and Haas Facility, currently use the lower portion of the Lower Aquifer for potable water. The groundwater is also used by industries in the area. Groundwater is not known or suspected to be used for domestic water supplies in the immediate vicinity of the Rohm and Haas Facility. Municipal water supply is available to all residential users in the area. The source water protection area map (Appendix F) obtained from Ohio EPA shows that no drinking water source water protection areas are located within the vicinity of the site. The Ohio Administrative Code Section 3701-28 defines and regulates private water systems. This program provides the inspections, laboratory testing, and permits that are necessary for the approval of a private water system. Hamilton County Health Department implements the regulations and the approval of a private water system. Due to the historical groundwater

impact in the neighboring properties, the potential for approval of a private water well in the adjacent vicinity of the site is unlikely. In addition, Rohm and Haas will implement institutional controls to restrict the groundwater use at the facility. Based on this information, potential exposure to groundwater as a potable water supply was not evaluated quantitatively in the risk assessment.

The nearest surface water body is Mill Creek, immediately adjacent to the west side of the facility.

4.1.3 Potential Receptors

The identification of potential human receptors is based on the characteristics of the site, the surrounding land uses, and the probable future land uses.

4.1.3.1 On-Site Receptors

Given the current and future industrial land use of the Rohm and Haas Facility, the principal potential human receptor that may be exposed to COPCs in on-site media (e.g., soil) is an on-site industrial worker. Two types of on-site workers are considered: one who spends most or all of his/her day engaged in outdoor activities, and one who spends most of his/her day indoors. In addition to the industrial worker, the construction worker involved in occasional activities requiring excavation into the subsurface could also be exposed to on-site media.

There may also be occasional visitors to the facility, such as customers, vendors, or contractors. However, these individuals are unlikely to be present in areas potentially affected by COPCs in soil and groundwater. In addition, visits by the same individual are likely to be much less frequent than the daily contact assumed for an industrial worker.

Unauthorized access to the operational areas of the facility is physically and administratively restricted. The facility is operational 24 hours per day with a security system and fencing to prevent intrusion of trespassers. As a result, there is minimal potential for an occasional trespasser to gain access to the operational 27 acres of the site. Therefore, a trespasser was not considered a potential on-site receptor.

4.1.3.2 Off-Site Receptors

Potential off-site receptors include individuals residing or working down-gradient of the facility, individuals using Mill Creek for recreational purposes, such as fishing, swimming, or wading, and recreational users at the adjacent ball fields. The creek and the ball field

recreational users were evaluated quantitatively. For the purpose of this assessment, the off-site residents were evaluated qualitatively.

4.2 IDENTIFICATION OF EXPOSURE PATHWAYS

This section describes the potential pathways by which the receptors described above could be exposed to COPCs located at or released from the Rohm and Haas Facility. An exposure pathway is a description of the mechanism by which an individual may come into contact with COPCs in the environment. In accordance with USEPA Risk Assessment Guidance (RAGS) (USEPA, 1989a), potential exposure pathways applicable to the Rohm and Haas Facility have been identified and addressed. An exposure pathway is defined by four elements (USEPA, 1989a):

1. A source and mechanism of COPC release to the environment;
2. An environmental receiving or transport medium (e.g., air, soil) for the released COPC;
3. A point of potential contact with the medium of concern; and
4. An exposure route (e.g., ingestion) at the contact point.

An exposure pathway is considered "complete" if all elements are present. Only complete exposure pathways need be evaluated. The characterization of the potential exposure pathways at the Rohm and Haas Facility, based on existing information, is presented in the preliminary SCM in Figure 4 and Table 2. Potential on-site receptors may be exposed to COPCs in surface and subsurface soil, groundwater, and air. Potential off-site receptors may be exposed to COPCs in surface water, sediment, air and via the food chain (i.e., fish ingestion). Further discussion of potential exposure pathways is presented in the following subsections.

4.2.1 Sources, Mechanisms of Releases, and Mechanisms of Transport

The primary on-site sources of chemicals in soils at the site were historical activities. Current activities at the facility, except for the combined sewer system (CSS), are not believed to have a significant potential for release of chemicals to the environment. Therefore, this analysis is based on historical sources only. The releases from historical sources and possibly from the CSS have potentially resulted in chemical impact in on-site soils and in on-site groundwater and off-site seeps. A brief summary of the nature and extent of impact to various media is provided in the FI Report (Geomatrix, 2002).

As stated in Section 2.1, the Rohm and Haas facility has never been involved in the manufacture, blending, or compounding of pesticides or herbicides, mercury, methyl mercury or tributyltin (oxide). The pesticides and herbicides, which have been detected at low concentrations at and near the site, are likely associated with activities pre-dating chemical manufacture at the site (i.e., dairy farming activities) or the result of surface water run-off and aerial drift from surrounding industrial use and commercial and/or residential applications of these chemicals. In addition, no records show that PCBs and PAHs were related to the historical activities. Consequently, pesticides or herbicides, mercury, PCBs and PAHs are not major constituents of concern related to the facility.

There are a number of mechanisms by which the COPCs identified above can migrate to other areas or to other media. USEPA (1989a) has identified several of these mechanisms. Based on current information, the relevance of these mechanisms to the Rohm and Haas Facility is discussed below.

Fugitive Dust Generation. Non-volatile chemicals present in soil can be released to ambient air as a result of fugitive dust generation. Several non-volatile chemicals have historically been detected in soil at the facility, including some SVOCs and metals. Although most of the facility is covered by structures, pavement, or grassy, landscaped areas that would prevent the re-suspension of dusts, this pathway was considered complete. This assumption also addresses the possibility that some of the structures may be removed.

Volatilization. Volatile chemicals present in soil and groundwater may be released to ambient or indoor air by volatilization through the vadose zone. Several volatile chemicals have been detected in both soil and groundwater at the facility. Therefore, the soil-to-air and groundwater-to-air pathways are potentially relevant to the Rohm and Haas Facility.

Surface Water Runoff. Surface water drainage enters the facility's CSS where it is transported to the Mill Creek Wastewater Treatment Plant, which is operated by the Metropolitan Sewer District (MSD). Under torrential rain conditions surface drainage from the site could enter Mill Creek. Sediment samples from Mill Creek were collected and analyzed, which would represent deposition from runoff.

Leaching (percolation). Chemicals present in soil may migrate downward to groundwater as a result of meteoric water infiltration. Chemicals from the site are believed to have entered groundwater in the Upper Aquifer on site. This pathway is potentially relevant to the Rohm

and Haas Facility. However, Lower Aquifer groundwater does not exhibit impact from the Rohm and Haas Facility based on additional site investigation results (Geomatrix, 2004). In addition, data obtained from the additional facility investigation activities show that groundwater deeper within the Upper Aquifer predominantly exhibits impacts from off-site sources, with localized possible exceptions (i.e., in the vicinity of UAW15-50). Additional leaching will be considered in the proposed further assessment of the groundwater to surface water migration pathway and potential migration to the lower aquifer to support Corrective Measures.

Groundwater Transport. The supplemental facility investigation results (Geomatrix, 2004) show that shallow groundwater impacts from the site may have migrated beyond the Rohm and Haas Facility western boundary, and reached points of groundwater discharge along and within Mill Creek. Low concentrations of suspected Rohm and Haas Facility constituents have been detected in seep waters and creek sediments in the vicinity of the Rohm and Haas Facility. Although a French drain and slurry wall have been installed at the Rohm and Haas Facility to reduce chemical migration onto the site and migration off site toward Mill Creek, this pathway is considered relevant to the Rohm and Haas Facility.

Bioaccumulation. Certain chemicals, depending on their physicochemical properties, can be taken up from surface water and sediment by aquatic organisms and concentrated in their tissues. Exposure would then result from ingestion of those organisms, e.g., fish. This pathway was considered an insignificant exposure pathway because the Mill Creek is not used for subsistence fishing and because, except for perhaps PCBs and mercury, contaminated fish tissue are not expected to occur at Mill Creek. This is based on Ohio EPA sampling data of Mill Creek (discussed further in Section 7.1.1). In addition, an independent USEPA evaluation concluded that bioaccumulative contaminants in the Mill Creek were likely the result of adjacent industrial activities (Attachments 1 and 2 of *Final Recommended Approach for Development of Groundwater Target Levels, Rohm and Haas Facility, Reading, Ohio,* June 25, 2007). However, as a conservative approach, the fish ingestion pathway was quantitatively evaluated for a recreational fisherman scenario.

4.2.2 Exposure Points and Routes

Based upon the migration pathways discussed above, points of potential human contact with chemicals are on-site soil, on-site groundwater, on-site air, off-site air, off-site (ball fields) soil, off-site surface water in Mill Creek, sediment from Mill Creek and ingestion of fish from Mill Creek.

Potential exposure routes associated with chemicals in soil are incidental ingestion, dermal contact, and inhalation of volatile chemicals and re-suspended particulates in air. Exposure routes associated with affected groundwater consist of inhalation of volatile chemicals released to air through volatilization and incidental dermal contact in areas where shallow groundwater is encountered during an excavation activity. As stated in Section 4.1.2, the groundwater ingestion pathway is incomplete. Exposure routes applicable to chemicals in surface water are incidental ingestion, and dermal contact. The primary exposure route applicable to chemicals in sediments is dermal contact. Ingestion of fish from Mill Creek was also considered as a potential exposure route.

4.2.3 Exposure Pathways

Given the release processes discussed above, the potential exposure pathways for current and future land use of the Rohm and Haas Facility property are presented below.

Outdoor Industrial Worker. Rohm and Haas Facility workers primarily involved in nonintrusive outdoor activities could be exposed to surface soil (typically the top 6 inches) via incidental ingestion and dermal contact. Soil analytical results collected from up to 2 foot bgs were considered as exposure point concentrations for this receptor because not enough data were collected from depths between 0 to 6 inches in accordance with the approved work plan. These worker receptors may also be exposed via inhalation to COPCs present on fugitive dusts generated by wind erosion or construction activities or volatile COPCs released to ambient air as a result of volatilization from groundwater or soil. These receptors could be present under current and future industrial land use conditions.

Indoor Industrial Worker. On-site facility workers who spend most of their day indoors are unlikely to be exposed to soil. These workers may be exposed via inhalation to volatile COPCs from soil and groundwater that are released to indoor air. These receptors could be present under current and future industrial land use conditions.

Construction Workers. Construction workers may be exposed to subsurface as well as surface soil (i.e., mixed soils) via incidental ingestion and dermal contact during intrusive construction/excavation activities. Mixed soil analytical results collected from 0 to 15 feet bgs were evaluated for this receptor. These receptors may also be exposed to ambient air containing volatile COPCs released from soil or exposed groundwater during excavation activities. This receptor may also directly contact exposed groundwater containing COPCs as part of construction activities and inhale COPCs present on fugitive dusts generated by

construction activities. However, dermal contact to exposed groundwater is only potentially applicable in areas where groundwater was encountered at depths less than 15 feet because normal construction activities usually occur within 15 feet bgs. These receptors could be present under current and future industrial land use conditions.

Off-site Residents. Off-site residents could be exposed to airborne COPCs as a result of fugitive dust and volatile emissions. However, the degree of exposure through these air pathways is likely to be less than that of the on-site workers, because residents are farther from the site although their exposure duration is assumed to be longer (365 days versus 250 days, and 30 years versus 25 years). These receptors were evaluated qualitatively based on the potential inhalation exposures of the outdoor industrial worker.

Off-site Recreational Users of the Ball Fields. Due to the proximity of the ball field to the industrialized portion of the Rohm and Haas facility, a potential for contaminated surface water runoff to contact the ball field soils was considered a potential exposure pathway. Thus, direct contact with the ball field soils was considered for adults and children using the fields.

Recreational Wading and Fishing of Mill Creek. Because COPCs were detected in Mill Creek, off-site receptors could be exposed to COPCs in surface water, sediments and ingestion of fish. A recreational wader of Mill Creek could be exposed via direct contact with the creek or incidental ingestion of creek water. COPCs were also identified in creek sediments. A recreational wader could also be exposed via incidental ingestion and dermal contact with the creek sediments. Recreational waders evaluated in this HHRA include adults and children. A recreational fisherman user scenario was also evaluated even though the Ohio Department of Health (ODH) has already issued advisories for fish consumption from the Mill Creek (OEPA, 2008a). Specifically, the ODH has advised that all persons limit consumption of sport fish caught from all waters in Ohio to one meal per week due to potential concerns with mercury contamination. In addition, the ODH has issued a specific advisory for the Mill Creek in that all persons should limit consumption of sport fish from the Mill Creek to one meal per month due to potential concerns with PCB contamination. For this risk assessment, it was assumed that a recreational fisherman could be exposed via ingestion of contaminated fish, and via incidental ingestion and dermal contact with surface water and sediments while fishing. Thus, an adult recreational fisherman was evaluated in this HHRA for informational purposes.

4.3 EXPOSURE QUANTIFICATION

The following paragraphs describe how exposure was quantified for the above exposure scenarios. The assumptions and approaches to be used are consistent with a Reasonable Maximum Exposure (RME) approach as defined by USEPA (1989a). The RME scenario is defined by USEPA as the "highest exposure that is reasonably expected to occur at the site."

4.3.1 Exposure Point Concentrations

The concentrations of chemicals at specific exposure points will vary over space and time. However, a single estimate of an exposure point concentration is currently required by USEPA guidance (1989a, 1992a) for risk assessment calculations. This single value must be representative of the average concentration to which a person would be exposed over the duration of the exposure. As a conservative approach, the maximum concentrations collected site-wide were used as the exposure point concentrations for all receptors and all media except for an intrusive industrial worker associated with the soil exposure pathways. The maximum detected concentrations were used as the representative concentrations to compensate for limited data on an Area of Concern (AOC) and solid waste management unit (SWMU) basis approach.

Exposure point concentrations are generally estimated using measured concentrations in environmental media, or estimated based on fate and transport models. Depending on a number of factors, including the distribution of the data (normal versus lognormal), the proportion of the samples reported as non-detect, and the total number of samples, there are several statistical parameters that may be used to estimate exposure point concentrations. USEPA (1992a) guidance recommends using the 95 percent upper confidence limit (95% UCL) of the mean as the exposure point concentration. 95% UCLs were only calculated for the mixed soil data (0-15 feet in depth) since sufficient data points were available as described in Section 4.3.1.1 below. Current USEPA-recommended methods for fitting distributions and calculating UCLs are discussed in USEPA (2002a) and the User's Guide of ProUCL Version 3.0 (hereafter referred to as ProUCL). USEPA has worked with its contractor, Lockheed Martin to develop the ProUCL software package to perform the distributional tests and UCL calculations described in the OSWER guidance (USEPA, 2002b). ProUCL Version 3.0 can be used to assign data distributions and calculate UCLs when adequate data are available. To select the equation, statistical analysis of the data distribution was performed for soil and groundwater data using the ProUCL software. Data for the surface water (six samples) were not sufficient to support a statistical distribution analysis because of the small sample set. The distribution was used to determine the most appropriate statistical method to calculate the 95% UCL; i.e., the exposure

point concentration. In the event that the recommended 95% UCL exceeded the maximum detected value, the maximum value was used as the exposure point concentration.

The presence of a chemical in some, but not all, samples suggests that it may also be present in the non-detect samples at some concentration between zero and the SQL for each sample. There are several methods for estimating the concentration in these non-detect samples (USEPA, 1992b). These include simple substitution methods, distributional methods, and robust statistical methods. The current default position of USEPA (1989a) is to substitute ½ the SQL for all non-detects. Thus, if a COPC was not detected in a particular sample, it was assumed to be present at one-half the SQL for calculating exposure point concentrations.

4.3.1.1 Soil

A single exposure point concentration for soil was derived based on an analysis of data for two soil depths: surface soil and mixed soil. Surface soil represents the soil to which the industrial worker may be exposed and was defined by soil samples collected from less than 2 foot bgs. Mixed soil represents soil to which a construction worker may be exposed and was defined by soil samples collected between 0 and 15 feet bgs. Unsaturated zone soil was defined by all soil samples above the water table (24 feet bgs). Since there were only three samples between 15 and 24 feet bgs, an independent assessment of unsaturated soil was not conducted.

Although localized areas of elevated concentrations were identified in the original risk assessment, exposure point concentrations for COPCs were developed using site-wide data. Exposure point concentrations developed using site-wide data are more representative of the exposure scenario for an on-site intrusive worker because a receptor's exposure would not be limited to that one area. Appendix G presents the data used to estimate exposure point concentrations for each COPC.

A 95% UCL was calculated as the representative concentration for each chemical using ProUCL for COPCs identified in mixed soil (i.e. <15 feet bgs). 95% UCLs were not calculated for surface soil (0-2 feet bgs) COPCs since the number of data points are limited on AOC and SWMU basis (i.e., the maximum detected concentration site-wide was used for surface soils). The recommended UCL value was used as the representative concentration for mixed soils (<15 feet bgs) as sufficient data were available. If the recommended UCL value was higher than the maximum value detected, the maximum concentration detected was used as the representative concentration in mixed soil. Exposure point concentrations in soil are presented in Table 3.1.

Surface soil data collected from adjacent to the ball field area for a recreational user was considered separately as a local area due to its uniqueness. The maximum concentrations detected in surface soil of this area were used as the exposure point concentrations.

4.3.1.2 Groundwater

Localized areas of elevated concentrations were identified in the original risk assessment. As a conservative approach, the maximum concentration detected in groundwater was used as the representative concentration. Exposure point concentrations in groundwater are presented in Table 3.2. The use of the maximum concentration will result in an exposure point concentration that is higher than a site-wide concentration based on a 95% UCL. This approach will result in higher estimates of risk because an on-site receptor's exposure would not be limited to that one area.

4.3.1.3 Surface Water

Six surface water samples were collected and the maximum concentrations were used as the representative concentrations in surface water related to the site. Thallium is the only metal that is identified as a COPC in surface water. Thallium was not detected in the non-filtered samples. Therefore, the dissolved concentration is used as the exposure point concentration. Exposure point concentrations in surface water are presented in Table 3.3.

4.3.1.4 Sediment

As a conservative approach, the maximum concentrations were used as the representative concentrations in sediment related to the site. Exposure point concentrations in sediment are presented in Table 3.4.

4.3.1.5 Indoor Air

Exposure point concentrations in indoor air were estimated using the Johnson & Ettinger model (1991). The Johnson & Ettinger model was parameterized by USEPA (2004) to evaluate potential emissions from subsurface soil or groundwater to indoor air. A more detailed description of the model is provided in Appendix I. The maximum detected VOC concentrations were used for the evaluation. COPCs evaluated for the soil and groundwater indoor air exposure pathways are based on whether the COPCs in soil and groundwater are volatile organic compounds as defined in Region 9 PRG Tables. Tables 3.5 and 3.6 summarize the soil and groundwater concentrations used to calculate exposure point concentrations for the indoor air exposure pathways.

4.3.1.6 Ambient Air

Ambient (outdoor) air concentrations were estimated independently for fugitive dust emissions and volatilization. Fugitive dust emissions from soil were estimated using the particulate emission factor equations including a regional-specific Q/C term. Volatilization from soil was estimated using the volatilization factor model developed by USEPA (1996b). ASTM model (ASTM, 1998) was used to estimate exposure to VOCs in ambient air from groundwater during construction activities. A more detailed description of these models is presented in Appendix J. COPCs evaluated for the soil and groundwater ambient air exposure pathways are based on whether the COPC in soil and groundwater is a volatile organic compound as defined in Region 9 PRG Tables. Tables 3.7 and 3.8 summarize the soil and groundwater concentrations used to calculate exposure point concentrations for the ambient air exposure pathways.

4.3.1.7 Fish

Concentrations in fish tissue were estimated from maximum detected concentrations in surface water for inorganic compounds and from maximum detected concentrations in creek sediments for organic compounds. Only those chemicals specified in Table 4-2 "Important Bioaccumulative Compounds" in the USEPA guidance document "*Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment*" (USEPA, 2000a) were assumed to be taken up by fish. Table 3.9 summarizes the fish tissue concentrations used to calculate exposure point concentrations for the fish ingestion pathways. Although the Mill Creek is designated as warm water habitat to meet uses associated with a healthy fish community per OEPA information (http://www.epa.state.oh.us/portals/35/rules/01-30.pdf), a recreational fishermen scenario was used to calculate the fish ingestion pathway. The input exposure parameters for a recreational fishermen scenario used to calculate the fish ingestion pathway were based on professional judgment according to the following site-specific conditions:

1. There are not any specific susceptible populations that would be subsistence fishing in that area of the Mill Creek. The Mill Creek does not support a diverse enough fish population that would attract fishermen and the fish present within the Mill Creek are not of a size that can support subsistence fishing. The most recent Ohio EPA fish data from the creek (2002) had only 1 species (carp) that had an average body weight greater than 100 g and these larger fish comprised only about 2% of the total fish population in the creek. The Mill Creek Restoration Project was contacted in December 2008 regarding use of the Mill Creek by fishermen. The director of the Mill Creek

Restoration Project, stated that they advocate that no fish be consumed that have been caught from the Mill Creek. The director also stated that the only known "fishing" spot is Winton Lake at Winton Woods Park, which is located approximately 4.5 miles from the ROH Cincinnati facility on the West Fork of the Mill Creek.

2. There are other fishable bodies of water within ten-mile radius that would attract anglers. The location of the site (and Mill Creek near the site) is not an attractive fishing spot due to the limited access and a significant number of industrial facilities in the immediate vicinity with 24-hr security and fences adjacent to the creek.

4.3.2 Exposure Equations

The "Annual Average Daily Dose" (AADD) or "Lifetime Average Daily Dose" (LADD) are the general parameters used to quantify exposure doses in site risk assessments. The AADD is used as a standard measure for characterizing long-term non-carcinogenic effects. The LADD addresses exposures that may occur over varying durations from a single event to an average 70-year human lifetime and is used to estimate potential carcinogenic risks.

The equations for calculating AADD and LADD for ingestion exposures are those presented by the USEPA in their 1989 RAGS guidance (USEPA, 1989a). The AADD and LADD equations for dermal exposures are taken from the 2004 RAGS dermal guidance (USEPA, 2004a).

4.3.3 Exposure Parameters

Exposure parameters are quantitative estimates of the frequency, duration, and magnitude of exposure to various media. The exposure parameters were selected from USEPA (1989a, 1991a, 1997a, 2002b, and 2004a) guidance, as appropriate, or were based on site-specific factors when applicable. Tables 4.1 through 4.14 present the exposure parameters for each of the receptors.

5.0 TOXICITY ASSESSMENT

The toxicity assessment is comprised of two parts (USEPA, 1989a):

1. **Hazard Identification** evaluates available information regarding the potential for a chemical to cause adverse health effects in exposed individuals; and

2. **Dose-Response Assessment** estimates the relationship between the extent of exposure and the increased likelihood (e.g., probability or chance) and/or severity of adverse effects.

Hazard identification entails calculating whether a chemical can cause an increase in a particular adverse effect (e.g., cancer) and the likelihood that the adverse effect will occur in humans. The result of hazard identification is a profile of the available toxicological information and its relevance to human exposure under conditions present in the environment. The hazard identification process has been completed by USEPA for all the chemicals identified as COPCs at the Rohm and Haas Facility.

Dose-response assessment entails quantifying the relationship between the dose of a chemical and the incidence of adverse effects in the exposed population. The results of the dose-response assessment are toxicity criteria that are used in the risk characterization to estimate the likelihood of adverse effects occurring in humans at different exposure levels. The toxicity criteria used to evaluate noncarcinogenic and carcinogenic health risks are commonly referred to as reference doses (RfDs) and slope factors (SFs), respectively. The basis for these criteria is described briefly in the following sections.

5.1 TOXICITY CRITERIA FOR NONCARCINOGENIC HEALTH RISKS

Observable adverse noncancer effects of chemicals occur only after a threshold dose is reached. For the purposes of establishing health criteria, this threshold dose is usually estimated from the no-observed adverse effect level (NOAEL) or the lowest-observed adverse effect level (LOAEL) determined in chronic animal exposure studies. The NOAEL is defined as the highest dose at which no adverse effects occur, whereas the LOAEL is defined as the lowest dose at which adverse effects begin to occur. NOAELs and LOAELs derived from animal studies are used by the USEPA and other regulatory agencies to establish RfDs for human intake of noncarcinogenic compounds. RfDs, which are expressed in terms of milligrams of chemical per kilogram of body weight per day (mg/kg-day), are criteria intended to represent the dose of a chemical that is not expected to cause adverse health effects over a lifetime of daily exposure, even in sensitive individuals, with a substantial margin of safety.

Uncertainty factors are used to set RfDs in an attempt to account for limitations in the quality or quantity of available toxicity data. Most RfDs include an uncertainty factor of 100, which is comprised of a factor of 10 to account for potential uncertainties in extrapolating animal data to human health effects, and another factor of 10 to account for possible differences in sensitivity within the human population. Furthermore, if the available database is incomplete and an LOAEL is used to establish an RfD, or if a chemical is persistent or bioaccumulative, then an additional safety factor of 10 may be applied.

The duration of exposure is considered in the development of RfDs. Exposure duration is divided into three categories for purposes of risk assessment (USEPA, 1989a):

- **Acute** refers to exposures for short durations measured in seconds, minutes, or hours and to effects that appear promptly after exposure.
- **Subchronic** refers to exposures of intermediate duration, from 2 weeks to 7 years.
- **Chronic** refers to prolonged or repeated exposures and effects that develop only after exposures from 7 years to a lifetime.

The exposure durations for complete exposure pathways in this risk assessment include chronic and subchronic exposures. The industrial worker and recreational user are considered to have chronic exposures, while the construction worker is considered to have a subchronic exposure. However, to be conservative, chronic RfDs have been used for both chronic and subchronic exposures.

5.2 TOXICITY CRITERIA FOR CARCINOGENIC HEALTH RISKS

Regulatory guidance assumes that chemicals that are carcinogenic should be treated as if they do not have thresholds (USEPA, 1989a). This approach assumes that the dose-response curve for carcinogens only allows for zero risk at zero dose (i.e., for all doses, some risk is assumed to be present). To estimate theoretically plausible responses at these low doses, various mathematical models are used. The accuracy of the projected risk depends on how well the model predicts the true relationship between dose and risk at dose levels where the relationship cannot be feasibly measured. The accuracy of these models is currently unknown, but they are believed not to underestimate the true risk.

Health risks for exposure to carcinogens are defined in terms of probabilities that quantify the likelihood of a carcinogenic response in an individual receiving a given dose of a particular compound. The slope factor (SF), which is expressed in units of $(mg/kg\text{-}day)^{-1}$, is defined as the 95% UCL of the probability of a carcinogenic response per unit daily intake of a chemical over 70 years. By using the 95% UCL, the estimate of carcinogenic response is conservative and purposefully overestimates the actual risk posed by the chemical.

5.3 TOXICITY CRITERIA USED IN HUMAN HEALTH RISK ASSESSMENT

The USEPA has completed toxicity assessments for most of the COPCs identified in this HHRA. The toxicity criteria used to evaluate noncarcinogenic and carcinogenic health risks

are reference doses (RfDs) and cancer slope factors (SFs), respectively. The RfDs and SFs for the COPCs being evaluated were gathered from the following USEPA sources, in descending order of hierarchy:

- USEPA (2007) Integrated Risk Information System (IRIS)

  IRIS is an USEPA electronic database containing up-to-date health risk and EPA regulatory information for numerous chemicals. IRIS contains only toxicity criteria that have been verified by the USEPA Work Groups and, consequently, is considered to be the preferred source of toxicity information. Information on IRIS always supersedes all other sources.

- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)

  The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC) develops PPRTVs on a chemical specific basis when requested by EPA's Superfund program. The PPRTVs are presented on the Region 9 PRG tables (USEPA, 2004b).

- Other Toxicity Values

  Additional EPA and non-EPA sources of toxicity information. Priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer reviewed. The additional sources used in the risk assessment include the following sources.

  - The California Environmental Protection Agency (Cal EPA) toxicity values (http://www.oehha.ca.gov/risk/chemicalDB//index.asp).
  - The Oak Ridge National Laboratory Risk Assessment Information System toxicity values (http://risk/lsd.ornl.gov/index.shtml).
  - The Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) (http://www.atsdr.cdc.gov/mrls.html).

The associated toxicity criteria for the COPCs evaluated in this HHRA are presented in Tables 5.1 and 5.2 for noncarcinogenic chemicals and Tables 6.1 and 6.2 for carcinogenic chemicals. The toxicity profiles for the COPCs at the site can be found in the Oak Ridge National Laboratory Risk Assessment Information System and the ATSDR websites.

The RfD or SF was used for the oral route of exposure. Consistent with USEPA (US EPA, 1996a, b and c), the inhalation reference concentration (RfC) or inhalation unit risk factor was used for the inhalation route of exposure. Oral toxicity values adjusted for gastrointestinal (GI) absorption were used as toxicity values for evaluating dermal exposure.

6.0 RISK CHARACTERIZATION

Risk characterization represents the final step in the risk assessment process. In this step, the results of the exposure and toxicity assessments are integrated into quantitative or qualitative estimates of potential health risks. Potential noncarcinogenic health effects and carcinogenic health risks are characterized separately.

6.1 NONCARCINOGENIC HEALTH EFFECTS

Potential adverse noncarcinogenic health effects were evaluated using the hazard index (also called HI) approach as recommended by USEPA (1989a). The first step in this approach is to compare the AADD for each chemical to the appropriate RfD. This comparison is expressed in terms of a "hazard quotient," which is calculated as follows:

$$\text{Hazard Quotient}_i = \frac{\text{AADD}_i}{\text{RfD}_i}$$

Per USEPA guidance (USEPA, 2004c), a comparison of a concentration term (instead of AADD) with an reference concentration (RfC) was used for the inhalation exposure pathway. The hazard quotient for the inhalation exposure pathway is calculated as follows:

$$\text{Inhalation Hazard Quotient}_i = \frac{(C_{(air\ -\ VOC)})(EF)(ED)(ET)}{(AT)(365 days/year)} \ / \ \text{RfC},$$

where:

$C_{(air--VOC)}$ = Csoil /VF;

Csoil = COPC concentration in soil (i.e., EPC);

VF = Volatilization factor (m^3/Kg);

EF = Exposure frequency (days/year);

ED = Exposure duration (years);

ET = Fraction of EF time breathing air at the site; and

AT = Noncancer averaging time (years).

A hazard quotient less than or equal to 1 indicates that the predicted exposure to that chemical should not result in an adverse noncarcinogenic health effect (USEPA, 1989a). In cases where individual chemicals potentially act on the same organs or result in the same health endpoint

(e.g., respiratory irritants), potential additive effects may be addressed by calculating a hazard index as follows:

$$\text{Hazard Index} = \sum_{i=1}^{n} \text{Hazard Quotient}_i$$

A hazard index of less than or equal to 1 indicates acceptable levels of exposure for chemicals having an additive effect. In this HHRA, a screening-level hazard index was calculated by summing the hazard quotients for all chemicals, regardless of toxic endpoint, as recommended by agency guidance (USEPA, 1989a). This approach is generally believed to overestimate the potential for noncarcinogenic health effects due to simultaneous exposure to multiple chemicals because it does not account for different toxic endpoints (USEPA, 1989a; NRC, 1988; Risk Commission, 1997; Seed, et al., 1995). However, it can be used as a screening tool to rapidly identify those exposure scenarios for which exposure to multiple chemicals does not pose a noncarcinogenic health risk.

It should be noted that hazard quotients or hazard indices greater than 1 do not necessarily mean that adverse health effects will be observed. As discussed in Section 5.0 and shown in Tables 5.1 and 5.2, a substantial margin of safety has been incorporated into some of the RfDs developed for the COPCs. For these chemicals, adverse health effects may not be observed even if the hazard quotient or hazard index is much larger than 1. If the screening hazard index is greater than 1, a target organ-specific hazard index may be calculated to more accurately assess the potential for noncarcinogenic effects to specific target organs.

The following sections summarize the results of the noncarcinogenic risk characterization for the four receptors quantitatively evaluated. The summary hazard indices are presented in Tables 7.1 through 7.8 and Tables 8.1 through 8.8; the calculations supporting these values are presented in Appendices I and J.

Indoor Industrial Worker

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in soil and groundwater by indoor industrial workers are summarized in Tables 7.1 and 8.1 and detailed calculations are presented in Appendix I. The total hazard index is 0.83, which is below the acceptable hazard level of 1. Therefore, exposure to chemicals in soil and groundwater that migrate to indoor air would not result in an unacceptable cancer risk under the conditions evaluated for this receptor.

Outdoor Industrial Worker

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in soil and groundwater by outdoor industrial worker are summarized in Tables 7.2 and 8.2. The total hazard index is 0.19, indicating exposure to chemicals in soil and groundwater would not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

Construction Worker

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in soil and groundwater by the construction worker are summarized in Tables 7.3 and 8.3. The total hazard index is 1.1, which slightly exceeds the acceptable hazard level of 1. However, the total hazard index for each target organ (total liver hazard index of 0.62, total kidney hazard index of 0.01, the total blood hazard index of 0.12 and the other hazard index of 0.39) is less than the acceptable hazard level of 1. Therefore, exposure to chemicals in soil and groundwater would not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

Adult Recreational Wader of Mill Creek

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in surface water and sediments via incidental ingestion and dermal contact by an adult recreational wader of the creek are summarized in Tables 7.4 and 8.4. The total hazard index is 0.006, indicating that exposure to chemicals in surface water and sediments would not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

Child Recreational Wader of Mill Creek

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in surface water and sediments in Mill Creek via incidental ingestion and dermal contact by a child recreational wader of the creek are summarized in Tables 7.5 and 8.5. The total hazard index is 0.036, indicating that exposure to chemicals in surface water and sediments would not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

Ball Field Recreational User (Age 6-13)

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in surface soil near the ball fields by a child recreational user age 6-13 are summarized in Tables 7.6 and 8.6. The total hazard index is 0.037, indicating that exposure to chemicals in

surface soil near the ball fields would not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

Ball Field Recreational User (Age 13-17)

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in surface soil near the ball fields by a child recreational user age 13-17 are summarized in Tables 7.7 and 8.7. The total hazard index is 0.036, indicating that exposure to chemicals in surface soil near the ball fields would not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

Adult Fisherman

The potential noncancer hazard quotients and hazard indexes associated with exposure to the COPCs in fish and via incidental ingestion and dermal contact with surface water and sediments by an adult recreational fisherman of the creek are summarized in Tables 7.8 and 8.8. The total hazard index is 0.67. The total hazard index is below the acceptable hazard index of 1 for the major site-related COPCs.

Off-site Residential Receptor

The potential hazard index associated with exposure to airborne COPCs as a result of fugitive dust and volatile emissions for an off-site residential receptor was not calculated. Based on the low contribution of the inhalation pathway (0.021) to the hazard index for the outdoor industrial worker at the Rohm and Haas Facility (Table 8.2), the potential hazard index for off-site residential receptors is also considered to be well below one, as a result of dispersion of chemicals in air.

6.2 CARCINOGENIC EFFECTS

Carcinogenic health risks are defined in terms of the increased probability of an individual developing cancer as the result of exposure to a given chemical at a given concentration. As required by USEPA (1989a), lifetime excess cancer risks are estimated for any chemical as follows:

$$\text{Lifetime Excess Cancer Risk}_i = \text{LADD}_i \times \text{SF}_i$$

Per USEPA guidance (USEPA, 2004c), a concentration term combined with unit risk was also used for the inhalation exposure pathway. The lifetime excess cancer risk for the inhalation exposure pathway is calculated as follows:

$$\text{Lifetime Excess Cancer Risk}_i = \frac{(C_{(air\text{-}VOC)})(EF)(ED)(ET)}{(AT)(365 days/year)} * \text{Unit Risk}$$

where:

$C_{(air--VOC)}$	=	For soil: Csoil /VF , where
Csoil	=	COPC concentration in soil (i.e., EPC) (mg/kg);
VF	=	Volatilization factor (m^3/kg);
EF	=	Exposure frequency (days/year);
ED	=	Exposure duration (years);
ET	=	Fraction of EF time breathing air at the site (unitless); and
AT	=	Noncancer averaging time (years).

As with hazard indices, the estimated excess cancer risks for each chemical and exposure route are summed regardless of toxic endpoint to estimate the total excess cancer risk for the exposed individual.

Regulatory agencies such as USEPA have defined what is considered an acceptable level of risk in various ways. The USEPA (1990a and 1990b) considers 1×10^{-6} to 1×10^{-4} to be the target range for acceptable risks at sites where remediation is considered. Estimates of lifetime excess cancer risk associated with exposure to chemicals of less than one-in-one-million (1×10^{-6}) are considered to be so low as to not warrant any further investigation or analysis (USEPA, 1990a).

It should be noted that cancer risks above the target range do not necessarily mean that adverse health effects will be observed. Current methodology for estimating the carcinogenic potential of chemicals is not believed to underestimate the true risk, but could overestimate the true risk by a considerable degree.

The following sections summarize the results of the carcinogenic risk characterizations for the receptors evaluated. The summary total estimated lifetime excess cancer risks are presented in Tables 7.1 through 7.8 and Tables 8.1 through 8.8; the calculations supporting these values are presented in Appendices I and J.

Indoor Industrial Worker

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in soil and groundwater by a current indoor industrial worker are summarized in Tables 7.1 and 8.1 and supporting calculations are presented in Appendix I. The total estimated cancer risk is 1.4×10^{-5}, which is within the acceptable risk range of 1×10^{-4} to 1×10^{-6}. Therefore, exposure to chemicals in soil and groundwater that migrate to indoor air would not result in an unacceptable cancer risk under the conditions evaluated for this receptor.

Outdoor Industrial Worker

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in soil and groundwater by current outdoor industrial worker are summarized in Tables 7.2 and 8.2. The total estimated cancer risk is 4.7×10^{-5}, which is within the acceptable risk range of 1×10^{-4} to 1×10^{-6}. Therefore, exposure to chemicals in soil and groundwater would not result in an unacceptable cancer risk under the conditions evaluated for this receptor. The chemical that contributes most to the total estimated cancer risk is arsenic, which is associated with the site-specific background discussed in the Supplemental RI (Geomatrix, 2004).

Construction Worker

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in soil and groundwater by current on-site construction workers are summarized in Tables 7.3 and 8.3. The total estimated cancer risk is 3.5×10^{-6}, which is within the acceptable risk range of 1×10^{-4} to 1×10^{-6}. Therefore, exposure to chemicals in soil and groundwater would not result in an unacceptable cancer risk under the conditions evaluated for this receptor.

Adult Recreational Wader of Mill Creek

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in surface water and sediments by an adult recreational wader of Mill Creek are summarized in Tables 7.4 and 8.4. The total estimated cancer risk is 9.7×10^{-7}, which is below the acceptable risk range of 1×10^{-4} to 1×10^{-6}. Therefore, exposure to chemicals in surface water and sediments would not result in an unacceptable cancer risk under the conditions evaluated for this receptor.

Child Recreational Wader of Mill Creek

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in surface water and sediments by a child recreational wader of Mill Creek are summarized in

Tables 7.5 and 8.5. The total estimated cancer risk is 3.7×10^{-6}, which is below the acceptable risk range of 1×10^{-4} to 1×10^{-6}. Therefore, exposure to chemicals in surface water and sediments would not result in an unacceptable cancer risk under the conditions evaluated for this receptor.

Ball Field Recreational User (Age 6-13)

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in surface soil by a child recreational user age 6-13 at the adjacent ball fields are summarized in Tables 7.6 and 8.6. The total estimated cancer risk is 2.1×10^{-6}, which is below the acceptable risk range of 1×10^{-4} to 1×10^{-6}. Therefore, exposure to chemicals in surface soil would not result in an unacceptable cancer risk under the conditions evaluated for this receptor.

Ball Field Recreational User (Age 13-17)

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in surface soil by a child recreational user age 13-17 at the adjacent ball fields are summarized in Tables 7.7 and 8.7. The total estimated cancer risk is 1.3×10^{-6}, which is below the acceptable risk range of 1×10^{-4} to 1×10^{-6}. Therefore, exposure to chemicals in surface soil would not result in an unacceptable cancer risk under the conditions evaluated for this receptor.

Adult Recreational Fisherman

The estimated theoretical lifetime excess cancer risks associated with exposure to the COPCs in fish and via incidental ingestion and dermal contact with surface water and sediments by an adult recreational fisherman of the creek are summarized in Tables 7.8 and 8.8. The total estimated cancer risk is 1.2×10^{-4}. The total cancer risk is above the acceptable risk range of 1×10^{-4} to 1×10^{-6}, primarily due to fish ingestion pathway, indicating that exposure via ingestion of fish in the Mill Creek from fishing activities may result in an unacceptable cancer risk under the conditions evaluated for this receptor. The primary chemical of concern is arsenic. Arsenic was detected in only one duplicate sample in surface water; thus, the risk from this compound is likely overestimated based on this low frequency of detection and the utilization of the maximum detected concentration with conservative uptake parameters in the fish tissue modeling.

Off-site Residential Receptor

The potential lifetime excess cancer risk associated with exposure to airborne COPCs as a result of fugitive dust and volatile emissions for an off-site residential receptor was not

calculated. Based on the low contribution of the inhalation pathway (3.0×10^{-7}, which is less than 1×10^{-6}) to carcinogenic risk for the outdoor industrial worker at the Rohm and Haas Facility (Table 8.2), potential cancer risks for off-site residential receptors are also considered to be well below the acceptable risk range, based on dispersion of chemicals in air.

6.3 UNCERTAINTY ANALYSIS

Uncertainty is inherent in many aspects of the risk assessment process, and generally arises from a lack of knowledge of (1) site conditions, (2) toxicity and dose-response of the COPCs, and (3) the extent to which an individual will be exposed to those chemicals. This lack of knowledge means that assumptions must be made based on information presented in the scientific literature or professional judgment. While some assumptions have significant scientific bases, others do not. The assumptions that introduce the greatest amount of uncertainty and their effect on the noncarcinogenic and carcinogenic risk estimates are discussed below. This discussion is generally qualitative in nature, reflecting the difficulty in quantifying the uncertainty in specific assumptions. In general, assumptions were selected in a manner that purposefully biases the process toward health conservatism.

6.3.1 Data Evaluation and Selection of Chemicals of Potential Concern

The selection of COPCs was based upon the results of the sampling and analytical program established for the Site. The factors that contribute to the uncertainties associated with the identification of COPCs are inherent in the data collection and data evaluation processes, including appropriate sample locations, adequate sample quantities, laboratory analyses, data validation, and treatment of validated samples.

The predominant sources of uncertainty and potential bias associated with site characterization are based on the procedures used for site investigation (including sampling plan design and the methods used for sample collection, handling, and analysis) and the procedures used for data evaluation. In general, a very comprehensive sampling program was implemented to account for the chemicals most likely to be present at the Site as a result of past Site history and activities. However, due to slow recharge rates in some of the monitoring wells (MW-EPA-2, UAW04-20, UAW05-20, UAW06-20, UAW08-20, UAW10-50, UAW10-80, UAW21-30 and UAW22-20), low-flow sampling methods were not used to collect the samples from these wells from 2001 – 2006. Thus, the concentrations of VOCs in these wells could be different than the values reported. Starting in 2007, groundwater samples will be collected using low-flow purge and sample techniques in all wells to reduce the uncertainty regarding the concentrations of

VOCs in these wells. Similarly, although certain areas were not characterized due to limited access (e.g., areas underneath the buildings), it is reasonably expected that the impact from those areas is adequately represented by the data collected from nearby locations.

Chemicals that were not detected or chemicals detected less than 5 percent of the time were eliminated during the COPC selection process, except for vinyl chloride, which may be breakdown product of other compounds, and thus was not eliminated based on frequency of detection. Although this has the potential to result in underestimating risks, consistent with USEPA (1989a) guidance, these chemicals were assumed not to be related to the manufacturing process and therefore, risks and hazards likely were not underestimated. Select compounds had elevated detection limits above risk-based screening limits, which is likely due to interferences caused by other chemicals with significantly elevated concentrations. Among those chemicals eliminated because of low detection frequencies (i.e., <5-percent), the majority had detection limits within one order of magnitude of the screening levels. Inclusion of the select results for compounds (alpha-BHC, beta-BHC, and gamma-BHC) with detection limits more than two order magnitude greater than the screening levels in soil would not have altered the conclusions of the risk assessment since the screening levels for these compounds were based on soil-to-groundwater protection levels and were much lower than the direct contact PRGs. For a few compounds (Aldrin and Aroclor 1242) with detection limits more than two orders of magnitude of the screening levels in groundwater, the screening levels used were associated with the groundwater ingestion pathway, which is an incomplete exposure pathway for the site and therefore, the conclusions of the risk assessment would not have changed. Eliminating bromodichloromethane, chloroform, 2-methylnaphthalene and cyanide in groundwater and arsenic in surface water as COPCs based on the fact these compounds did not exceed their respective MCLs may have resulted in underestimating the total risk since the detected concentrations were higher than tap water PRGs. However, the maximum detected concentrations of these compounds (chloroform, 2-methylnaphthalene, cyanide and bromodichloromethane) were within one order of magnitude of the tap water PRGs, which would not have caused an exceedance of the 1E-04 to 1E-06 target risk range.

In soil, three VOCs (acrylonitrile, iodomethane, and tetrachloroethene), three SVOCs (dibenz(a,h)anthracene, 2,4-dimethylphenol and indeno(1,2,3-cd)pyrene), and seven pesticides (aldrin, alpha-BHC, beta-BHC, gamma-BHC, chlorobenzilate, dieldrin, and Endosulfan II) were eliminated from the chemicals of potential concern list due to infrequent detection (detected at a frequency of less than 5%). All concentrations for VOCs are estimated with a “J”

qualifier, and iodomethane and tetrachloroethene were also detected in the blanks with a "B" qualifier. In addition, the maximum detected concentrations are within one order of magnitude of the screening levels. In groundwater, one SVOC (2-methylnaphthalene), and four pesticides and PCBs (Aldrin, Aroclor 1242, alpha-BHC, and Isodrin) were eliminated from the chemicals of potential concern list due to infrequent detection.

To determine the compounds that may be present at concentrations consistent with surrounding conditions, background samples were collected to evaluate chemicals occurring naturally in soil (e.g., metals) or regionally as a result of neighboring industrial activities. A total of ten off-site background locations were sampled and two samples from each location (total of twenty samples) were analyzed as part of the facility investigation program. Five locations (borings B-01 through B-05) were sampled near the baseball fields and Swimming Pool and Recreational Center (south of the site), and five locations (borings B-06 through B010) were sampled near the Former Municipal Water Supply Well Field owned by the City of Reading (north of the site and north of Cincinnati Drum and Pristine). Although efforts were made to gain access to all of the properties adjacent to the Rohm and Haas facility, access for off-property sampling could only be obtained from the City of Reading property. Two samples were collected from each location at depths of 1.5 to 2 feet bgs and 9 to 11.5 feet bgs. The background samples were analyzed for CLP-TAL plus aniline, isodrin and tin. The background data showed that metals and other naturally occurring chemicals (e.g. calcium) were detected in the majority of samples analyzed. Twenty-six SVOCs (including 2-methylnaphthalene, acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, bis(2-ethylhexyl)phthalate, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd) pyrene, naphthalene, phenanthrene, and pyrene), pesticides (4,4'-DDE, aldrin, dieldrin, endrin ketone, and isodrin) and PCBs (Aroclor 1254 and Aroclor 1260) were also detected in one or more samples from background locations. Statistical analysis of the background data is provided in Appendix K.

The maximum detected concentrations in surface water, including seep water, were compared to EPA's National Recommended Water Quality Criteria (NRWQC) for human health consumption of surface water and aquatic organisms (e.g., fish, crayfish) to determine additional COPCs in surface water associated with potential surface water exposure pathways. When NRWQC are not available, MCLs or RSLs were used as the comparison values. The comparison results (Tables 8.9 and 8.10) show that beta-BHC, alpha-chlordane, 4,4'-DDE, 4,4'-DDT, dieldrin, heptachlor epoxide, aluminum, arsenic, chromium, iron, lead, manganese,

and vanadium were identified as additional COPCs in seep water, and bis(2-ethylhexyl)phthalate and arsenic were additional COPCs in surface water. Dibromochloromethane and thallium were previously identified and included in the risk calculations. The detected surface water concentration of 1.4 μg/l for bis(2-ethylhexyl)phthalate is very close to the conservative screening level of 1.2 μg/l. The NRWQC for arsenic of 0.018 μg/l includes consumption of water and organism pathways. Although the fish ingestion pathway did show an unacceptable cancer risk, the detected arsenic concentration of 3.6 μg/l was the only detection in three surface water samples and it was detected in a duplicate sample that was qualified by the laboratory as being an estimated value. Excluding metals detected in seep water may result in underestimating the risk; however, direct human exposure to seeps was considered an incomplete exposure pathway because of the limited physical areal extent of the seeps and low to no visible flow.

An additional comparison to Ohio River Basin Human Health surface water criteria was performed for compounds detected in surface water (including seep water). The Ohio EPA screening levels used for the comparison are presented in Tables 8.9 and 8.10. As shown in Table 8.9 (Comparison of Maximum Detections in the Seeps to Surface Water Criteria for Human Health), only two compounds (chlorobenzene and mercury) have lower Ohio EPA screening levels than the NRWCC, MCL or RSLs. Of these two compounds, only the maximum detection of mercury (0.18 ug/L) exceeds the Ohio EPA criterion of 0.012 ug/L. For compounds detected in surface water samples (Table 8.10), only the mercury Ohio EPA screening value of 0.12 ug/L was lower than the NRWCC, MCL or RSLs. The maximum detected concentration of mercury in the surface water (0.094 ug/L) exceeds this Ohio EPA criterion. Although mercury was identified as a potential additional compound of concern in seeps and surface water, it is eliminated as a compound of potential concern for the fish ingestion pathway because mercury is not a major site-related constituent of concern.

6.3.2 Exposure Assessment

Exposure Point Concentrations

The use of site-wide data to develop exposure point concentrations in soil may underestimate the exposure in locations where the concentrations of various contaminants exceed screening levels; however, the compounds were eliminated from further evaluation based on a frequency of detection that is less than 5%. However, the potential exposure for an industrial worker to be exposed only to these locations where infrequently detected compounds are co-located is unlikely due to the nature of their activities. In addition, the soil and groundwater quality data

presented in Tables 1.1 and 1.2 show that the compounds that were eliminated due to low frequency of detection were not located in the same area as the compounds identified as COPCs. For chemicals that were not detected in individual samples, it was assumed that one-half the SQL was representative of the concentration that may be present in soil for purposes of calculating the arithmetic average and 95% UCL concentrations used as the exposure point concentrations associated with the soil direct contact exposure pathways. The current default position of USEPA (1989a) is to substitute one-half the SQL for all non-detects. USEPA guidance (1992b) indicates that substitution of one-half of the SQL is adequate when the proportion of non-detects is less than 10 to 15 percent. If the fraction of non-detects becomes large, then assuming that the value of each non-detect is equal to one-half of the SQL will generally overestimate the expected true mean concentrations, with the degree of overestimation increasing with increasing proportions of non-detects. In addition, the use of maximum concentrations instead of site-wide averages as exposure point concentrations for the surface soil, groundwater, inhalation of indoor air, and surface water and sediment exposure pathways is conservative, which likely resulted in overestimating the total risk.

For metals detected in groundwater and surface water, concentrations analyzed for total metals were used for the exposure point concentrations. However, the dissolved concentration was used as the exposure point concentration for some compounds in surface water since total metals were not analyzed at every location. Using the dissolved concentration instead of the total concentration may result in a slight underestimation of the risk.

Fish tissue concentrations were estimated using maximum detected concentrations in surface water and sediments. Using the maximum detected concentration likely overestimates the risk as fish are mobile organisms and may be exposed to a wide range of concentrations. In addition, the fish tissue concentrations were modeled which likely results in an overestimation of risk given the conservatism of the model assumptions.

Environmental Fate and Transport

Fate and transport models were used to estimate indoor and ambient air concentrations of COPCs volatilized from soil and groundwater. While some site-specific conditions were incorporated into the model, the model results are typically conservative, which tends to over-estimate risk. The use of soil data in the Johnson and Ettinger soil indoor air model was based on the assumption that soil and soil gas in equilibrium could result in an overestimation of the risk. Soil gas data would be more accurate for the indoor air evaluation. However, soil gas data were not collected for the site. As a conservative approach, infinite source was assumed in

the model. In addition, a small industrial building used in the previous risk assessment was used in the current model.

Exposure Assumptions and Parameters

The exposure assessment is based on an reasonable maximum exposure (RME) scenario, which is defined by USEPA as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site (USEPA, 1989a). To achieve this goal, the RME is based on highly conservative exposure assumptions. For example, the evaluation assumes that an industrial worker will be present on-site for 250 days per year for 25 years. For a construction worker, exposure was assumed to occur four and half months over one year exposure duration, which may be greater than most site construction projects. This and other upper-bound estimates of exposure most likely overestimate the potential health risks associated with exposure to the COPCs in soil. Exposure to VOCs in ambient air from groundwater by the construction worker is assumed to occur based on migration through the vadose zone, which may underestimate the risk and hazard due to emissions to ambient air from groundwater exposed during the construction activities. However, the exposure to groundwater for a construction worker is limited because groundwater will be pumped out of the excavation area to facilitate construction activities. Thus, dermal contact with groundwater is a more significant exposure pathway when compared to the inhalation of emissions from groundwater for a construction worker.

The creek recreational wader scenario was evaluated separately for an adult and a child receptor. This approach may underestimate risks for a receptor that lives near Mill Creek for his/her entire life: 6 years as a child and 24 years as an adult. However, if the risk and hazard index for a child and adult recreational wader are combined, the risk and hazard index are still below the acceptable risk and hazard levels. Separating the risk evaluation for a ball field recreational user to age 6-13 and age 13-17 may also underestimate risks for a child that uses the ball field between age 6-17. However, if the risk and hazard index for the two age groups are combined, the risk and hazard index are still below the acceptable risk and hazard levels.

The adult recreational fisherman scenario was evaluated using a conservative “fraction ingested from a contaminated source” of 100%. Based on the location of the site and the fact that the Mill Creek is not an attractive fishing spot, especially near the site, it is unlikely for a fisherman to only fish in the Mill Creek during the fishing season. In addition, the following input exposure parameters used will result in over-estimation of the total risk and hazard:

- An adult exposure duration of 30 years was used for the calculation.

- Although there is a current fish advisory issued for the Mill Creek that recommends a limit of one meal per month of fish from the Mill Creek due to the presence of PCBs, a more conservative exposure frequency was utilized in the risk assessment (20 meals of fish/yr) versus the exposure frequency currently recommended by the Ohio EPA (12 meals/year based on the fish advisory). The conservative exposure frequency was based on the season for when fishing activities are most likely to occur (May through September) at a frequency of once per week given the climate of the Cincinnati area and ease of access to the creek.

- The conservative default meal size of 228 grams was used in the calculations for the fish ingestion pathway from the BRA to be consistent with U.S. EPA guidance at http://www.epa.gov/waterscience/fish/advice/es.html.

6.3.3 Toxicity Assessment

Uncertainty in Toxicity Criteria

One of the largest sources of uncertainty in any risk assessment is associated with the scientific community's limited understanding of the toxicity of most chemicals in humans following exposure to the low concentrations generally encountered in the environment. The majority of available toxicity data are from animal studies, which are then extrapolated using mathematical models or multiple uncertainty factors to generate toxicity criteria used to predict what might occur in humans. Sources of conservatism in the toxicity criteria used in this evaluation include:

- The use of conservative methods and assumptions to extrapolate from high dose animal studies to predict the possible response in humans at exposure levels far below those administered to animals;

- The assumption that chemicals considered to be carcinogens do not have thresholds (i.e., for all doses greater than zero, some risk is assumed to be present); and

- The fact that epidemiological studies (i.e., human exposure studies) are limited and are not generally considered in a quantitative manner in deriving toxicity values.

The toxicity criteria used in the HHRA are based on an evaluation of noncarcinogenic and carcinogenic health risks that were developed using different methods. The noncarcinogenic criteria (i.e., oral and inhalation RfDs) incorporate multiple uncertainty factors to account for

limitations in the quality or quantity of available data (e.g., animal data in lieu of human data). These uncertainty factors are applied without regard to available data on the true likelihood of a variation in human response. Therefore, RfDs may be hundreds of times smaller than doses that would actually cause adverse health effects. This purposeful bias in the development of RfDs overestimates the actual potential for noncarcinogenic health risks for these chemicals.

The carcinogenic toxicity criteria (i.e., oral and inhalation SFs) also are developed using techniques that purposefully bias the criteria toward health conservatism. For example, most SFs are based on the premise that cancer data from high dose animal studies will predict cancer response in humans at dose levels thousands of times lower. The process also assumes that the carcinogenicity of a chemical in an animal model is representative of the response in humans. Finally, the statistical techniques used by regulatory agencies to extrapolate data from animals to human exposures generally assume that the dose-response curve is linear and that the 95% UCL of the slope is representative of the chemical's carcinogenic potency. In addition, a factor of 3 applied to the cancer toxicity value of mutagenic compound (i.e. benzo(a)pyrene) for child age 2 to 16, which is a conservative approach. In aggregate, these assumptions overestimate the risk estimates. Given this, actual risks are unlikely to be higher than the risk estimates, but could be considerably lower.

Lack of Route-Specific Toxicity Criteria

In the absence of data for the inhalation route of exposure, the SF or RfD for the oral route was used in the evaluation. As a result, the health risk estimates for these chemicals may be over- or underestimated. When available, agency-derived toxicity values were used in the quantitative risk assessment. Although toxicity values were not available for every detected analyte, omission of these chemicals is not anticipated to underestimate the predicted overall health risks. In fact, there may be some overestimation of the adverse health effects due to the conservatism involved in toxicity assessment of toxic chemicals that drive the human health risks at the site.

Use of Chronic Toxicity Data for Subchronic Exposures

The exposure period for the construction worker is assumed to be one year, which is less than the typical duration required to be classified as chronic exposure (7 years). Use of chronic toxicity criteria for a subchronic exposure duration, however, is conservative and likely to overestimate the hazard index.

Weight of Evidence of Carcinogenicity

As shown in Tables 6.1 and 6.2, USEPA assigns weight-of-evidence classifications to potential carcinogens (IRIS, 2007). Constituents evaluated in this assessment are classified as Group A, Group B1, Group B2, Group C, or Group D, defined as follows:

- Group A constituents (known human carcinogens) are agents for which there is sufficient evidence to support a causal association between exposure to the agents in humans and cancer.
- Group B1 constituents (probable human carcinogens) are agents for which there is limited evidence of carcinogenicity in humans.
- Group B2 constituents (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals, but inadequate or no evidence in humans.
- Group C constituents (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or no human data.
- Group D constituents are not classifiable as to their carcinogenicity in humans based on no human data and inadequate animal data.

Four of the chemicals evaluated were identified in Group A; one of the chemical evaluated was identified in Group B1; sixteen of the chemicals evaluated were identified in Group B2; three of the chemicals evaluated were identified in Group C; ten were identified in Group D; and seven are not currently assigned to a group by USEPA (Tables 6.1 and 6.2). Quantitative cancer risk characterization is generally performed for all Group A, B1, and B2 carcinogens identified at a site. A quantitative evaluation of Group C carcinogens and other chemicals identified as carcinogens is typically performed on a case-by-case basis because the weight of evidence in support of an association between constituent exposure and cancer is not as strong as Group A, B1, and B2. To be conservative, all twenty one of these chemicals were evaluated quantitatively as carcinogens. Group D constituents are not quantitatively evaluated as carcinogens.

6.3.4 Uncertainty Associated with Risk Characterization

One source of uncertainty that is unique to risk characterization is the assumption that the total risk associated with exposure to multiple chemicals is equal to the sum of the individual risks for each chemical (i.e., the risks are additive). Other possible interactions include synergism, where the total risk is higher than the sum of the individual risks, and antagonism, where the total risk is lower than the sum of the individual risks. Relatively little data are available

regarding potential chemical interactions following environmental exposure to chemical mixtures. Some studies have been carried out in rodents given simultaneous doses of multiple chemicals. The results of these studies indicated that no interactive effects were observed for mixtures of chemicals affecting different target organs (i.e., each chemical acted independently), whereas antagonism was observed for mixtures of chemicals affecting the same target organ, but by different mechanisms (Risk Commission, 1997).

While there are no data on chemical interactions in humans to chemical mixtures at the dose levels typically observed in environmental exposures, animal studies suggest that synergistic effects will not occur at levels of exposure below their individual effect levels (Seed, et al., 1995). As exposure levels approach the individual effect levels, a variety of interactions may occur, including additive, synergistic and antagonistic (Seed, et al., 1995).

Current USEPA guidance for risk assessment of chemical mixtures (USEPA, 1989a) recommends assuming an additive effect following exposure to multiple chemicals. Subsequent recommendations by other parties, such as the National Academy of Sciences (NRC, 1988) and the Presidential/Congressional Commission on Risk Assessment and Risk Management (Risk Commission, 1997) have also advocated a default assumption of additivity. As currently practiced, risk assessments of chemical mixtures generally sum cancer risks regardless of tumor type and sum non-cancer hazard indices regardless of toxic endpoint or mode of action. Given the available experimental data, this approach likely overestimates potential risks associated with simultaneous exposure to multiple chemicals.

6.3.5 Conclusions of Uncertainty Analysis

In summary, these and other assumptions contribute to the overall uncertainty in the risk assessment. However, given that the largest sources of uncertainty generally result in overestimates of exposure or risk, it is believed that results presented in this document are based on conservative estimates.

6.4 THE POTENTIAL RISK ASSOCIATED WITH MIGRATION OF IMPACTED GROUNDWATER TO SURFACE WATER

The potential risk associated with migration of impacted groundwater to surface water was evaluated for the site because groundwater may be discharging into surface water at Mill Creek. The migration of impacted groundwater to surface water is not currently a pathway of concern due to the operation of a French Drain that collects groundwater from the shallow upper aquifer; however, this pathway is a potential concern in the future if the French Drain

system is decommissioned or otherwise becomes non-operational. It should be noted that continuous operation of the French Drain is planned and in fact, increasing the operational capacity of the French Drain is currently being evaluated by Rohm and Haas.

A conservative screening approach was used by comparing the most current maximum detected concentrations in groundwater in all wells to EPA's NRWQC for human health consumption of surface water and aquatic organisms (e.g., fish, crayfish) to determine COPCs in groundwater. MCLs were used as the screening levels if NRWQC were unavailable, and RSLs for tap water were used if neither NRWQC nor MCL were available. Results of this comparison (Table 8.11) identified the following COPCs in groundwater: 1,1,2-trichloroethane, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, benzene, bromodichloromethane, carbon tetrachloride, chlorobenzene, chloroform, methylene chloride, tetrachloroethene, toluene, trichloroethene, vinyl chloride, 2-methylnaphthalene, aniline, bis(2-ethylhexyl)phthalate, naphthalene, aluminum, antimony, arsenic, cadmium, chromium, cobalt, iron, lead, manganese, nickel, thallium, and vanadium.

These 31 COPCs in groundwater were identified for the groundwater to surface water discharge pathway when comparing the maximum detected concentrations in groundwater to the most conservative surface water screening value (2009 NRWQC, 2010 MCL or RSL for tap water). An additional comparison to Ohio EPA Ohio River Basin human health surface water screening levels was performed for compounds detected in groundwater. The Ohio EPA screening levels used for the comparison are also presented in Table 8.11. For compounds detected in the groundwater samples (Table 8.11), seven compounds (1,1-dichloroethene, chlorobenzene, trans-1,2-dichloroethene, 2-chlorophenol, mercury, selenium and silver) have lower Ohio EPA screening levels than the NRWCC, MCL or RSLs. Of these seven compounds, only the maximum detections of 1,1-dichloroethene, 2-chlorophenol and mercury exceed the Ohio EPA surface water criteria for drinking water. Note that the maximum detections of 1,1-dichloroethene and 2-chlorophenol did not exceed the Ohio EPA surface water criteria for human health non-drinking water sources. The non-drinking water criteria are more applicable to the Mill Creek based on its current water supply designation by the state for agricultural and industrial water supply use only (per OEPA information at *http://www.epa.state.oh.us/portals/35/rules/01-30.pdf*). When compared to Ohio EPA human health screening values for non-drinking water uses, only mercury was identified as an additional compound of concern in seeps, surface water and groundwater. However, mercury

is eliminated as a compound of potential concern because mercury is not a major site-related constituent of concern.

7.0 SCREENING ECOLOGICAL RISK ASSESSMENT

A Screening Ecological Risk Assessment (SERA) was performed for the Rohm and Haas Facility. The goal of the SERA is to determine whether constituents suspected to be derived from the Rohm and Haas Facility pose a potential risk to plants, animals, and ecologically valuable habitats in the vicinity of the Facility.

This SERA report identifies and analyzes the following:

- Potential ecological receptors, including sensitive and protected species, wetlands and water bodies, and natural areas in the site vicinity;
- Constituent sources, affected media, and constituents of potential ecological concern (COPECs); and
- Potential exposure pathways for plants and animals.

Based on this analysis, potential ecological risks are identified and areas of the site are prioritized according to the degree of the risks. Principal data gaps are identified and the need for further evaluation is discussed.

The primary guidance documents used to prepare this SERA are as follows:

- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments ("ERAGS", USEPA, 1997d);
- Guidelines for Ecological Risk Assessments (USEPA, 1998b);
- Guidelines for Characterizing Background Chemicals in Soil at Superfund Sites (USEPA, 2001b); and
- Role of Screening Level Ecological Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments (USEPA, 2001c).

According to these guidance documents, the SERA is the first tier in the process of evaluating ecological risks at RCRA sites. The purpose of the SERA is to quickly screen available information to identify areas that need closer evaluation, and determine more specifically the

type and degree of ecological risk. In cases where there is insufficient information, the SERA can identify data gaps that can be addressed by additional tiers of effort such as a Baseline Ecological Risk Assessment (BERA) or a Detailed Ecological Risk Assessment (DERA). The BERA and the DERA may include field sampling and quantitative assessment of potential risks. Thus, the results of the SERA are not intended as a definitive description and characterization of ecological risks at the Rohm and Haas Facility. Rather, consistent with the USEPA Region 5 approach, the SERA provides a preliminary analysis to assist Rohm and Haas and USEPA in determining whether more comprehensive and detailed ecological evaluations are needed.

7.1 PROBLEM FORMULATION

The problem formulation establishes the goals and focus of the SERA. It establishes the assessment endpoints based on potentially complete exposure pathways and toxicological effects.

7.1.1 Environmental Setting

7.1.1.1 Terrestrial

An ecological characterization was performed to identify, map, and describe the upland, wetland and aquatic ecosystems that occur within the vicinity of the Rohm and Haas Facility. Federal and state natural resource agencies were contacted regarding species of concern, significant habitats, and fishery resources within 2 miles of the Rohm and Haas Facility (Appendix L). In addition, a biologist from Geomatrix conducted a reconnaissance survey of the site and surrounding area on May 29 and 30, 2001. The objectives of the survey were to describe plant communities and aquatic resources on and adjacent to the site, observe wildlife species, identify significant ecological resources, and observe evidence of stress to plants and animals (if any) from site-related manufacturing processes.

The Rohm and Haas Facility operational area (excluding the recreational fields) is mostly covered with buildings or asphalt. Little vegetation exists to support wildlife populations. The area surrounding the Rohm and Haas Facility is a residential area that supports a diversity of wildlife species tolerant of human activities. A total of five distinct upland vegetation plant communities were identified within the vicinity of the Rohm and Haas Facility. Plant species identified by cover type are presented in Table 9.1. Each terrestrial cover type is described below as to plant species composition, vegetation structure and land use. Aerial photographs showing the habitat types at the site and surrounding vicinity are provided in Appendix M.

Successional Old Field. A successional old field was identified along the western fence line of the property and south of the property, but only comprises approximately 0.4 acre on the site itself. It was dominated by panic grasses (*Panicum sp.*) and goldenrods (*Solidago sp.*). Other herbs that occur in lesser abundance include yellow sweet clover (*Melilotus officinalis*), Queen Anne's lace (*Daucus carota*), and teasel (*Dipsacus sylvestris*). This cover type is periodically disturbed, especially near the park which borders the southern and western portion of the facility, and will likely remain in an early successional state. The successional old field serves as wildlife habitat that provides edge, cover and food. Songbirds and mammalian species, such as goldfinches (*Carduelis tristis*), song sparrows (*Melospiza melodia*), white-footed mice (*Peromyscus leucopus*), and meadow voles (*Microtus pennsylvanicus*), which consume the seeds of grass and forbs are typically observed in these areas. With an abundant prey base, carnivores, such as red fox (*Vulpes vulpes*), may also reside in the area.

Riparian Forest. A narrow riparian forest is located along the banks of Mill Creek with approximately 0.2 acres of this habitat type actually on site. The dense canopy is dominated by red maple (*Acer rubrum*), box elder (*Acer negundo*), sycamore (*Platanus occidentalis*), and cottonwood (*Populus deltoides)* trees. The understory varies in density and is dominated by tartarian honeysuckle (*Lonicera tatarica*) and sandbar willow (*Salix interior*). The ground layer was sparse due to the lack of sunlight penetration. The predominant species noted in the ground layer included reed canary grass (*Phalaris arundinacea*), and goldenrods. The riparian corridor provides excellent habitat for many animals because of the seasonal or perennial presence of water. This water is likely used directly for drinking by animals in the general area. In addition, pooled water (relatively still water along the creek banks), which is essential for breeding populations of amphibians, was not observed during the site visit. The creek banks are relatively steep in the vicinity of the site with consistently flowing water.

Residential Area. Residential areas lie to the south and east of the Rohm and Haas Facility. They consist of buildings (mainly single family homes) surrounded by maintained lawns (i.e., frequent mowing) and ornamental plantings. The lawns consist of grasses and weed species, including English plantain (*Plantago lanceolata*), crab grass (*Digitaria ischaemum*), and dandelion (*Taraxacum officinale*). Ornamental shrubs and small trees are planted along the foundations of the homes. In addition, larger trees are planted in the yards. Several recreational areas (baseball diamonds and a school football stadium) and a cemetery are also found in this cover type. This type of habitat comprises approximately 8 acres of the site, mostly (7 acres) of which are baseball fields. The mowed lawn areas surrounding the residences and constant

disturbance from human activity create an environment that is of limited value to wildlife. Species more tolerant of human activity, such as American robins (*Turdus migratorius*) and raccoons (*Procyon lotor*), may typically be present. The ornamental plantings provide nesting sites and cover.

Industrial Area. The site itself (approximately 25.4 acres) and bordering lands to the north are industrial. With the exception of the southern portion of the Rohm and Haas Facility, most of these areas are covered with gravel, concrete, asphalt, rubble piles or a gravel and dirt mixture. Areas to the north of the Rohm and Haas Facility are essentially devoid of vegetation, with the exception of a few small weedy patches of grass, due to constant disturbances from heavy equipment. The southern portion of the Rohm and Haas Facility (generally the area around Building 40, stretching across to the immediate north of the parking lot, to the area south of Building 27) has trees, lawn, and landscaping. Therefore, there is currently little area for free growth of vegetation or development of wildlife habitats.

7.1.1.2 Freshwater Wetlands

A review of the U.S. Fish and Wildlife National Wetland Inventory (NWI) Maps (http:// nationalmap.gov/) indicates the presence of a palustrine forested broad-leaved deciduous temporarily-flooded (PFO1A) wetland on the western bank of Mill Creek across from the Rohm and Haas Facility. Based on review of aerial photographs of this area (copies provided in Appendix M), it appears that at least half of this wetland has been recently impacted by construction activities in the area. In addition, the Mill Creek is classified as a riverine wetland in some areas on the Glendale, Ohio quadrangle.

7.1.1.3 Mill Creek

Mill Creek borders the Rohm and Haas Facility to the west, and represents the only aquatic habitat in the facility's vicinity. Representatives of Geomatrix performed a visual reconnaissance of Mill Creek at least once per calendar quarter during 2001, to check for the presence of active seeps or any apparent sign of chemical impact. In October 2003, representatives from USEPA and other government agencies participated in a reconnaissance trip to Mill Creek. Geomatrix representatives also performed a visual reconnaissance of Mill Creek as part of the Supplemental FI in March 2004. The following bullets summarize Mill Creek reconnaissance activities performed:

- First Quarter 2001: March 21, 2001, by representatives of Geomatrix and Rohm and Haas. This reconnaissance was performed within 48 hours of a rainfall event.

Access to the creek bank was marginal due to its steep slopes, slippery footing, and heavy brush cover. Despite this, the reconnaissance team was able to directly view an estimated 80 percent of the bank lying west of the facility.

- Second Quarter 2001: April 18 and again on May 29 and 30, 2001, by Rohm and Haas and Geomatrix personnel. An ecological survey (including observations from a canoe on May 30th) was performed. At the time of the field reconnaissance, the creek generally contained approximately 24 inches of water in the center and three to six inches along the banks. Pool areas, suitable for swimming, with over three feet of water were found in several locations. The creek was flowing at a field estimated rate of about one cubic foot per second (cfs). The creek is approximately 25 feet wide with a bed predominantly comprised of rock and concrete debris. The earthen banks are steep (25° slope) and are well vegetated with a forested riparian habitat. During the reconnaissance, several outfalls, some of which were combined sewer overflows, were observed entering the stream. A sewer odor was observed along this stream, with the strongest odor in the vicinity of the combined sewer outfalls (CSOs)s. No aquatic fauna were observed in the stream during the survey.

- Third Quarter 2001: August 22, 2001 by representatives of Geomatrix. Small seeps were identified near the northwest property corner and at a location about 300 feet south of the northwest property corner.

- Fourth Quarter 2001: December 6, 2001, by Geomatrix. A stream gauge was installed on the west bank of Mill Creek, near the north (upstream) facility boundary across from the SS-1 stream station location.

- First Quarter 2002: March 6, 2002 by Geomatrix. During this reconnaissance, the stream level was recorded. The seeps observed during the third quarter of 2001 were no longer visible. Eight creek bed sediment samples were collected from Mill Creek at locations upstream, downstream and adjacent to the facility.

- October 2003: On October 28, 2003, Mill Creek was observed by representatives from Rohm and Haas, USEPA, Geomatrix, Booz Allen Hamilton, the U.S. Geological Survey and Ohio Environmental Protection Agency as part of a meeting held at the site.

- March 2004: March 25, 26, and 27 by Geomatrix. During this reconnaissance, 6 creek bed samples and 6 surface water samples were collected at locations downstream of and adjacent to the facility.

Water quality standards described in Chapters 3745-1 and 3634-1 of the Ohio Administrative Code (OAC) define beneficial use designations, describing existing or potential uses for surface water bodies within the State of Ohio. These beneficial use designations consider the use and

value of the water for public water supplies, the protection and propagation of aquatic life, recreation in and on the water, agriculture, industrial, and other use issues. Possible beneficial use designations include "aquatic life use," "recreational use," "public water supply," and "state resource water."

The State of Ohio has assigned Mill Creek the following beneficial use designations:

- Aquatic Life – warm-water habitat;
- Recreation – primary contact recreation; and
- Water Supply – agricultural and industrial.

The designation as a warm-water habitat defines the "typical" warm-water assemblage of aquatic organisms for the stream. Primary contact recreation waters are suitable for full body contact recreation (e.g., swimming). To qualify as a primary contact recreation use, a stream must have at least one pool with an area of at least 100 square feet and a depth of at least three feet. The water supply designation indicates Mill Creek may be used for irrigation and livestock watering and industrial and commercial use without treatment.

The Mill Creek was identified as a priority impaired water on Ohio's 2006 303(d) list. Biological and chemical stream surveys indicate nutrients, bacteria, organic enrichment, organic chemical pollutants, metals and habitat alterations are some of the primary causes of impairment in the watershed (OEPA, 2004a). Virtually the entire length of the lower 17 miles of Mill Creek (which includes the segment adjacent to the facility) have been in non-attainment. Since 1988, 75% of biological index scores and evaluations (56 total) have reflected poor or very poor quality (OEPA, 2004a). Contaminated fish tissue due to mercury contamination (statewide) and PCBs (for approximately the lower 20 miles of Mill Creek) has prompted the State of Ohio to issue a limited consumption advisory for all fish species (one meal per week of fish caught from all Ohio surface waters due to mercury contamination and one meal per month of fish caught from Mill Creek due to PCB contamination) (OEPA, 2008a).

7.1.1.4 Fish and Wildlife Resources

Wildlife uses of each cover type were evaluated using literature sources and field observations. Wildlife sightings included direct observations and also identifications based on vocalizations,

tracks, browse, burrows, and scat. General wildlife values (e.g., food and cover availability) for each cover type were also noted.

No state-listed endangered, threatened, or species of concern occur within 2 miles of the Rohm and Haas Facility (ODNR, 2005) (Appendix L); nor were any observed during the field reconnaissances. Two federally-listed endangered species, Indiana bat (*Myotis sodalis*) and running buffalo clover (*Trifolium stoloniferum*), are listed as potentially occurring in the area (USFWS, 2005) (Appendix L). The preferred summer habitat of the Indiana bat is dead trees and snags along riparian corridors, especially those with exfoliating bark or cavities in the trunk or branches that may be used as maternity roosts, and live trees (such as shagbark hickory) which have exfoliating bark. Snag trees or shagbark hickory were not observed during the field reconnaissance; therefore, this species is unlikely to occur in the vicinity of the site. Running buffalo clover can be found in partially shaded woodlots, mowed areas, and along streams and trails. Running buffalo clover requires periodic disturbance and a somewhat open habitat to successfully flourish, but cannot tolerate full-sun, full-shade or severe disturbance. Although conditions for running buffalo clover may be found in some areas on-site, the USFWS has indicated that they believe the possibility of its occurrence on-site is remote. Running buffalo clover was not observed during any of the site reconnaissances performed on 29 and 30 May 2001. The USFWS also notes that the site is within range of the bald eagle (*Haliaeetus leucocephalus*), a Federally-listed threatened species, and the sheepnose mussel (*Plethobasus cyphyus*), a Federal candidate species. Based on the site location, USFWS has indicated that any project would have no effect on these two species, provided best management practices are implemented.

The surrounding 2-mile radius is occupied predominantly by residential homes and industrial/commercial properties. The residential areas are dominated by mowed lawns interspersed with trees and shrubs. The industrial areas consist of paved areas and buildings. Because of the lack of vegetation and constant human activity, these areas do not support an abundance of terrestrial wildlife. The wildlife expected to occur in the vicinity of the facility includes more urbanized bird and mammalian species, such as rock dove (*Columbia livia*), gray squirrel (*Sciurus carolinensis*), and Norway rat (*Rattus norvegicus*). Since limited areas of vegetation exist, the population size in the area will also be limited. Tables 9.2 through 9.4 list species that may potentially occur within and adjacent to the site based on the cover types identified during the field reconnaissance. The species observed during the field reconnaissance (which

are representative for the point in time of the field reconnaissance) also are identified in the tables.

Portions of Mill Creek support a warm-water fishery, although no fish were observed in the creek during the SERA reconnaissance, or other creek reconnaissances performed as part of the FI or Supplemental FI (Geomatrix, 2002 and 2004). Pollutant and habitat modification impacts in Mill Creek have reduced the biological community composition to a predominance of pollution tolerant species based on data gathered in 1992, 1995, 1997 and 2002 (OEPA, 2004a). Fish species recorded in the vicinity of the site during these studies included: white sucker, common carp, creek chub, striped shiner, spotfin shiner, fathead minnow, bluntnose minnow, central stoneroller, yellow bullhead, green sunfish, bluegill, orangethroat darter, blacknose dace, silverjaw minnow, brown bullhead, white crappie, largemouth bass, Johnny darter, gizzard shad, and goldfish. A visual survey of the creek segment directly adjacent to the site was completed in a canoe from Cincinnati Drum to the bridge south of the site on May 30, 2001. No fish of any species were observed in the water.

Results of macroinvertebrate sampling by the OEPA in Mill Creek were similar to the fish survey results (OEPA, 2004a). Assessment in the urban and industrialized areas of Mill Creek indicated declining water quality with poor to very poor macroinvertebrate communities in 1992 (based on quantitative sampling) and marginally good to poor communities in 1997 (based on artificial substrate sampling). Most improvements in the macroinvertebrates between the 1992 and 1997 surveys were attributable to water quality improvements in East Fork Mill Creek because of upgrades made to the Butler County Upper Mill Creek Water Reclamation Facility (OEPA, 2004a). Additional macroinvertebrate surveys were conducted in the vicinity of the site in 2002. In 1992, a total of 18 Taxa were recorded, in 1997, a total of 45 Taxa were recorded, and in 2002, a total of 38 Taxa were recorded from surveys conducted in the vicinity of the site.

7.1.2 Source Areas

The Rohm and Haas Facility was constructed in 1949, and chemical manufacturing operations began in 1950. The character and extent of chemical impact to environmental media at the site is described in the FI Report (Geomatrix, 2002).

7.1.3 Fate and Transport

The fate and transport of chemicals in the environment are influenced by a variety of physicochemical and site-specific factors. The chemical constituents detected in samples at the

Rohm and Haas Facility include VOCs, SVOCs (primarily PAHs), pesticides/PCBs, and inorganic constituents. Environmental fate and transport processes for chemicals potentially associated with the Rohm and Haas Facility are briefly discussed in the following subsections. It should be noted that PAHs are ubiquitous throughout Mill Creek based on sampling of the Mill Creek conducted by the OEPA. In the latest survey, conducted in 2002, PAHs were found at six of eight sites in the survey (OEPA, 2004a). There were ten different PAHs identified throughout the survey. All were part of the 16 priority pollutants PAHs identified by USEPA. Six of the ten PAHs were evaluated by the MacDonald Sediment Quality Guidelines. Individual and additive toxicity of PAH sediment compounds was evaluated using the MacDonald Sediment Quality Guidelines. If total PAH sediment concentrations exceeded 22.4 mg/kg, the mixture was considered over the Probable Effect Concentration (adverse effects nearly always occur). If any one PAH compound was over the MacDonald probable effects concentration (PEC) the entire mixture is considered over the PEC even if the total amount of PAHs was below 22.4 mg/kg. PAHs are classified as "pyrogenic" or "petrogenic". Pyrogenic PAH compounds are generated from combustion or pyrolysis of organic matter (wood, coal, petroleum or wastes). Petrogenic PAHs are generated from organic matter subjected to temperature and pressure over geologic time. The fingerprint of PAH compounds found in the Mill Creek sediments would be classified as Pyrogenic. Possible sources of PAHs are from urban runoff/fallout from diverse organic mixtures of soot, atmospheric dust, internal combustion exhaust and storm water containing residual lubricating oils. Used motor oil is a mixture of Pyrogenic and Petrogenic PAHs. The fingerprint of "fresh" used motor oil will have a wide range of PAHs, from the lighter naphthalene to heavier benzo(b)fluoranthene, in addition to alkyl PAHs. As the motor oil ages, it will tend to concentrate the less degradable heavier pyrogenic PAH compounds. Sediment organics generally improved in the mainstem and East Fork Mill Creek from 1997 to 2002. One site, Mill Creek at Crescentville Road [River Mile (RM) 18.7], did not detect any sediment organic compounds in either year. PAHs were detected at every site on the mainstem starting at Sharon Road (RM 16.6) and moving downstream. Mill Creek at the Formica (RM 14.8) entrance was the only site on the mainstem having an increase in total PAH in 2002 (7.64 mg/kg) compared to 1997 (4.1 mg/kg). Total PAH levels in sediment dropped slightly from 2.6 mg/kg in1997 to 2.32 mg/kg in 2002. Both years were between the MacDonald PEC and threshold effects concentration (TEC). West Columbia Road (RM 13.2 – immediately downstream of the Rohm and Haas facility) was the most contaminated sediment organic site on the survey for both years. Ten of the same PAHs were identified in both survey years. All were part of the 16 priority pollutant PAHs identified by USEPA. In 1997, the West Columbia Road site had four PAHs - chrysene (1.3 mg/kg),

fluoranthene (3.2 mg/kg), phenanthrene (1.5mg/kg), pyrene (2.5 mg/kg) and total PCBs (0.892 mg/kg), over the MacDonald PEC. Total PAHs were 14.3 mg/kg. Total PAHs were 8.43 mg/kg, which is between the MacDonald PEC and TEC.

Similarly, based on an analysis of spatial trends in polychlorinated biphenyl (PCB) and pesticide concentrations and the known use and handling of these chemicals in large quantities by neighboring facilities (i.e., GE, Pristine and Cincinnati Drum), the presence of these two classes of chemicals in Mill Creek may not be attributable to the Rohm and Haas facility as the facility never manufactured or handled these compounds. OEPA sampling of Mill Creek for pesticides shows that at the Sharon Road location (RM 16.6), the pesticides endosulfan sulfate (9.9 µg/kg) and methoxychlor (7.8 µg/kg) were present in sediment in 1997. No pesticides were detected at this location in 2002. The 2002 survey detected one compound, chlordane (18.2 µg/kg), above the MacDonald PEC. Various benzene hexachloride (BHC) isomers were detected upstream (RM 14.75 – 26.35) of the Rohm and Haas facility, at concentrations ranging from 0.0029 – 0.0084 µg/l in water samples. In addition, various other pesticides (BHC – 0.0022 – 0.015 µg/l; dieldrin – 0.0024 – 0.011 µg/l; heptachlor epoxide – 0.0031 – 0.0057 µg/l; endrin – 0.006 – 0.016 µg/l; and 4,4'-DDE – 0.0059 µg/l) were detected in the East Fork of Mill Creek, a tributary that discharges upstream of the Rohm and Haas facility at RM 17.45 (OEPA, 2004a). Thus, the low levels of pesticides and PCBs detected adjacent to the Rohm and Haas facility are consistent with regional background levels for these compounds.

7.1.3.1 Physicochemical Properties

The fate and transport of chemicals in the environment depend on the properties of both the chemicals and the environmental media in which they occur. Appendix H lists the primary organic compounds detected during the investigation of the site, with selected physical and chemical properties (e.g., water solubility, Henry's Law Constant, octanol-water partition coefficient, organic-carbon partition coefficient).

Water solubility is the maximum concentration of a compound that will dissolve in water at a specific temperature. Highly soluble compounds can be rapidly leached from soils and water and are generally mobile in groundwater and surface water. Chemicals of low water solubility are relatively immobile in aquifers but may be transported rapidly in turbulent surface waters as suspended particles. Some water-insoluble compounds become readily mobile when in contact with organic solvents.

Vapor pressure is a measure of the volatility of a chemical in its pure state and is an important determinant of vaporization from waste sites. A compound's tendency to volatilize from water depends upon its Henry's Law Constant. Henry's Law Constant is the ratio, at equilibrium, of a compound's vapor pressure to its water solubility. It may be expressed in units of atmospheres-cubic meters per mole (atm-m^3/mol). Compounds with Henry's Law Constants greater than 10^{-3} atm-m^3/mol readily volatilize from water. Those with Henry's Law Constants from 10^{-3} to 10^{-5} atm-m^3/mol volatile less readily, while those with Henry's Law Constants less than 10^{-5} atm-m^3/mol volatilize slowly.

The octanol-water partition coefficient (K_{ow}) expresses the equilibrium distribution of an organic compound between octanol and water. K_{ow} is often used to estimate the extent to which a chemical will partition from water into fatty tissues of animals. Log K_{ow} values range from -2.5 to 10.5. Organic chemicals with log K_{ow} values less than three are generally considered not to concentrate in animal tissues; that is, they do not bioaccumulate.

The organic carbon partition coefficient (K_{oc}) is a measure of the tendency of organic compounds to sorb to soil and sediment and is expressed by this equation:

$$K_{oc} = \frac{\text{(mg chemical sorbed / kg organic carbon)}}{\text{(mg chemical dissolved / l of solution)}}$$

K_{oc} values for organic compounds range from 1 to 10^7; higher values indicate greater sorption potential. Chemicals with K_{oc} values less than 10^3 generally do not sorb strongly to soil.

Bioconcentration factors (BCFs), which relate the concentration of the chemical in an organism at equilibrium to the concentration of the chemical in water, are used to assess the potential for chemical bioconcentration, especially for inorganic compounds. BCFs correlate with the octanol/water partition coefficient and solubility of a chemical. Biota-sediment accumulation factors (BSAFs) relate the concentration of the chemical in an organism at equilibrium to the concentration of the chemical in sediments, especially for organic compounds.

7.1.3.2 Fate and Transport Mechanisms for Chemicals Detected at the Site

Volatile Organic Compounds (VOCs)

VOCs have high vapor pressures and, therefore, would be expected to volatilize readily from environmental media to the atmosphere. Once released to the atmosphere, these compounds are rapidly photodegraded. These compounds have low octanol/water coefficients (log K_{ow}) and, therefore, do not adsorb well to soil, sediment, or water-borne particulate matter. Since VOCs have low octanol/water coefficients and high water solubilities, these chemicals have a low potential to bioconcentrate in organisms (Howard, 1990).

Metals

In a terrestrial setting, trace elements released to the environment tend to accumulate in the soil (Sposito and Page, 1984). Mobility of these trace elements in soil is low, and accumulated metals are depleted slowly by leaching, plant uptake, erosion, or chelation.

The transport of trace elements in soil may occur via the dissolution of metals into pore water and leaching to groundwater, or colloidal or bulk movement (i.e., wind or surface water erosion). The rate of trace element migration in soil is affected by the chemical, physical and biological characteristics of the soil. The most important characteristics include:

- Eh-pH system;
- Cation exchange capacity and salt content;
- Quantity of organic matter;
- Plant species;
- Water content and temperature; and
- Microbial activity.

Metals that do mobilize from the soil into the water column are most mobile under acid conditions, and increasing pH usually reduces their bioavailability. Generally, metals do not exist in soluble forms for long, and tend to accumulate in bottom sediment. Once in the sediment, most metals sorb onto hydrous iron and manganese oxides, clayey minerals and organic materials and are eventually partitioned into the sediments. Metal bioavailability from the sediment is enhanced under conditions of low pH, high dissolved oxygen, and high temperature. During these conditions, metals become more soluble and freely move in the interstitial pore water and the water column (McIntosh, 1992).

Mercury, particularly methyl mercury, is a special compound of concern due to its persistence in the environment, potential to bioaccumulate, and toxicity to humans and the environment (ATSDR, 1999). Although, methyl mercury has no industrial uses; it is formed in the environment from the methylation of the inorganic mercurial ion, which is partly derived from industrial sources (ATSDR, 1999). Methyl mercury exposure occurs primarily through the diet, with fish and fish products as the dominant source. However, the U.S. EPA currently considers modeling concentrations in fish tissue highly uncertain given the preponderance of potential sources of mercury that are unrelated to the site as documented previously in this report. The presence of multiple and varying factors that affect mercury uptake and methylation would add complexity to this issue. As a more practical, still conservative, approach, the levels of mercury in water were compared to the appropriate screening criteria for identified pathways as presented in Sections 3.2.2., 3.2.3, 7.2.3 and 7.2.4. Thus, mercury was not retained as a compound of concern for the fish ingestion pathways since it was detected below applicable screening levels.

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs contain only carbon and hydrogen and consist of two or more fused benzene rings in linear, angular, or cluster arrangements. In general, most PAHs can be characterized as having low vapor pressure, low to very low water solubility, low Henry's Law Constant, high log K_{ow}, and high K_{oc}, which means PAHs remain bound to soil and sediment particles and do not freely enter the water column.

High partition coefficients and low solubilities suggest that PAHs are likely to be adsorbed onto sediment particles. Conversely, these properties, in combination with their low vapor pressure, indicate that most PAHs will not readily volatilize into the atmosphere.

Although PAHs are regarded as persistent in the environment, they are degradable by micro-organisms. Environmental factors, microbial flora, and physicochemical properties of the PAHs themselves influence degradation rates and degree of degradation. Important environ-mental factors influencing degradation include temperature, pH, redox potential (the tendency of a chemical to accept or donate electrons, or to become reduced or oxidized), and microbial species present. Physicochemical properties that influence degradation include chemical structure, concentration, and lipophilicity ("fat-loving" tendency).

The fate of adsorbed PAHs in water is influenced by a number of factors, including duration of PAH exposure to sunlight, which will largely determine the extent of photodegradation. In

general, only small amounts of PAHs in aquatic systems will be found in solution but PAHs could be expected to accumulate in sediments. The ultimate fate of PAHs that accumulate in sediments is biodegradation and biotransformation by benthic (sediment-dwelling) organisms. However, biodegradation is slow in the absence of penetrating solar radiation and oxygen (Eisler, 1987).

In general, PAHs show little tendency to biomagnify in food chains, despite their high lipid solubility, probably because most PAHs are rapidly metabolized by the organisms that are exposed to them (Eisler, 1987).

Polychlorinated Bipheyls (PCBs)

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs (although never manufactured at the Rohm and Haas facility) was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils

PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs. PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.

PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water (ATSDR, 2007).

Pesticides

Various pesticides were detected at low concentrations at the facility and in background locations. Pesticides were never manufactured or known to be stored at the Rohm and Haas facility. The fate and transport of these compounds vary depending on the exact pesticide detected and the medium in which it was detected. The fate and transport of a few pesticides

detected in various media at the site are discussed below. All of the information provided below is from the applicable ATSDR Toxicological Profile for the substance. For a detailed discussion of the fate and transport of the various pesticides detected at and adjacent to the Rohm and Haas facility, refer to the specific ATSDR Toxicological Profile for the compound of interest. The ATSDR profiles can be accessed at the following website: http://www.atsdr.cdc.gov/toxpro2.html.

Aldrin/Dieldrin: Aldrin and dieldrin are insecticides with similar chemical structures. They are discussed together because aldrin quickly breaks down to dieldrin in the body and in the environment. Pure aldrin and dieldrin are white powders with a mild chemical odor. The less pure commercial powders have a tan color. Neither substance occurs naturally in the environment. From the 1950s until 1970, aldrin and dieldrin were widely used pesticides for crops like corn and cotton. Because of concerns about damage to the environment and potentially to human health, EPA banned all uses of aldrin and dieldrin in 1974, except to control termites. In 1987, EPA banned all uses. Aldrin is readily converted to dieldrin in the environment. Dieldrin is subject to atmospheric transport, and, as a result, is ubiquitous in the environment. Dieldrin persists because it is relatively resistant to biotransformation and abiotic degradation. Thus, it is found in low levels in all media (air, water, and soil).

Aldrin and dieldrin were popular pesticides for corn and cotton crops, and were used as a prophylactic and for treatment of timber against termite infestation. Consistent with their intended use on insects in soil, aldrin and dieldrin are not very water soluble, but readily bind to sediment and are rarely leached into deeper soil layers and groundwater. As they take decades to break down in the environment, past agricultural uses of aldrin and dieldrin have resulted in persisting soil residues and uptake in a wide range of crops. In biological systems of soils, plants, and animals, aldrin converts rapidly to dieldrin by a microsomal oxidation reaction (epoxidation). The half-life of dieldrin in temperate soils is about 5 years, while it disappears more quickly (up to 90% in 1 month) from tropical soils. Organochlorine pesticides, including dieldrin, continue to enter streams in the United States from atmospheric deposition and erosion of soils contaminated from past use. Aldrin and dieldrin may be volatilized from sediment and redistributed by air currents, contaminating areas far from their sources. Nationally, levels of aldrin and dieldrin have declined since their agricultural uses were discontinued.

When aldrin and dieldrin are released to the environment, sunlight and bacteria change aldrin to dieldrin so that we mostly find dieldrin in the environment. In addition, they bind tightly to soil

and slowly evaporate to the air. Dieldrin in soil and water breaks down very slowly. The only reports of aldrin or dieldrin contamination of groundwater occurred at sites with high concentrations of these compounds.

Plants take in and store aldrin and dieldrin from the soil and aldrin rapidly changes to dieldrin in plants and animals. In animals, dieldrin is stored in the fat and leaves the body very slowly.

BHC: Hexachlorocyclohexane (HCH), formally known as benzene hexachloride (BHC), is a synthetic chemical that exists in eight chemical forms called isomers. The different isomers are named according to the position of the hydrogen atoms in the structure of the chemical. One of these forms, gamma-HCH (or γ-HCH, commonly called lindane), is produced and used as an insecticide on fruit, vegetables, and forest crops, and animals and animal premises. It is a white solid whose vapor may evaporate into the air. The vapor is colorless and has a slight musty odor when it is present at 12 or more parts HCH per million parts air (ppm). γ-HCH has not been produced in the United States since 1976. However, imported γ-HCH is available in the United States for insecticide use as a dust, powder, liquid, or concentrate. It is also available as a prescription medicine (lotion, cream, or shampoo) to treat and/or control scabies (mites) and head lice in humans.

Technical-grade HCH, a mixture of several chemical forms of HCH, was also once used as an insecticide in the United States and typically contained about 10–15% of γ-HCH as well as the alpha (α), beta (β), delta (δ), and epsilon (ε) forms of HCH. Virtually all of the insecticidal properties reside in the gamma isomer. Technical-grade HCH has not been produced or used in the United States for more than 20 years.

Although technical-grade HCH is no longer used as an insecticide in the United States, α-, β-, γ-, and δ-HCH have been found in the soil and surface water at hazardous waste sites because they persist in the environment. Once released to the environment, HCH can partition to all environmental media. Although its atmospheric lifetime is long, HCH can be degraded by reacting with photochemically produced hydroxyl radicals or can be removed from the air by wet and dry deposition. Biodegradation is believed to be the dominant decomposition process for HCH in soil and water, although hydrolysis and photolysis may also occur to a lesser extent. The rates of degradation depend on the ambient environmental conditions. Although technical-grade HCH has essentially been banned in the United States for many years, α-, β-, and δ-HCH continue to be detected in environmental media because of the long environmental persistence of these compounds.

4,4'-DDE and 4,4'-DDT: DDT (1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)ethane) is a pesticide that was once widely used to control insects on agricultural crops and insects that carry diseases like malaria and typhus, but is now used in only a few countries to control malaria. Technical grade DDT may also contain DDE (1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethylene) and DDD (1,1-dichloro-2,2-bis(*p*-chlorophenyl) ethane) as contaminants. DDD was also used to kill pests, but to a far lesser extent than DDT. Both DDE and DDD are breakdown products of DDT. DDT does not occur naturally in the environment. After 1972, the use of DDT was no longer permitted in the United States except in cases of a public health emergency. It is, however, still used in some other areas of the world, most notably for controlling malaria. When deposited on soil, DDT, DDE, and DDD are strongly adsorbed. However, they may also revolatilize into the air, which is more likely to occur from moist soils than dry soils. They may photodegrade on the soil surface and biodegrade. DDT biodegrades primarily to DDE under unflooded conditions (e.g., aerobic) and to DDD under flooded (e.g., anaerobic) conditions. As a result of their strong binding to soil, DDT, DDE, and DDT mostly remain on the surface layers of soil; there is little leaching into the lower soil layers and groundwater. DDT may be taken up by plants that are eaten by animals and accumulate to high levels, primarily in adipose tissue and milk of the animals.

Although the use of DDT is no longer permitted in the United States, DDT may be released into the atmosphere in other countries where it is still manufactured and used, including Mexico. DDT, DDE and DDD may also enter the air when they evaporate from contaminated water and soil. DDT, DDE, and DDD in the air will then be deposited on land or surface water. This cycle of evaporation and deposition may be repeated many times. As a result, DDT, DDE, and DDD can be carried long distances in the atmosphere. These chemicals have been found in bogs, snow, and animals in the Arctic and Antarctic regions, far from where they were ever used.

7.1.4 Mechanisms of Ecotoxicity and Potential Receptors

The ecological effect of a chemical constituent depends on many factors, such as the constituent's bioavailability, its concentration in the environment and/or receptor organism, synergistic interactions among constituents, the duration and frequency of receptor biota exposure to that constituent, the species of the receptor, the metabolic rate of the species, and the characteristics of the metabolic processes of the species (USEPA, 1988b). Constituents in the environment can affect receptor biota and ecosystems in both lethal and sublethal ways, such as the following:

- Altered developmental rates, metabolic and physiologic processes and functions, or behavior;
- Increased susceptibility to disease, parasitism, or predation;
- Disrupted reproductive functions; and
- Mutations or other reduction in the viability of offspring (USEPA, 1989b)

When potential effects of an environmental constituent on biotic receptors are being evaluated, the toxicity of the constituent must be determined. The determination should be based on field data, monitoring data, and the results of toxicity testing of contaminated media (USEPA, 1989b).

7.1.5 Exposure Pathways

A conceptual site model, which illustrates complete exposure pathways, is presented in Figure 5. The exposure pathway is a course that a chemical may take from a source to an individual receptor, and includes a source, a release mechanism, an exposure point, and an exposure route. The exposure point is the location of potential contact between and individual and a chemical, while the exposure route is the way that a chemical comes in contact with that individual.

Ecological resources in the vicinity of the Rohm and Haas Facility may be exposed to constituents through various exposure routes (see Figure 5). Surface soil, sediments and surface water are the environmental media most likely to be encountered by biota.

Upon their release, some of the chemicals detected are persistent and may be transformed to more bioavailable forms and mobilized in the food chain. Mobilization of chemicals in the terrestrial food chain could occur through the following pathways:

- Uptake by plants;
- Contact and absorption of chemicals in surface soils, incidental ingestion, and feeding on contaminated food by invertebrates;
- Incidental ingestion of or contact with surface soils by terrestrial wildlife; and/or
- Bioaccumulation from vegetation or prey at the base of the food chain by terrestrial wildlife.

Mobilization of chemicals in the aquatic food chain could occur through the following pathways:

- Uptake by aquatic macrophytes;
- Contact and absorption of chemicals in sediments, incidental ingestion, and feeding on contaminated food by aquatic invertebrates;
- Incidental ingestion and contact with sediments by aquatic and semi-aquatic wildlife; and
- Bioaccumulation from vegetation or prey at the base of the food chain by aquatic and semi-aquatic wildlife.

7.1.6 Ecological Receptors

Based on the pathways identified above, the following general classes of ecological receptors potentially might be exposed to chemicals at and in the vicinity of the Rohm and Haas Facility:

- Terrestrial wildlife species that may be in contact with the soils and feed within the terrestrial food chain (including terrestrial plants and soil invertebrates);
- Predatory fish species that are present on at least a seasonal basis and feed on resident forage species or benthic organisms;
- Benthic macroinvertebrates that are burrowers, tube dwellers, or found at the sediment-water interface, and are preferably deposit feeders, grazers, or suspension feeders;
- Obligate, permanent aquatic wildlife species that are in frequent contact with the sediments and/or feed primarily on fish and macroinvertebrates; and
- Facultative aquatic wildlife species that may be in contact with the sediments and/or frequently use the creek for foraging.

Fish and/or macroinvertebrates were not observed in Mill Creek during the creek reconnaissances. However, it is important to note that the reconnaissance program was limited to visual observations and did not include electro-shocking, trapping, or other means of collecting aquatic organisms. Poor habitat provided by the artificial streambed (e.g., riprap) would not be conducive to a benthic invertebrate community, but would not preclude the development of such a community. Without a control or reference condition, however, a benthic invertebrate study would provide little useful information, especially given the nature of the stream bed.

7.1.7 Screening Endpoints

The ecological values of the Rohm and Haas Facility and its vicinity include populations and communities of plants and animals in terrestrial habitats. Potential ecological risk is determined by exposure frequency, constituent concentration, mechanism of exposure, and duration of exposure. The Rohm and Haas Facility and surrounding area is industrial and residential with minimal habitat available to support a wildlife population. Specifically, only 0.4 acres of old field habitat and 0.2 acres of riparian habitat exist at the site and the remainder of the site has been developed for site manufacturing and support activities. Since only transient species and a few individual animals would use this area, the frequency and duration of exposure is limited. Therefore, exposure pathways for terrestrial receptors are incomplete and further evaluation of soil is not required.

Although the aquatic habitat provided by Mill Creek is limited at best, aquatic species were included in this SERA. In broad terms, the values to be protected (assessment endpoints) are the structure and function of site ecosystems, and the survival and reproduction of species typical of the region. Because there are no rare, threatened, or endangered species or communities known to occur on site or that are likely to come in frequent contact with site constituents, no special consideration will be given to protecting individuals or populations of rare species.

Two types of endpoints were used to compare the data to identify chemicals of potential ecological concern (COPECs). The first are screening values that, below which, adverse effects are not expected, even for the most sensitive receptors. Typically, USEPA Region 5 Ecological Screening Values (ESLs) were used to identify COPECs in sediments and surface water. A detailed description of these comparisons is presented below in Sections 7.2.1 (sediments) and 7.2.2 (surface water).

In addition, measurement endpoints (a measure of effect) were also evaluated for several key receptor species. A measurement endpoint is a measurable ecological characteristic that is related to the valued characteristic chosen as the assessment endpoint (USEPA 1998b). For selected key receptor species, effects relative to the assessment endpoint were extrapolated from the selected measurement endpoints. Both the no-observed-adverse-effect level (NOAEL) and the lowest-observed-adverse-effect level (LOAEL) were evaluated in the SERA. To assess the risk to aquatic life, the measurement endpoint consisted of chronic water quality criteria published by the OEPA for the Ohio River basin (and by USEPA Region 5 if OEPA values were unavailable) for surface water samples collected from Mill Creek adjacent to the

site. In addition, the potential migration of the groundwater to surface water and sediment pore water was evaluated using the same endpoints by comparing maximum detected concentrations in groundwater to chronic water quality criteria established by the OEPA and USEPA Region 5.

Likewise, sediment no effect levels published by various sources as indicated on Table 15.1 were used to evaluate impacts to macroinvertebrates living in the creek bed sediments of Mill Creek adjacent to the site.

In some instances, empirical data may be available for the specific receptor and endpoint. However, for some COPECs, data on surrogate species and/or on endpoints other than the LOAEL and NOAEL were identified. The rationale for selection of surrogates is provided in Appendix E.

7.2 CHEMICAL SCREENING

COPECs were identified by comparing available chemical concentrations detected surface water and sediments with ESLs from USEPA Region 5. Due to the limited frequency and duration of exposure, exposure pathways for terrestrial receptors are incomplete and further evaluation of soil was not completed. As mentioned above, maximum detected groundwater concentrations were also compared to OEPA chronic water quality criteria to identify potential surface water COPECs due to the potential interaction between groundwater and surface water. The levels used in this process are intended only for screening purposes and identification of COPECs. They are not meant to imply any definitive level of risk or to be indicative of risk-based cleanup or remediation goals. No chemicals exceeding screening criteria were eliminated as COPECs. Additionally, chemicals were retained as COPECs if they were detected and no screening value is available for the compound. The impact of chemicals that were non-detect but have detection limits exceeding screening criteria are discussed in Section 7.5.1.

Appendix N of this report summarizes toxicological information from the scientific literature for COPECs detected at and in the vicinity of the Rohm and Haas Facility. The summaries present information on constituent toxicity, likely mechanisms of toxicity, and potential effects on receptor biota, populations, and ecosystems.

7.2.1 Sediment

Chemical screening results for sediment samples, including frequency of detection and range of detected concentration, are presented in Table 10.1. Thirty sediment samples were collected from along the east bank of Mill Creek and the creek bed sediments and analyzed for parameters from the Sediment Target Analyte List (SED TAL). The maximum detected concentration of each constituent was compared to the Region 5 ESLs or surrogate values if a Region 5 ESL was unavailable. A description of surrogate chemical compounds is provided in Appendix E. The following surrogate compounds or alternate screening criteria were used to identify COPECs in sediments for ecological receptors:

Compound Detected:	**Surrogate/Alternate Screening Criteria Used:**
Methylcyclohexane	Toluene
Dibenzofuran	Washington State NEL Sediment Screening Benchmark
Diallate	Region 5 Residential Soil ESL
Endrin ketone	Endrin
Aluminum	Ohio Sediment Reference Value (SRV) (Ohio EPA, 2008b)
Barium	Ohio SRV
Beryllium	Ohio SRV
Iron	Ohio SRV
Manganese	Ohio SRV
Selenium	Ohio SRV
Thallium	Ohio SRV
Tin	Region 5 Soil Screening Benchmark

Compound Detected:	**Surrogate/Alternate Screening Criteria Used:**
Vanadium	Ohio SRV

Results of comparing the maximum detected concentration in sediment of each constituent to the ESLs identified the following COPECs:

> Acetone, 2-methyl naphthalene, 3-methyl phenol, 4-methyl phenol, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, 4,4'-DDE, 4,4'-DDT, beta-BHC, dieldrin, Aroclor-1248, Aroclor-1254, lead, and tin.

7.2.2 Seep and Surface Water

Chemical screening results, which were combined for seep and surface water samples, are presented in Table 10.2. The frequency of detection and range of detected concentration are also presented on this table. Two seep samples were collected along the east bank of Mill Creek and seven surface water samples (including one duplicate) were collected from within Mill Creek and analyzed for the full Surface Water Target Analyte List (SW-TAL) parameters. Since ecological receptors are exposed to water as it comes from the ground, results were compared to the unfiltered water. This is also a more conservative approach since most criteria are published as dissolved concentrations. The maximum detected concentration of each constituent was compared to the Region 5 ESLs or surrogate values if a Region 5 ESL was unavailable. A description of surrogate chemical compounds is provided in Appendix E. The following surrogate compounds or alternate screening criteria were used to identify COPECs in surface water/seeps for ecological receptors:

Compound Detected:	**Surrogate/Alternate Screening Criteria Used:**
cis-1,3-Dichloropropene	Ohio EPA Outside the Mixing Zone Average for the Ohio River Basin

Compound Detected:	**Surrogate/Alternate Screening Criteria Used:**
trans-1,3-Dichloropropene	Ohio EPA Outside the Mixing Zone Average for the Ohio River Basin
1,3,5-Trinitrobenzene	Ohio EPA Outside the Mixing Zone Average for the Ohio River Basin
2-Nitrophenol	Ohio EPA Outside the Mixing Zone Average for the Ohio River Basin
Dimethyl phthalate	Ohio EPA Outside the Mixing Zone Average for the Ohio River Basin
o-Dintribenzene	Ohio EPA Outside the Mixing Zone Average for the Ohio River Basin
Chromium, hexavalent	Ohio EPA Outside the Mixing Zone Average for the Ohio River Basin
Methylcyclohexane	Toluene
Aluminum	Region 4 Chronic Surface Water Criteria
Iron	Region 4 Chronic Surface Water Criteria
Manganese	Region 6 Freshwater Criteria

Results of comparing the maximum detected concentration of each constituent to ESLs identified the following COPECs in the seep and/or surface water:

> 1,2-dichlorobenzene, bis(2-ethylhexyl)phthalate, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, heptachlor epoxide, aluminum, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, tin, vanadium and zinc.

It should be noted that the volume of water emerging from the seeps is very limited compared to the volume of water in Mill Creek and a remediation system at the Rohm and Haas Facility is already in place to minimize the contribution of groundwater from the site to the Creek. Specifically, a "Documentation of Environmental Indicator (EI) Determination" was completed in the fall of 2003 and subsequent communications concerning this EI Determination (Geomatrix, 2004) have determined that some of the assumptions in this EI may be too conservative when estimating the flow rate of the seeps into the Mill Creek (estimated at 7-8 gallons per day). For example, in the EI Determination, it was assumed that there would be a ten-fold dilution of groundwater entering Mill Creek. The actual dilution, however; is likely many orders of magnitude higher than ten times. The calculations in the EI Determination conclude that contaminated groundwater flux into the creek could be as high as 13,000 gallons per day. This is a conservative calculation and the actual flow is probably much less. The EI Determination also documents the average Mill Creek flow at approximately 12 million gallons per day; such a flow is consistent with repeated observations of the creek at the Rohm and Haas Facility. Even using the conservatively high groundwater-to-creek flux values from the EI Determination, surface water therefore dilutes groundwater by a factor of over 900-fold. This is confirmed by the surface water sampling results in Mill Creek near the Rohm and Haas Facility.

Also the potential risks to fish were evaluated as part of the screening of surface water compared to aquatic criteria. No COPECs were identified in the surface water of Mill Creek as shown in Table 15.2; thus, further evaluation of risks to fish was not conducted. The evaluation of the potential risks to fish is further detailed in Section 7.4.3.

7.2.4 Groundwater to Surface Water

An additional pathway that was evaluated is the potential for groundwater to discharge to surface water. Although not currently a pathway of concern based on the surface water data collected directly from the Mill Creek and the operation of a French Drain that collects groundwater from the shallow upper aquifer, this pathway is a potential concern in the future should the French Drain system be decommissioned, become non-operational, or other engineering controls are deemed necessary at the site. Therefore, the maximum detected concentrations in 2004 for pesticides and PCBs, (which are the most recent data for these compounds) and 2006 data for other constituents in groundwater in all wells were compared to Ohio surface water criteria for Outside the Mixing Zone Average (OMZA) concentrations (or Region 5 ESLs if OMZA were unavailable) as shown on Table 10.3 to determine COPECs in

groundwater. Results of this comparison identified the following COPECs in groundwater: 1,1,2-trichloro-1,2,2-trifluoroethane, bromodichloromethane, carbon disulfide, chlorobenzene, chloroethane, cyclohexane, tetrachloroethene, toluene, xylenes, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, aniline, caprolactam, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-Chlordane, dieldrin, Endosulfan I, Endosulfan II, endrin, endrin aldehyde, endrin ketone, gamma-BHC (lindane), gamma-Chlordane, heptachlor, heptachlor epoxide, methoxychlor, toxaphene, aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, and tin.

7.3 COPEC REFINEMENT

The objective of this step is to select receptors to represent the focus of the remainder of the SERA process. Ecological receptors are considered to include wildlife that may reasonably be expected to reside or regularly forage in areas affected by site contaminants, given current and anticipated future site conditions. Based on current land uses at and near the site, ecological receptors selected are aquatic receptors associated with Mill Creek.

Not all the site currently supports habitat that can attract or sustain ecological receptors. The presence of ecological receptors is generally curtailed in highly developed areas where habitat conditions are poor and/or human activity levels are sufficiently disruptive to discourage wildlife use. Guidelines considered in selecting receptors from the potentially exposed community include the following:

- relationship to the assessment endpoint;
- limited home range;
- role in local non-human food chains;
- potential high abundance and wide distribution at the site;
- relatively long-lived to provide chronically exposed individuals;
- sufficient toxicological information available in the literature for comparative and interpretive purposes;
- sensitivity to COPECs;
- likely recurrence after site remediation; and
- suitability for long-term monitoring, if necessary.

Four selected receptor species (mallard, muskrat, mink and great blue heron) have either been observed at, or are likely to be present in the vicinity of the site. Additionally, a spotted

sandpiper was selected as a potential receptor to evaluate the risk to avian receptors that ingest contaminated macroinvertebrates dwelling in the sediments of Mill Creek even though it is unlikely to occur at or near the site. Lastly, aquatic life and sediment macroinvertebrates were also evaluated as separate key receptor species as well as food sources for higher trophic level organisms.

When selecting representative receptor species, it is important that sufficient toxicological information is available in the literature on the receptor species, or a closely-related species. While the ecological communities at the individual sites may have species with desirable characteristics for use as receptor species, not all of these species have been extensively used for toxicological testing.

The receptors were also selected based on their sensitivity to the COPECs, and to represent the trophic levels and the characteristics of the area being assessed. Based on available information, specific receptor species were selected to be representative of ecological populations potentially exposed to COPECs sediments and surface water at and near the site. These representative receptor species are evaluated according to the measurement endpoints selected for the site. These measurement endpoints in turn evaluate the assessment endpoints and policy goals that are ultimately evaluated in the ecological assessment.

The mallard and muskrat were selected as representative herbivores consuming aquatic plants; the spotted sandpiper as a representative aquatic invertivore, and the mink and great blue heron as second-order consumers of aquatic prey. The mink is also considered to be a sensitive species and toxicological effects are more likely to be apparent in this species than other potential consumers in this trophic level (i.e., raccoon). The selected species are considered to be representative of both current and/or future ecological receptors at the site.

7.3.1 Analysis

The analysis stage identifies and quantifies potential pathways of biota exposure to COPECs. The exposure assessment was conducted by characterizing the magnitude (concentration) and distribution (locations) of the contaminants detected in the sampled media, evaluating pathways by which chemicals may be transported through the environment, and determining the points at which organisms identified in the study area may contact contaminants.

Ecological exposure pathways for biota may be direct or through the food web via consumption of contaminated organisms. Direct exposure pathways include dermal contact, absorption,

inhalation, and ingestion. Because there is little toxicological data on dermal and inhalation exposure, these exposure routes are addressed qualitatively.

Food web (indirect) exposure pathways for biota can occur when fauna consume contaminated biota. Examples of food web exposure include animals at higher trophic levels consuming plants or animals that bioaccumulate contaminants. Contamination of biota could result from exposure to one or more COPECs. Bioavailability is an important contaminant characteristic that influences the degree of chemical-receptor interaction. Bioavailable compounds are those that a receptor can take in from the environment. Bioavailability is a function of several physical and chemical environmental factors. These properties directly affect a contaminant's behavior in regards to receptor exposure.

Exposure pathways consist of four components: source and mechanism of contaminant release, transport medium, potential receptors, and exposure route. If any of these components are not complete, then contaminants in those media do not constitute an environmental risk at the site.

The concepts of bioaccumulation and biomagnification have been historically applied in several ways, typically in reference to aquatic organisms. Bioaccumulation refers to the uptake and retention of a substance by an organism from its surrounding medium and food (USEPA, 1995c), and biomagnification refers to the process by which tissue concentrations of bioaccumulated toxic substances increase as the substances pass up through two or more trophic levels (Suter, 1993).

Adjustments were made in the exposure assessment to account for accumulation and biomagnification of contaminants through the trophic levels. For aquatic receptors, bioconcentration factors (BCFs) were used to model food chain uptake for inorganic compounds and biota-sediment accumulation factors (BSAFs) were used to model food chain uptake for organic compounds.

7.3.2 Characterization of Exposure Pathways

Ecological receptor exposure pathways potentially associated with affected media are described in this subsection.

7.3.2.1 Surface Water and Sediment Exposure Pathways

Potential sources for contaminated surface water include contaminated soil, sediment, and groundwater. The release mechanisms include surface runoff, groundwater discharge (seeps

and direct discharge), and sediment to surface water interaction. Exposure routes for contaminated surface water include ingestion and intake by aquatic fauna, dermal contact, and inhalation. Consumption of bioaccumulated contaminants constitutes a potential indirect exposure pathway for faunal receptors.

Potential contaminant sources for sediment include contaminated surface water, groundwater and soil. The release mechanisms include surface water runoff, groundwater discharge, and airborne deposition. Potential receptors of chemicals in contaminated sediments include aquatic flora and fauna. Direct exposure routes for contaminated sediment include uptake by aquatic flora and ingestion, dermal contact, and inhalation by aquatic fauna. Indirect exposure pathways from sediment include consumption of bioaccumulated contaminants by consumers in the food chain.

7.3.2.2 Biota Exposure Pathways

Animals may be exposed indirectly to contaminants through ingestion of biota (plants and animals) that have bioaccumulated contaminants. Because analysis of biological tissue was not conducted, the potential for exposure via completed pathways was inferred based on estimated contaminant uptake and assimilation by vegetation and prey species, and on the bioaccumulation and biomagnification properties of the contaminants.

7.3.3 Exposure Assessment

The first step in measuring exposure rates for wildlife involves the calculation of feeding and watering rates for site receptors. USEPA (1997d) and USEPA (1999) include a variety of exposure information for a number of avian and mammalian species. Data are directly available for body weights of various species. Similarly, information regarding feeding and watering rates, and dietary composition, are also available for many species. Such exposure parameters were compiled for the selected receptor species (mallard, muskrat, mink, great blue heron, and spotted sandpiper). Feeding rates for receptors were based upon USEPA (1999) or Ohio EPA (2008b). The Ohio EPA values are based on the USEPA Wildlife Exposure Factors Handbook (1993) but are specific to Ohio. Literature values for diet fraction and body weights were also taken from USEPA (1999) and Ohio EPA (2008b). Although home range is reported for each of these receptors, modification of the exposure based on home range was not conducted for this SERA (i.e., the receptors were all assumed to spend 100% of their time at the site).

The exposure point concentration (EPC) evaluated for each COPC in each media (surface water and sediment) was determined based the maximum detected concentration.

The next step in calculating wildlife receptor exposure rates involves calculating exposure. The general exposure equation for each receptor is as follows:

Exposure = Total Average Daily Dose = $ADD_P + ADD_A + ADD_S + ADD_W$

Where:

ADD_P = Average daily dose by ingestion of plant matter (mg/kg-day)

ADD_A = Average daily dose by ingestion of animal matter (mg/kg-day)

ADD_S = Average daily dose by ingestion of soil or sediment (mg/kg-day)

ADD_W = Average daily dose by ingestion of surface water (mg/kg-day)

Each individual average daily dose parameters are separately calculated as follows:

For aquatic plants:

$$\mathbf{ADD_P = EPC \times UF_P \times CF \times NIR_{food}}$$

Where:

EPC = Exposure Point Concentration in sediments (mg/kg)

UF_P = Sediment-to-plant uptake factor (unitless)

CF = Dry weight to wet weight conversion factor (unitless)

NIR_{food} = Species-specific normalized food ingestion rate (g/g-day)

For benthos:

$$\mathbf{ADD_A = [(EPC/\%TOC) \times BSAF \times \% Lipid] \times NIR_{food}}$$

Where:

EPC = Exposure Point Concentration in sediment (mg/kg)

% TOC = Total organic carbon percentage (unitless)

BSAF = Biota-sediment accumulation factor (chemical and species specific)

% Lipid = Lipid percentage of the organism (unitless)

NIR_{food} = Species-specific normalized food ingestion rate (g/g-day)

For fish for uptake of inorganic compounds:

$$\mathbf{ADD_A = EPC \times BCF \times NIR_{food}}$$

Where:

EPC = Exposure Point Concentration in surface water (mg/L)

BCF = Bioconcentration factor (L/kg)

NIR_{food} = Species-specific normalized food ingestion rate (g/g-day)

For fish for uptake of organic compounds:

$$\mathbf{ADD_A = [(EPC/\%TOC) \times BSAF \times \% Lipid] \times NIR_{food}}$$

Where:

EPC = Exposure Point Concentration in sediment (mg/kg)

% TOC = Total organic carbon percentage (unitless)

BSAF = Biota-sediment accumulation factor (chemical and species specific)

% Lipid = Lipid percentage of the organism (unitless)

NIR_{food} = Species-specific normalized food ingestion rate (g/g-day)

For the purposes of this risk assessment, the common carp was selected as the representative key fish receptor species in Mill Creek. This selection was based on data collected by the Ohio EPA in 2002 during a biological study of Mill Creek (OEPA, 2004). The common carp was typically the largest and most commonly occurring fish species and it is an omnivorous species. For benthos, the key receptor was assumed to be a freshwater crustacean, as this group of species generally has the highest percent lipid of benthic organisms.

For ingestion of sediment:

$$\mathbf{ADD_S = EPC \times S_F \times NIR_{food}}$$

Where:

EPC = Exposure Point Concentration in sediment (mg/kg)

S_F = Fraction of sediment ingested (unitless)

NIR_{food} = Normalized food ingestion rate (g/g-day)

For ingestion of surface water:

$$\mathbf{ADD_S = EPC \times NIR_{SW}}$$

Where:

EPC = Exposure Point Concentration in surface water (mg/L)

NIR_{SW} = Species-specific normalized surface water ingestion rate (g/g-day)

All estimates of tissue concentrations in the various food sources are presented in Tables 11.1 through 11.3. Only those chemicals specified in Table 4-2 "Important Bioaccumulative Compounds" in the USEPA guidance document "*Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment*" (USEPA, 2000a) were assumed to be taken up by the various food sources. Receptor specific parameters are provided in Table 12. Total estimated intakes for each receptor are presented on Tables 13.1 through 13.5. Specifically, intakes for each receptor were calculated as follows:

Mallard: $ADD_{aquatic\ plants} + ADD_{sediment} + ADD_{surface\ water}$

Muskrat: $ADD_{aquatic\ plants} + ADD_{sediment} + ADD_{surface\ water}$

Mink: $ADD_{fish} + ADD_{sediment} + ADD_{surface\ water}$

Great Blue Heron: $ADD_{fish} + ADD_{sediment} + ADD_{surface\ water}$

Spotted Sandpiper: $ADD_{benthos} + ADD_{sediment} + ADD_{surface\ water}$

7.3.4 Assessment of Toxicity of COPECs to Receptors

Toxicity information pertinent to identified receptors was gathered for those analytes identified as COPECs. Because the measurement endpoint ranges from the NOAEL to the LOAEL, preference was given to chronic studies noting concentrations at which no adverse effects were observed and ones for which the lowest concentrations associated with adverse effects were observed. If no such studies were located, order of preference follows from median-effect levels, to lowest lethal levels, and finally to median-lethality levels. At each of these levels, preference was given to chronic studies, then sub-chronic, and finally, acute studies.

Using the relevant toxicity information, receptor-specific Toxicity Reference Values (TRVs) were calculated for each of the COPECs. TRVs represent NOAELs and LOAELs with conversion values incorporated for toxicity information derived from studies other than no-effect or lowest-effect studies. TRVs were calculated using a conversion in accordance with guidance issued by the OEPA (2008b) to adjust the reported effects doses to a final TRV. The reported effects dose was then further adjusted to account for potential species differences by using a scaling factor based on body weight. LOAELs were developed from NOAELs by multiplying the NOAEL by a factor of 10 if a specific value for the LOAEL was not cited in the original study. Specifically, TRV development was as follows:

- Chronic-NOAEL to $NOAEL_{mc}$ – no modification
- Sub-chronic NOAEL to $NOAEL_{mc}$ – multiply sub-chronic NOAEL by 1/3 – 1/10
- Chronic LOAEL to $NOAEL_{mc}$ – multiply chronic LOAEL by 1/3 – 1/10
- Sub-chronic LOAEL to $NOAEL_{mc}$ – multiply sub-chronic LOAEL by 1/10 – 1/100
- Acute NOAEL to $NOAEL_{mc}$ – multiply acute NOAEL by 1/100
- Acute LOAEL to $NOAEL_{mc}$ – multiply acute LOAEL by 1/1000
- LD_{50} to $NOAEL_{mc}$ – multiply LD_{50} by 1/10,000

Allometric scaling factors were calculated by the following equation:

$$NOAEL_w = NOAEL_t \times [(bw_t)^{1/4} / (bw_w)^{1/4}]$$

Where:

$NOAEL_w$ = no observed adverse effect level for the wildlife receptor

$NOAEL_t$ = no observed adverse effect level for the test species

bw_t = body weight of the test species

bw_w = body weight of the wildlife receptor

Thus, the following allometric scaling factors were developed for modifying toxicity data for laboratory test species to the identified receptor species:

Test Species	Test Species Body Weight (kg)	Receptor Species	Receptor Species Body Weight (kg)	Allometric Scaling Factor
Mouse	0.03	Muskrat	1.174	0.4
		Mink	1.02	0.418
Rat	0.35	Muskrat	1.174	0.734
		Mink	1.02	0.733
Mink	1.0	Muskrat	1.174	0.96
		Mink	1.02	0.995

NOAELs for avian receptors were not modified using any scaling factors. Identified NOAELs and LOAELs for site COPECs are presented in Table 14.

7.4 RISK CHARACTERIZATION AND DISCUSSION

Potential risks posed by COPECs were evaluated by calculating a hazard quotient (HQ) for each constituent, for each endpoint species. HQs for all pathways were determined by dividing the maximum concentration by the appropriate toxicological reference value for the constituent:

$$HQ = C_{max}/TRV$$

If the resultant HQ is greater than 1, a potential risk for adverse effects from exposure to COPECs exists. The magnitude of the HQ indicates the relative risk posed to endpoint species. It is important to note that this approach is conservative, and probably overestimates the potential for adverse effects upon the wildlife populations.

7.4.1 Sediment

Potential risks to key terrestrial receptors from site-specific COPECs detected in sediments are shown in Tables 13.1 (mallard), 13.2 (muskrat), 13.3 (mink), 13.4 (great blue heron) and 13.5 (spotted sandpiper) and Table 15.1 for macroinvertebrates. Below is a summary of the HQs that are greater than 1 when using NOAELs to calculate the HQ:

COPEC	Receptor HQ Based on NOAEL as the TRV					
	Mallard	Muskrat	Mink	Great Blue Heron	Spotted Sandpiper	Macroinvertebrates
Aluminum		61				
Arsenic			3		3	
Cadmium					5	
Copper					4	
Lead					11	
Tin					2	
Zinc					79	
2-Methylnaphthalene						4
3-Methylphenol						5
4-Methylphenol						10
Acenaphthene						30
Acenaphthylene						8
Anthracene						30
Benzo(a)anthracene						10
Benzo(a)pyrene						8
Benzo(ghi)perylene						4
Benzo(k)fluoranthene						3
Chrysene						10
Dibenz(ah)anthracene						6
Fluoranthene						10
Fluorene						10
Indeno(123-cd)pyrene						3

COPEC	Receptor HQ Based on NOAEL as the TRV					
	Mallard	Muskrat	Mink	Great Blue Heron	Spotted Sandpiper	Macroinvertebrates
Naphthalene						4
Phenanthrene						20
Pyrene						20
4,4'-DDE				10	79	
4,4'-DDT					19	
Beta-BHC						2
Dieldrin					2	10
Aroclor-1254			4			2

Note: A blank indicates that the calculated HQ was less than 1 for the COPEC - receptor combination.

When HQs are calculated using LOAELs as the toxicity reference values for the key receptor species (LOAELs are not available for macroinvertebrates), the following COPECs had HQs greater than 1:

- Mallard: None
- Muskrat: Aluminum (HQ = 6)
- Mink: None
- Great Blue Heron: None
- Spotted Sandpiper: 4,4'-DDE (HQ = 8), 4,4'-DDT (HQ = 2), copper (HQ = 3), zinc (HQ = 8)

A summary of the calculated HQs that exceed 1 are discussed by chemical in the following paragraphs. Additional discussion of the ecological significance of these risks is presented in Section 7.6.

Aluminum was detected in all 22 sediment samples for which it was analyzed. The only receptor that had a HQ greater than 1 for aluminum was the muskrat (HQ = 61). The primary exposure pathway to aluminum for the muskrat is not via incidental ingestion of sediment or uptake of aluminum via the food chain, but rather via direct ingestion of aluminum in the seep. Aluminum was detected in the sediments near the site at concentrations ranging from 1,690 – 9,330 mg/kg, which are below the sediment screening value of 28,000 mg/kg (Ohio SRV, 2008b). In addition, the lack of attractive habitat for the muskrat in the vicinity of the site and the limited extent and no apparent flow for the seeps further preclude the likelihood that this

receptor would only be exposed to the maximum detected concentrations. Thus, the detected concentrations of aluminum are not likely to pose a significant risk to this receptor since the detected concentrations are below the sediment screening value and the amount of attractive habitat for the muskrat in the vicinity of the site is very limited.

Arsenic was detected in all 29 sediment samples for which it was analyzed. Concentrations ranged from 2.8 – 6.3 mg/kg, which are below the Region 5 ESL for arsenic and the Ohio SRV for arsenic of 11 mg/kg. Arsenic was indicated as a COPEC for the mink and spotted sandpiper due to ingestion of contaminated prey species (fish for the mink and benthic macroinvertebrates for the sandpiper). Since the range of detected concentrations are all below the Region 5 ESL and Ohio SRV and because the modeled prey concentrations are based on conservative uptake parameters and the maximum detected concentration of arsenic; arsenic is not thought to pose a significant risk to area wildlife.

Cadmium, copper and zinc were detected in all 29 sediment samples for which they were analyzed. All detected concentrations of these compounds were below applicable Region 5 ESLs for sediment. These metals are COPECs for the spotted sandpiper due to the ingestion of contaminated prey species (benthic macroinvertebrates). Since the range of detected concentrations are all below the Region 5 ESLs and because the modeled prey concentrations are based on conservative uptake parameters and the maximum detected concentrations; these metals are not thought to pose a significant risk to area wildlife. In addition, the lack of attractive habitat for the spotted sandpiper in the vicinity of the site (i.e., no sandbars or shallow soft sediments to serve as a foraging areas) preclude the likelihood that this receptor would only be exposed to the contaminants at harmful levels.

Lead was detected in all 29 sediment samples for which it was analyzed. Concentrations ranged from 4 – 38.3 mg/kg. The maximum detected concentration only slightly exceeds the Region 5 ESL of 35.8 mg/kg for lead in sediment and it is the only sample that had a detection of lead above the Region 5 ESL. Lead is a COPEC for the spotted sandpiper primarily due to ingestion of contaminated prey species (benthic macroinvertebrates). Since all but one of the detected concentrations of lead were below the Region 5 ESLs and because the modeled prey concentrations are based on conservative uptake parameters and the maximum detected concentration of lead; lead is not thought to pose a significant risk to area wildlife. In addition, the lack of attractive habitat for the spotted sandpiper in the vicinity of the site (i.e., no sandbars or shallow soft sediments to serve as a foraging areas) preclude the likelihood that this receptor would only be exposed to the contaminants at harmful levels.

Tin was detected in all 29 sediment samples (including the seep samples) for which it was analyzed. Concentrations ranged from 2.7 – 76.3 mg/kg; however, the maximum detected concentration of tin solely in the sediments of the Mill Creek was 9.8 mg/kg. Tin is a COPEC for the spotted sandpiper due solely to the incidental ingestion of sediment. Because it is unlikely that the sandpiper would only be exposed to the maximum detected concentration of tin in sediment, the risk to the sandpiper is likely overestimated. In addition, there are no Region 5 ESLs published for tin in sediment. Instead the Region 5 soil ESL was used as a surrogate screening value. A literature search was conducted regarding acceptable concentrations of tin in sediments. A Dutch Intervention Value of 900 mg/kg was found for tin (VROM, 2006) and an estimated no or low effect concentration of 90 mg/kg was derived (900 mg/kg x 0.1). Since the maximum detected concentration in all sediments is less than the estimated no/low effect concentration and the maximum detected concentration of tin in the sediments of Mill Creek are approximately 1/10 of this estimated no/low effect concentration, the detected concentrations of tin in sediments adjacent to the site are not thought to pose a significant risk to wildlife. In addition, the lack of attractive habitat for the spotted sandpiper in the vicinity of the site (i.e., no sandbars or shallow soft sediments to serve as a foraging areas) preclude the likelihood that this receptor would only be exposed to the contaminants at harmful levels.

Zinc was detected in all 29 sediment samples for which it was analyzed. Concentrations ranged from 16.4 - 101 mg/kg, which are below the Region 5 ESL for zinc. Zinc was indicated as a COPEC for the spotted sandpiper due to the ingestion of contaminated prey species (benthic macroinvertebrates). Since the range of detected concentrations are all below the Region 5 ESLs and because the modeled prey concentrations are based on conservative uptake parameters and the maximum detected concentration of zinc; zinc is not thought to pose a significant risk to area wildlife. In addition, the lack of attractive habitat for the spotted sandpiper in the vicinity of the site (i.e., no sandbars or shallow soft sediments to serve as a foraging areas) preclude the likelihood that this receptor would only be exposed to the contaminants at harmful levels.

The calculated HQs for PAHs exceeded 1 only for benthic macroinvertebrates. The highest calculated HQs were 30 for both acenaphthene and anthracene. Seven sediment samples were collected and analyzed for PAHs. Acenaphthene, acenaphthylene, fluorene, and naphthalene were all detected in only one of these seven samples. Anthracene and most of the remaining PAHs were detected in five of the seven samples; however, not all PAHs were detected in all

seven sediment samples. The range of detected concentrations of PAHs are similar to concentrations detected throughout the sediments of the Mill Creek as collected and analyzed by the OEPA (OEPA, 2004) and therefore the concentrations detected adjacent to the site are consistent with those detected in background locations.

4,4'-DDE was detected in 7 of 29 samples collected from the sediments of Mill Creek. The highest calculated HQ was 79 for the spotted sandpiper. 4,4'-DDE was indicated as a COPEC for the great blue heron and spotted sandpiper due to ingestion of contaminated prey species (fish for the great blue heron and benthic macroinvertebrates for the sandpiper). If the LOAEL is used to calculate the HQ, only the HQ for the spotted sandpiper is above 1. Since the modeled prey concentrations are based on conservative uptake parameters and the maximum detected concentration of 4,4'-DDE; 4,4'-DDE is not thought to pose a significant risk to area wildlife. In addition, the lack of attractive habitat for the spotted sandpiper in the vicinity of the site (i.e., no sandbars or shallow soft sediments to serve as a foraging areas) preclude the likelihood that this receptor would only be exposed to the contaminants at harmful levels. Given the fact that the highest detected concentrations were from the creek bank and not the actual creek bed, the detected concentrations of 4,4-DDE are not thought to pose a significant risk to ecological receptors using Mill Creek.

4,4'-DDT was detected in 2 of 29 samples collected from the sediments of Mill Creek. The detected concentrations were 0.004 and 0.0056 mg/kg; which only slightly exceeds the Region 5 ESL for 4,4'-DDT of 0.00416 mg/kg. 4,4'-DDT was indicated as a COPEC for the spotted sandpiper due to ingestion of contaminated prey species (benthic macroinvertebrates). Since the range of detected concentrations are only slightly above the Region 5 ESLs and because the modeled prey concentrations are based on conservative uptake parameters and the maximum detected concentration of 4,4'-DDT; 4,4'-DDT is not thought to pose a significant risk to area wildlife. In addition, the lack of attractive habitat for the spotted sandpiper in the vicinity of the site (i.e., no sandbars or shallow soft sediments to serve as a foraging areas) preclude the likelihood that this receptor would only be exposed to the contaminants at harmful levels.

Beta-BHC was detected in 4 of 29 samples collected from the sediments of Mill Creek. Three of the four detected concentrations of beta-BHC in the sediments are qualified results since the analyses had to be re-run and the percentage difference between the original and confirmation samples was greater than 40 percent. Detected concentrations ranged from 0.0046 – 0.094 mg/kg. The highest calculated HQ was 2 for benthic macroinvertebrates. Given the uncertainty with the data and the fact that the highest detected concentrations was from the

creek bank and not the actual creek bed, the detected concentrations of beta-BHC are not thought to pose a significant risk to ecological receptors using Mill Creek.

Dieldrin was also detected in only 4 of 29 samples collected from the sediments of Mill Creek. The highest calculated HQs were 10 for benthic macroinvertebrates and 2 for the spotted sandpiper. The range of detected concentrations was 0.002 – 0.024 mg/kg. The primary exposure to dieldrin for the sandpiper is uptake of dieldrin via the food chain—specifically, benthos living in the sediments of Mill Creek. However, the lack of attractive habitat for the spotted sandpiper in the vicinity of the site (i.e., no sandbars or shallow soft sediments to serve as foraging areas) preclude the likelihood that this receptor would only be exposed to the contaminants at harmful levels. In addition, two of the four detected concentrations of dieldrin in the sediments are qualified results since the analyses had to be re-run and the percentage difference between the original and confirmation samples was greater than 40 percent. Also, the maximum detected concentration of dieldrin in the sediments (0.024 mg/kg at location CS-6A in 2004) is somewhat suspect since it was not detected in the duplicate sample collected from this same location (duplicate result was <0.0042 mg/kg). Thus, the detected concentrations of dieldrin are not thought to pose a significant risk to ecological receptors using Mill Creek.

Aroclor-1254 was detected in only one of seven sediment samples collected. Aroclor-1254 was indicated as a COPEC for the mink due to ingestion of contaminated prey species (fish) and to benthic invertebrates due to contact. Since Aroclor-1254 was only detected in one sample and because this detected concentration is consistent with those to concentrations of PCBs detected throughout the sediments of the Mill Creek as collected and analyzed by the OEPA (OEPA, 2004), the concentrations of PCBs detected adjacent to the site are not thought to pose a significant risk to area wildlife.

7.4.2 Surface Water

Potential risks from site-specific COPECs detected in surface water of the Mill Creek are shown in Table 15.2 for aquatic life. Although the maximum detected concentration in either the seeps or the surface water of Mill Creek was used for screening (Table 10.2) and in the surface water intake calculations for the key receptor species (Tables 13.1 through 13.5), only the maximum detected surface water concentration collected from the Mill Creek adjacent to the site was used for the surface water evaluation. This is because the seeps do not produce enough water to support their own aquatic life. As can be seen by this table, no COPECs in surface water were identified for aquatic life in Mill Creek.

In addition, Table 16 (Comparison of Seep Data to Ohio OMZA and Region 5 ESLs) also provides additional information regarding the ecological risk characterization for the groundwater – surface water interface. A discussion of the results of this comparison is provided in Section 7.5.1.2.

7.5 UNCERTAINTIES

For this aspect of the SERA, a qualitative analysis was made of the uncertainties associated with the various components of the assessment, including the problem formulation and screening of contaminants and criteria used, toxicity and exposure characterization, and characterization of risk. This analysis identifies the potential magnitude of underestimating or overestimating the potential for adverse effects to organisms.

7.5.1 Preliminary Problem Formulation Analysis of Uncertainty

The preliminary problem formulation step of the SERA may have some degree of uncertainty regarding the selection of COPECs, identification of potential exposure pathways, and the selection of receptor species. The selection of assessment and measurement endpoints is determined by USEPA guidance (1997d and 1998b).

7.5.1.1 Uncertainty Concerning the Selection of COPECs

The screening criteria used for the selection of ecological COPECs were derived from various sources per USEPA and Ohio EPA guidance. These criteria are recommended for screening of site contaminants and are developed by the USEPA- and Ohio EPA-recommended resources. Uncertainties associated with the sources and derivation of the criteria could possibly underestimate or overestimate the number of site COPECs depending on the conservatism of the criteria.

In addition, several compounds were not detected; however, detection limits for some of these compounds were above applicable screening criteria.

In sediments, 101 compounds had one or more detection limits that exceeded the respective screening value. For 73 of these compounds (61 of which are SVOCs and pesticides, which are not related to the manufacturing processes used at the Rohm and Haas site), all detection limits for all samples exceeded the screening value. Even though the detection limits are indicated as being higher than the screening value, the laboratory may be able to estimate a concentration below the detection limit, using the "J" qualifier to annotate that result and thereby reduce the uncertainty associated with compounds reported as "non-detect". A majority of these

compounds were not detected in either groundwater or soil samples, or if they were detected in other media, they were detected infrequently (refer to Table 1.2 for groundwater detections).

In the seep and surface water samples, 64 compounds (53 of which are SVOCs, pesticides and PCBs, which are not related to the manufacturing processes used at the Rohm and Haas site) had detection limits that exceeded the respective screening value. Despite these instances where the detection limits are above the screening value, these compounds were not selected as COPECs (which could possibly underestimate the total risk) since the compounds were not detected in other site media, or because the high detection limits for some of the compounds are likely due to matrix interference since the laboratory was able to report detections that are lower than the lowest reported detection limit (i.e., "J" qualified data). In addition, for surface water, both total and dissolved concentrations were available for the inorganic compounds. To be conservative, the total concentrations were used to evaluate the risk to ecological receptors. However, for some locations, only the dissolved fraction was reported. Thus, the risk to aquatic receptors may be slightly underestimated by using the dissolved concentrations in lieu of total concentration data.

There were no detected compounds in surface water for which a screening value (or suitable surrogate) was unavailable. For the groundwater to surface water pathway, the following compounds did not have screening values available: (1,1,2-trichloro-1,2,2-trifluoroethane, bromodichloromethane, chloroethane, cyclohexane and caprolactam). However, these compounds were retained as COPECs in order not to eliminate compounds that may pose a risk to aquatic life in Mill Creek. Likewise, for the creek bed sediments, sediment invertebrate benchmarks were not available for the following compounds: barium, beryllium, diallate, thallium, tin and vanadium. For the metals, the Dutch Ministry of the Environment has published "Intervention Values" for barium in sediment (625 mg/kg) (VROM, 2008) and "levels indicative of serious contamination" for beryllium (IV = 30 mg/kg), thallium (IV = 15 mg/kg), tin (IV = 900 mg/kg) and vanadium (IV = 250 mg/kg) (VROM, 2006). These latter values are for soils but can be used as surrogate values for sediments. In general, these values are concentrations above which, serious ecological impacts are likely to occur. If 1/10 of the Dutch values are used as surrogate criteria, none of the detected concentrations of these compounds exceed these surrogate values. Even though a thorough literature search was conducted for additional sediment quality criteria for these compounds, published values for freshwater sediments were not available for these compounds. The following sources were consulted for information: National Oceanic and Atmospheric Administration (NOAA)

Screening Quick Reference Tables (SQuiRTs) (updated November 2006); Eisler, 1989; Risk Assessment Information System (RAIS, 2007); McDonald & Trevors, 1988; California Department of Toxic Substances Control, Human Health and Ecological Division, 2003; IPCS, 2005; as well as a general search of "Toxicity in sediment" on the web search engine "Google".

7.5.1.2 Uncertainty Concerning Selection of Exposure Pathways

The pathways selected for evaluation of potential risks to ecological receptors include exposure to Mill Creek sediments and surface water (including potential groundwater seeps and direct discharge).

As an additional evaluation of the groundwater – surface water interface, the Mill Creek surface water sampling results and seep sampling results were compared to alternative screening criteria. For the seep data, maximum detected concentrations were compared to Ohio OMZA surface criteria or Region 5 ESLs if OMZA were unavailable. As a result of this comparison (Table 16), the following COPECs were identified in the two seep samples:

> 4,4'-DDE, 4,4'-DDT, alpha-Chlordane, Heptachlor epoxide, aluminum, barium, chromium, cobalt, copper, iron, lead, manganese, nickel, tin, vanadium and zinc.

These exceedances in the seeps are not thought to be significant since most of these COPECs are PAHs, pesticides or PCBs and are consistent with concentrations detected in background locations and because these compounds are not associated with site manufacturing processes. In addition, the seeps have very limited flow and cannot support aquatic life for which the criteria are designed to protect.

Comparison of surface water data from the Mill Creek was discussed previously in Section 7.4.3 and no COPECs were identified in the surface waters of Mill Creek as shown on Table 15.2.

The selection of exposure pathways is a direct result of the sampling data results. In order to determine the potential exposure to ecological receptors, the presence of constituents in environmental media must first be established. The magnitude at which these constituents are present also greatly influences resulting exposure estimates. The sampling data may not represent the actual overall distribution of contamination in the media at the site, which could result in underestimation or overestimation of potential risk from identified chemicals. However, the calculation and use of the EPC provided conservative exposure estimates and it is, therefore, unlikely that the potential for underestimation of deleterious levels of

contaminants has occurred. If the full extent of contamination has not been determined, and other areas of high concentration of contaminants are present but not sampled, risk could be underestimated in this study.

7.5.1.3 Uncertainty Concerning Selection of Ecological Receptors

Receptors were selected based on several factors, including their known or potential occurrence in the vicinity of the site, their trophic level, as well as their level of sensitivity to contaminants. These decisions are based on best professional judgment and recommendations by USEPA (1997d) regarding wildlife exposure parameters and calculations. Limitations regarding the determination of receptor species include the availability of exposure and toxicity information, abundance versus sensitivity, and ecological relevance. The potential for overestimation or underestimation exists when using receptor species and extrapolating calculated risks to other species within that trophic level.

7.5.2 Ecological Effects Evaluation Analysis of Uncertainty

The evaluation of ecological effects involves the derivation of ecological TRVs for comparison to the calculated exposures. Because toxicity information is limited for many chemicals, TRVs from similar or related chemicals are sometimes used. The use of surrogate toxicity values may underestimate or overestimate risk. For other chemicals, analytical results may not distinguish between different isomers or forms of a chemical although available toxicity information does, or vice versa. The absence of isomer specific toxicity values or isomer specific analytical data for some chemicals may tend to overestimate or underestimate risks. The TRV selection process may overestimate risk since the most conservative (and scientifically defensible) TRV is chosen rather than a range of or median TRV(s). In addition, the toxicity values used are chemical-specific and are incorporated into the TRV by use of conversion factors. For example, a conversion factor may be applied for the extrapolation from LD50 to chronic exposures. The use of conversion factors may overestimate or underestimate risk for a particular COPEC. Toxicity studies for species other than the receptor species of concern are often used in the development of TRVs. The use of related species to estimate toxicity to a representative receptor species may overestimate or underestimate risk due to different species sensitivity to particular toxicants.

TRVs may not be available for some COPECs, thereby precluding their inclusion in the quantitative risk estimates. The resulting risk estimates will not include the chemical-specific risks from these chemicals and therefore, may underestimate risk. For this assessment, toxicity

data was available for all of the identified COPECs with the exception of iron (all key receptors) and carbon disulfide, chlorobenzene, 1,2-dichlorobenzene, 3-methylphenol, 4-methylphenol, and methoxychlor for birds.

7.5.3 Preliminary Exposure Assessment Analysis of Uncertainty

Factors that can contribute to uncertainty in the exposure assessment include identification and evaluation of exposure pathways, assumptions for scenario development, intake parameters, and the use of the conservative EPC.

The identification of potential exposure pathways and receptors is based on site-specific reasonable current use and future ecological habitat. Site-specific receptors were identified to the extent possible and exposure parameters tailored to these receptors to minimize uncertainty in the defined scenarios and exposure assessments.

Values assumed for exposure parameters (e. g., feeding rates and dietary intake) used in calculations for intakes are based on USEPA (1997d), and Ohio EPA (2008b) guidance. These assumptions may result in underestimating or overestimating the intakes calculated for specific receptors, depending on the accuracy of the assumptions relative to actual site conditions and uses. The use of the conservative EPC may overestimate risk since the receptor is actually exposed to a broader range of contaminant concentrations rather than the maximum detected concentration.

Exposure and toxicity information are not available for dermal or inhalation exposure for all COPECs; hence, their lack of evaluation may underestimate risk. On-site exposure of COPECs to receptors may occur via dermal and inhalation pathways. Although these exposure routes are expected to be negligible compared to exposure via ingestion routes, intake of contaminants from these additional pathways may occur. Therefore, the overall contaminant exposure may be underestimated.

Another source of exposure estimation uncertainty is that contamination is assumed to remain constant over time. Fate and transport mechanisms, which would result in the degradation and loss of some COPECs from the environment, may not be considered in the exposure evaluation for ecological receptors. In addition, the risk calculations are based on the EPC, which is reflective of the reasonable maximum exposure at a single point. Exposure would occur throughout the site at various levels, including the EPC. Thus, actual risks may be lower than those presented in the assessment.

Additionally, the site is located in a fairly industrialized area along the Mill Creek. Elevated concentrations of some of the COPECs may in part be due to these regional conditions, both naturally and as a result of surrounding industry practices. In order to not underestimate the risk due to these "background" conditions, all detected compounds were included in the initial evaluation of risk, which may overestimate the risk to receptors that may have developed adaptations for these higher regional concentrations of COPECs. To determine the risk from surrounding conditions, background samples were collected to evaluate chemicals occurring naturally in soil (e.g., metals) or regionally as a result of neighboring industrial activities. A total of ten off-site background locations were sampled and two samples from each location (total of twenty samples) were analyzed as part of the facility investigation program. Five locations (borings B-01 through B-05) were sampled near the baseball fields and Swimming Pool and Recreational Center (south of the site), and five locations (borings B-06 through B010) were sampled near the Former Municipal Water Supply Well Field owned by the City of Reading (north of the site, Cincinnati Drum and Pristine). Although efforts were made to gain access to all of the properties adjacent to the Rohm and Haas facility, access for off-property sampling could only be obtained from the City of Reading property. Two samples were collected from each location at depths of 1.5 to 2 feet bgs and 9 to 11.5 feet bgs. The background samples were analyzed for CLP-TAL plus aniline, isodrin and tin. The background data showed that metals and other naturally occurring chemicals (e.g. calcium) were detected in the majority of samples analyzed. Twenty-six SVOCs (including 2-methylnaphthalene, acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, bis(2-ethylhexyl)phthalate, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd) pyrene, naphthalene, phenanthrene, and pyrene), pesticides (4,4'-DDE, aldrin, dieldrin, endrin ketone, and isodrin) and PCBs (Aroclor 1254 and Aroclor 1260) were also detected in one or more samples from background locations. The presence of SVOCs, pesticides and PCBs in background locations indicate that the concentrations detected at the site that are consistent with those detected in the background locations could be due to surrounding industrial activities. Statistical analysis of the background data is provided in Appendix K.

7.5.4 Preliminary Risk Characterization Analysis of Uncertainty

The preliminary risk characterization step may have some degree of uncertainty regarding risk estimation and risk description. Uncertainties in the risk estimation are compounded under the assumption of dose additivity or nonadditivity for multiple substance exposure. For this assessment, it was assumed that the potential toxic effects of the COPECs were non-additive.

This assumption may result in the underestimation of risk since concurrent exposure to several contaminants, particularly PAHs, might have synergistic toxic effects.

7.6 ECOLOGICAL SIGNIFICANCE

Ecological risks (i.e., HQ≥1) may result from exposure to COPECs in sediments in Mill Creek. Exposure to soils by terrestrial receptors was determined to be an incomplete pathway. No COPECs were identified in surface water samples collected from Mill Creek; however, there is a potential concern for the Mill Creek from the potential migration of contaminated groundwater to Mill Creek. Specifically, the results of the ecological risk assessment indicated the following:

- In sediments, only tin (in 1 of 28 samples) shows a potential risk to insectivorous waterfowl (spotted sandpiper) primarily due to incidental ingestion of sediment. The maximum detected concentration of tin solely in the sediments of the Mill Creek was 9.8 mg/kg. Because it is unlikely that the sandpiper would only be exposed to the maximum detected concentration of tin in sediment, the risk to the sandpiper is likely overestimated. In addition, there are no Region 5 ESLs published for tin in sediment. A Dutch Intervention Value of 900 mg/kg was found for tin (VROM, 2006) and an estimated no or low effect concentration of 90 mg/kg was derived (900 mg/kg x 0.1). Since the maximum detected concentration of tin in all sediments is less than the estimated no/low effect concentration and the maximum detected concentration of tin in the sediments of Mill Creek are approximately 1/10 of this estimated no/low effect concentration, the detected concentrations of tin in sediments adjacent to the site are not thought to pose a significant risk to wildlife. There were no identified final COPECs in surface water.

Overall, the estimated risks to ecological receptors are thought to have minimal ecological significance in all media due to the limited toxicity of the detected compounds to the ecological receptors, the elevated concentrations in background samples, the urbanized setting of the surrounding area, and the operation of a French Drain that collects groundwater prior to discharge into the Mill Creek. Therefore, the SERA adequately assesses the current risks to ecological receptors. However, further assessment of the groundwater to surface water migration pathway will be conducted to confirm the BRA results and to evaluate whether continued operation of the French Drain or other controls need to be implemented at the site.

There are several reasons for these conclusions. First, for a chemical in a soil to pose a risk, it must first be made available to a receptor through mobilization, transport, and exposure; and then the chemical must have the potential to elicit an adverse response from the ecological receptor associated with that exposure. The implications of these factors on whether or not the identified COPECs are likely to pose a significant risk to ecological receptors was further evaluated in the Uncertainties section (Section 7.5) of this report.

Regardless of their origin or age of chemical, the COPECs in soil have minimal ecological significance at the Rohm and Haas Facility. Potential ecological risk is determined by exposure frequency, constituent concentration, mechanism of exposure, and duration of exposure. The Rohm and Haas Facility and surrounding area is industrial and residential with minimal habitat available to support a wildlife population. Specifically, only 0.4 acres of old field habitat and 0.2 acres of riparian habitat exist at the site. The remainder of the site has been developed for site manufacturing and support activities; therefore, exposure pathways for terrestrial receptors are incomplete. Since only transient species and a few individual animals would use this area, the frequency and duration of exposure is limited. Additionally, the site is located in a fairly industrialized area along the Mill Creek. Elevated concentrations of some of the COPECs (e.g., pesticides, PAHs and PCBs) may in part be due to these regional conditions, both naturally and as a result of neighboring industry practices. In order to not underestimate the risk due to these "background" conditions, all detected compounds were included in the evaluation, which may overestimate the risk to receptors that may have developed adaptations for these higher regional concentrations of COPECs. Therefore, further evaluation of soil is not required since the pathway for exposure for terrestrial receptors is incomplete.

As discussed previously, the abundance of water in Mill Creek compared to the flow from the seeps makes the seeps an unlikely source of ecological exposure. Also, the contribution of the seeps to concentrations of contaminants in Mill Creek are likely to be minimal given the significantly greater flow rate in Mill Creek. Furthermore, surface water sample results from Mill Creek show no current risk to aquatic life within the Creek as only a few chemicals were detected in the surface water of Mill Creek and those detections were all below applicable screening levels. Additionally, sediment samples from the creek bed show limited potential risk to macroinvertebrates within Mill Creek; and primarily the risk is related to elevated concentrations of PAHs and dieldrin. The maximum detection of dieldrin in the creek bed sediments is 0.024 mg/kg. This is slightly higher than the range of detections reported by OEPA (OEPA, 1994) for a 5-mile stretch of Mill Creek that includes the site area. The range

of detections for dieldrin within this 5-mile stretch (including upstream samples and samples downstream of the influence of the site) is 0.00182 – 0.0164 mg/kg. Additionally, the elevated levels of PAHs within the sediments of Mill Creek are not unexpected for a channelized creek within a heavily urbanized/industrialized area as discussed previously in Sections 7.1.3 and 7.4.2. Additionally, a remediation system is in place to minimize the flow of groundwater from the Rohm and Haas Facility to Mill Creek, thus, no further evaluation of the seeps or sediments will be required.

Tin was detected at less than twice its reported national background concentration in the creek bed sediments. The maximum detected concentration of tin in sediments was 9.8 mg/kg while the reported average background is 5 mg/kg (NOAA, 2006). A no effect level in sediments could not be found in the literature for tin. The following sources were consulted for information regarding the toxicity of tin in sediments: NOAA SQuiRTs, (updated November 2006); Eisler, 1989; Risk Assessment Information System (2007); McDonald & Trevors, 1988; California Dept. of Toxic Substances Control, Human Health and Ecological Division, 2003; IPCS--INCHEM, 2005; as well as a general search of "Toxicity in sediment" on the web search engine "Google". A Record of Decision (ROD) was found for the Tex Tin Corporation Superfund Site in Region 6 concerning tin; however, the tin contamination was in marine sediments. The lowest NOAEL for tin in marine sediments that was cited in this report was 11 mg/kg. This NOAEL was not used as a screening value since it is based on marine sediments and the exact methodology was not given in the ROD description. However, inorganic tin presents a low toxicological risk due to its low solubility, poor absorption, low accumulation in tissues and rapid excretion. On the other hand, organotins can be bioaccumulated and are more toxic than inorganic tins (Eisler, 1989).

Likewise, detected concentrations of 3-methylphenol and 4-methylphenol in sediment exceeded screening levels and these chemicals were retained as COPECs. Both 3-methylphenol and 4-methylphenol are commonly detected compounds in urban environments (both are by-products of combustion from sources such as car exhaust). The site has sampled for 3-methylphenol and 4-methylphenol eight times in groundwater since October 2001 and because of co-elution of 3-methylphenol and 4-methylphenol (where the laboratory cannot distinguish between the two compounds), only detections of 4-methylphenol are reported in the data validation process. When evaluating the data, 4-methylphenol has only been detected 11 times in over 300 groundwater samples. Detections have ranged from a high of 330 ug/L (UAW08-20 in November 13, 2001) to a low of 2.4 ug/L (UAW16-10 in October 12, 2001). In November

2006) 4-methylphenol was detected once at a concentration of 12 ug/L (in the duplicate sample; the original sample was not detected at detection limit of 10 ug/L). Given the low and infrequent detections of methylphenols in groundwater, the inability of the laboratory to distinguish between 3-methylphenol and 4-methylphenol, and the presence of methylphenols in urban environments, it seems unlikely that the low, estimated concentrations of 3-methylphenol and 4-methylphenol (both detected in sediments at estimated concentrations of 0.24 mg/kg at location CS-3A) would be a result of input from site groundwater. Therefore, 3-methylphenol and 4-methylphenol are not believed to pose a significant risk to area wildlife. However, further evaluation of the groundwater to surface water pathway for other identified COPECs should be conducted to determine if the concentrations in groundwater have the future potential to affect aquatic life in Mill Creek.

7.7 SCIENTIFIC MANAGEMENT DECISION POINT (SMDP)

Per USEPA guidance, at the conclusion of the SERA, a scientific management decision point (SMDP) should be reached. Based on the assessment conducted above, further evaluation of surface soil, or the sediments and surface water of Mill Creek are not required for the following reasons: there is very limited natural habitat on-site and the habitat that is available is mostly mowed lawn and landscaped areas, there is low potential for bioaccumulation for the primary COPECs, and the concentrations detected are consistent with those detected in background locations.

For the groundwater to surface water migration pathway, a number of chemicals detected in groundwater exceed water quality criteria. This pathway should be evaluated further using site-specific information to determine if this pathway presents a significant risk to aquatic life in Mill Creek.

8.0 CONCLUSIONS

This baseline risk assessment was conducted to evaluate the potential for adverse human health and ecological effects as a result of potential exposure to chemicals in soil and groundwater at the Rohm and Haas Facility and in sediment and seeps at Mill Creek, which is adjacent to the facility.

The results of the human health risk assessment indicated the following:

- For the indoor industrial worker, the carcinogenic risk estimate (1.4×10^{-5}) is within the acceptable level. The hazard index (0.83) is also below the acceptable hazard

level of 1. Therefore, potential exposure to chemicals in soil and groundwater that may migrate to indoor air would not result in adverse health effects for this receptor, especially considering the conservative nature of the models used for the evaluation.

- For the outdoor industrial worker, the hazard index (0.19) and carcinogenic risk estimates (4.7×10^{-5}) were below or within the acceptable levels, indicating exposure to chemicals would be within the acceptable risk range or below the acceptable hazard index.

- For the construction worker, the carcinogenic risk estimate (3.5×10^{-6}) is within the acceptable level. The total hazard index (1.1) slightly exceeds the acceptable hazard level of 1. However, the total hazard index for each target organ (total liver hazard index of 0.62, total kidney hazard index of 0.01, total blood hazard index of 0.12, and other hazard index of 0.39) is below the acceptable hazard level of 1; therefore, potential exposure to chemicals would be within the acceptable risk range or below the acceptable hazard index.

- For the recreational wader, adult and child, hazard indexes (0.006 and 0.036, respectively) and the carcinogenic risk estimates (9.7×10^{-7} and 3.7×10^{-6}, respectively) were below acceptable levels. The combined risk and hazard index for a 30-year exposure scenario (6 years as a child and 24 years as an adult) are 4.7×10^{-6} and 0.042, respectively, which are also below or within the acceptable target risk and hazard levels. Therefore, exposure to chemicals in surface water and sediments, based on surface water and sediment data from Mill Creek, is not anticipated to result in adverse health effects. However, further assessment of the groundwater to surface water migration pathway will be conducted (including leaching as a potential component of the shallow groundwater to surface water migration pathway) to confirm the BRA results and to evaluate the design and implementation of Corrective Measures. Low-flow purge and sample techniques will be used to collect future groundwater data from all wells to reduce the uncertainty associated with the sampling methodology.

- For the ball field recreational user (age 6-13), the hazard index is 0.037 and the carcinogenic risk estimate is 2.1×10^{-6}, which are below or within acceptable levels. Therefore, exposure to chemicals in surface soil in the vicinity of the ball field is not anticipated to result in adverse health effects.

- For the ball field recreational user (age 13-17), the hazard index is 0.036 and the carcinogenic risk estimate is 1.3×10^{-6}, which are below or within acceptable levels. Therefore, exposure to chemicals in surface soil in the vicinity of the ball field is not anticipated to result in adverse health effects.

- For the adult recreational fisherman, the hazard index (0.67) was below acceptable levels; however, the carcinogenic risk (1.2×10^{-4}) is above the acceptable levels, primarily due to the fish ingestion pathway. Therefore, exposure via ingestion of fish in the Mill Creek from fishing activities may result in an unacceptable cancer risk under the conditions evaluated for this receptor. The primary chemical of concern is arsenic. Arsenic was detected in only one duplicate sample in surface water; thus, the risk from this compound is likely overestimated based on this low frequency of detection and the utilization of the maximum detected concentration with conservative uptake parameters in the fish tissue modeling and because arsenic was detected at or below background levels in the surface water and sediments of Mill Creek. Thus, further evaluation of the fish ingestion pathway is not warranted at this time.

- For the off-site resident, the risk and hazard index are not calculated. However, the risk and hazard for the receptor should be acceptable because the hazard index (0.021) and carcinogenic risk (3.0×10^{-7}) predicted for the inhalation exposure for the outdoor industrial worker were below the acceptable levels. Thus, potential exposure to chemicals in ambient air from the Rohm and Haas Facility is not anticipated to result in adverse health effects.

- The groundwater leaching to the lower aquifer pathway is not currently completed since the lower aquifer groundwater does not exhibit impact from the Rohm and Haas facility based on additional site investigation results (Geomatrix, 2004) and groundwater monitoring data from the past few years. Although the release occurred at least ten years ago and groundwater data should be representative of the leaching capacity, additional leaching will be considered in the proposed further assessment of the groundwater to surface water migration pathway and potential migration to the lower aquifer to support Corrective Measures.

- New groundwater data collected as part of the groundwater monitoring program will be compared to the data and assumptions used in this risk assessment in order to identify newly detected compounds, changes in frequency of detection, and deviations from historical concentration range in the development of future corrective measures. Low-flow purge and sample techniques will be used to collect future groundwater data from all wells to reduce the uncertainty associated with the sampling methodology.

For ecological receptors, no COPECs were identified in surface water samples collected from Mill Creek and the soil pathway was determined to be incomplete. Tin was identified as a potential COPEC in the sediments of Mill Creek, however, since the maximum detected concentration of tin (9.8 mg/kg) in all sediments is approximately 1/10 of the estimated no/low effect concentration (90 mg/kg), the detected concentrations of tin in sediments adjacent to the

site are not thought to pose a significant risk to wildlife. There is a potential for contaminated groundwater to migrate to the Mill Creek.

Overall, the estimated risks to ecological receptors are thought to have minimal ecological significance due to the limited toxicity of the detected compounds to the ecological receptors, the elevated concentrations in background samples, the urbanized setting of the surrounding area, and the operation of a French Drain that collects groundwater prior to discharge into the Mill Creek. Therefore, the SERA adequately assesses the current risks to ecological receptors. However, further assessment of the groundwater to surface water migration pathway and potential effect on the sediments and surface water of Mill Creek will be conducted to confirm the BRA results and to evaluate the design and implementation of Corrective Measures.

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TABLES

TABLE 1.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SOIL
Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Soil, Ambient and Indoor Air
Exposure Point:	On-Site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Volatile Organic Compounds																
67641	Acetone	0.0019	J	23	B	mg/kg	T-6-7.5'	53 / 126	0.0057 - 190	23	--	16	WQ	--	--	Y	ASL
107131	Acrylonitrile	1.1	J	1.1	J	mg/kg	DP17-13'	1 / 37	0.088 - 250	1.1	--	0.49	C	--	--	N	IFD
71432	Benzene	0.0017	J	0.93	J	mg/kg	DP56A-9.5-10.5'	10 / 126	0.004 - 47	0.93	--	0.03	WQ	--	--	Y	ASL
75274	Bromodichloromethane	0.0015	J	0.0015	J	mg/kg	DP07-9'	1 / 126	0.004 - 47	0.0015	--	0.6	WQ	--	--	N	IFD, BSL
78933	2-Butanone	0.0031	J	0.64	J	mg/kg	DP01-2'	15 / 126	0.016 - 190	0.64	--	110000	N	--	--	N	BSL
75150	Carbon disulfide	0.00089	J	1.5		mg/kg	DP14-3'	23 / 126	0.004 - 47	1.5	--	32	WQ	--	--	N	BSL
108907	Chlorobenzene	0.00053	J	42		mg/kg	DP38-14.5	36 / 126	0.004 - 14	42	--	1	WQ	--	--	Y	ASL
67663	Chloroform	0.0036	J	0.0036	J	mg/kg	DP07-9'	1 / 126	0.004 - 47	0.0036	--	0.47	C	--	--	N	BSL
74873	Chloromethane	0		0		mg/kg		0 / 126	0.0044 - 47	0	--	160	N	--	--	N	ND
110827	Cyclohexane	0.022		2.4		mg/kg	DP67A-12.5-13.5'	3 / 89	0.008 - 94	2.4	--	140	SAT	--	--	N	BSL
95501	1,2-Dichlorobenzene	0.071	J	2800		mg/kg	DP78A-9-10'	16 / 126	0.34 - 170	2800	--	17	WQ	--	--	Y	ASL
541731	1,3-Dichlorobenzene	0.26	J	28	J	mg/kg	DP78A-9-10'	2 / 126	0.34 - 170	28	--	600	SAT	--	--	N	BSL
106467	1,4-Dichlorobenzene	0.062	J	170		mg/kg	DP78A-9-10'	7 / 126	0.34 - 170	170	--	2	WQ	--	--	Y	ASL
75718	Dichlorodifluoromethane	0.0032	J	0.0032		mg/kg	DP19-2'	1 / 126	0.004 - 47	0.0032	--	310	N	--	--	N	BSL
75343	1,1-Dichloroethane	0.022		0.022	J	mg/kg	STR10-11'	1 / 126	0.004 - 47	0.022	--	23	WQ	--	--	N	BSL
107062	1,2-Dichloroethane	0.0026	J	0.015	J	mg/kg	DP31-15	2 / 126	0.004 - 47	0.015	--	0.02	WQ	--	--	N	BSL
156592	cis-1,2-Dichloroethene	0.0051		0.0051	J	mg/kg	STR10-11'	1 / 126	0.002 - 24	0.0051	--	0.4	WQ	--	--	N	BSL
156605	1,2-Dichloroethene (trans)	0.0051	J	0.0051		mg/kg	STR10-11'	1 / 109	0.004 - 12	0.0051		0.7	WQ			N	BSL
100414	Ethylbenzene	0.005	J	6.2	J	mg/kg	DP16-12.5'	18 / 126	0.004 - 14	6.2	--	13	WQ	--	--	N	BSL
74884	Iodomethane	0.6	JB	0.6	JB	mg/kg	T-6-7.5'	1 / 37	0.0044 - 12	0.6	--	0.2	WQ	--	--	N	IFD
98828	Isopropylbenzene	0.029	J	0.24	J	mg/kg	DP01-2'	4 / 89	0.004 - 47	0.24	--	2000	N	--	--	N	BSL
79209	Methyl acetate	0.0019	J	6		mg/kg	UAW17-40-5'	6 / 89	0.008 - 94	6	--	92000	N	--	--	N	BSL
108872	Methylcyclohexane	0.00076	J	21		mg/kg	DP67A-12.5-13.5'	15 / 89	0.008 - 14	21	--	8700	N	--	--	N	BSL
75092	Methylene chloride	0.0014	JB	11	JB	mg/kg	DP16-12.5'	26 / 126	0.004 - 47	11	--	0.02	WQ	--	--	Y	ASL
127184	Tetrachloroethene	0.0026	J	0.067	JB	mg/kg	T-6-7.5'	5 / 126	0.00145 - 47	0.067	--	0.06	WQ	--	--	N	IFD
108883	Toluene	0.00052	J	240		mg/kg	DP56A-9.5-10.5'	42 / 126	0.004 - 7.1	240	--	12	WQ	--	--	Y	ASL
79016	Trichloroethene	0.0025	J	0.0025	J	mg/kg	STR10-11'	1 / 126	0.004 - 47	0.0025	--	0.06	WQ	--	--	N	BSL
75014	Vinyl chloride	0.0084		0.0084		mg/kg	STR10-11'	1 / 126	0.0044 - 47	0.0084	--	0.01	WQ	--	--	N	BSL
1330207	Xylenes (total)	0.002	J	50		mg/kg	DP01-2'	24 / 126	0.008 - 27	50	--	210	WQ	--	--	N	BSL

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Exposure Medium:	Soil, Ambient and Indoor Air
Exposure Point:	On-Site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Semi-Volatile Organic Compounds																
83329	Acenaphthene	0.069	J	0.58		mg/kg	UAW01-30-1.5'	2 / 126	0.34 - 170	0.58	--	570	WQ	--	--	N	BSL
208968	Acenaphthylene	3.3	J	3.3	J	mg/kg	UAW17-40-5'	1 / 126	0.34 - 170	3.3	--	570	WQ	--	--	N	BSL
98862	Acetophenone	0		0		mg/kg		0 / 126	0.34 - 170	0	--			--	--	N	ND
62533	Aniline	0.16	J	22		mg/kg	UAW08-20-13'	7 / 54	0.35 - 170	22	--	300	C	--	--	N	BSL
120127	Anthracene	0.054	J	1.5		mg/kg	UAW01-30-1.5'	4 / 126	0.34 - 170	1.5	--	12000	WQ	--	--	N	BSL
100527	Benzaldehyde	0.68		9.3		mg/kg	DP67A-12.5-13.5'	5 / 89	0.34 - 170	9.3	--	62000	N	--	--	N	BSL
56553	Benzo(a)anthracene	0.07	J	5.4		mg/kg	UAW01-30-1.5'	9 / 126	0.34 - 170	5.4	--	2	WQ	--	--	Y	ASL
50328	Benzo(a)pyrene	0.085	J	6.2		mg/kg	UAW01-30-1.5'	8 / 126	0.34 - 170	6.2	--	0.21	C	--	--	Y	ASL
205992	Benzo(b)fluoranthene	0.07	J	7		mg/kg	UAW01-30-1.5'	11 / 126	0.34 - 170	7	--	2.1	C	--	--	Y	ASL
191242	Benzo(ghi)perylene	0.062	J	2.8		mg/kg	UAW01-30-1.5'	6 / 126	0.34 - 170	2.8	--	4300	WQ	--	--	N	BSL
207089	Benzo(k)fluoranthene	0.078	J	2.8		mg/kg	UAW01-30-1.5'	4 / 126	0.34 - 170	2.8	--	21	C	--	--	N	BSL
92524	1,1-Biphenyl	0.67	J	39	J	mg/kg	DP78A-9-10'	4 / 89	0.34 - 170	39	--	23000	N	--	--	N	BSL
117817	bis(2-Ethylhexyl) phthalate	0.033	J	150		mg/kg	STR03-12.5'	20 / 126	0.34 - 170	150	--	120	C	--	--	Y	ASL
86748	Carbazole	0.48		0.48		mg/kg	UAW01-30-1.5'	1 / 91	0.34 - 170	0.48	--	0.6	WQ	--	--	N	BSL
218019	Chrysene	0.064	J	5.9		mg/kg	UAW01-30-1.5'	11 / 126	0.34 - 170	5.9	--	160	WQ	--	--	N	BSL
53703	Dibenz(a,h)anthracene	0.82		0.82		mg/kg	UAW01-30-1.5'	1 / 126	0.34 - 170	0.82	--	0.21	C	--	--	N	IFD
132649	Dibenzofuran	0.32	J	3.5	J	mg/kg	UAW17-40-5'	2 / 126	0.34 - 170	3.5	--	1600	N	--	--	N	BSL
120832	2,4-Dimethylphenol	24		24		mg/kg	UAW17-40-5'	1 / 126	0.34 - 170	24	--	9	WQ	--	--	N	IFD
84662	Diethyl phthalate	0		0		mg/kg		0 / 126	0.34 - 170	0	--	100000	MAX	--	--	N	ND
117840	Di-n-octyl phthalate	0.29	J	0.29		mg/kg	DP15-2'	1 / 126	0.34 - 170	0.29	--	10000	WQ	--	--	N	BSL
206440	Fluoranthene	0.062	J	14		mg/kg	UAW01-30-1.5'	15 / 126	0.34 - 170	14	--	4300	WQ	--	--	N	BSL
86737	Fluorene	0.063	J	4.3	J	mg/kg	UAW17-40-5'	3 / 126	0.34 - 170	4.3	--	560	WQ	--	--	N	BSL
193395	Indeno(1,2,3-cd)pyrene	0.076	J	2.7		mg/kg	UAW01-30-1.5'	5 / 126	0.34 - 170	2.7	--	2.1	C	--	--	N	IFD
91576	2-Methylnaphthalene	0.16	J	22	J	mg/kg	T-6-7.5	4 / 126	0.34 - 170	22	--	84	WQ	--	--	N	BSL
95487	2-Methylphenol	0.57		15		mg/kg	UAW17-40-5'	2 / 126	0.34 - 170	15	--	15	WQ	--	--	N	BSL
108394	3-Methylphenol	5.4	J #	5.4	J #	mg/kg	DP17-13'	1 / 37	0.35 - 86	5.4	--	31000	N	--	--	N	BSL
106445	4-Methylphenol	0.46	#	35	#	mg/kg	UAW17-40-5'	3 / 126	0.34 - 170	35	--	3100	N	--	--	N	BSL
91203	Naphthalene	3.8	J	3.8	J	mg/kg	UAW17-40-5'	1 / 126	0.34 - 170	3.8	--	84	WQ	--	--	N	BSL
85018	Phenanthrene	0.07	J	9.8		mg/kg	UAW17-40-5'	11 / 126	0.34 - 170	9.8	--	12000	WQ	--	--	N	BSL
108952	Phenol	0.075	J	13		mg/kg	UAW17-40-5'	3 / 126	0.34 - 170	13	--	100	WQ	--	--	N	BSL
129000	Pyrene	0.063	J	11		mg/kg	UAW01-30-1.5'	13 / 126	0.34 - 170	11	--	4200	WQ	--	--	N	BSL

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	Pesticides and PCBs																
12674112	Aroclor 1016	0.016	J	0.016	J	mg/kg	UAW05-20-13'	2 / 126	0.034 - 75	0.016	--	21	C	--	--	N	BSL
53469219	Aroclor 1242	0.063		0.48		mg/kg	STR01-88'	5 / 126	0.034 - 75	0.48	--	0.74	C	--	--	N	BSL
12672296	Aroclor 1248	0.011	J	0.011	J	mg/kg	T-3-3	1 / 126	0.034 - 75	0.011	--	0.74	C	--	--	N	BSL
11097691	Aroclor 1254	0.024		0.98		mg/kg	UAW17-40-1.5'	8 / 126	0.034 - 75	0.98	--	0.74	C	--	--	Y	ASL
11096825	Aroclor 1260	0.011	J	0.028	J	mg/kg	UAW13-20-1.5'	6 / 126	0.0055 - 75	0.028	--	0.74	C	--	--	N	BSL
309002	Aldrin	0.098	J	0.26	PG	mg/kg	DP66A-9.5-10.5'	2 / 126	0.0018 - 2	0.26	--	0.1	C	--	--	N	IFD
319846	alpha-BHC	0.2	PG	0.2	PG	mg/kg	DP78A-9-10'	1 / 126	0.0018 - 2	0.2	--	0.0005	WQ	--	--	N	IFD
319857	beta-BHC	0.0017	J	0.25	PG	mg/kg	DP73A-12-13'	4 / 126	0.0018 - 2	0.25	--	0.003	WQ	--	--	N	IFD
58899	gamma-BHC (Lindane)	0.16		0.16		mg/kg	DP79A-12-13'	1 / 126	0.0018 - 2	0.16	--	0.009	WQ	--	--	N	IFD
5103719	alpha-Chlordane	0.00083	J	0.14	J	mg/kg	DP56A-9.5-10.5'	2 / 91	0.0018 - 0.9	0.14	--	10	WQ	--	--	N	BSL
5103742	gamma-Chlordane	0.00047	J	1.7		mg/kg	DP56A-9.5-10.5'	9 / 91	0.0018 - 0.21	1.7	--	10	WQ	--	--	N	BSL
510156	Chlorobenzilate	10	PG	10	PG	mg/kg	DP13-11'	1 / 37	0.0035 - 2.2	10	--	6.4	C	--	--	N	IFD
72548	4,4'-DDD	0.00064	J	0.16	J	mg/kg	DP56A-9.5-10.5'	5 / 126	0.0018 - 2	0.16	--	10	C	--	--	N	BSL
72559	4,4'-DDE	0.0002	J	0.2		mg/kg	DP56A-9.5-10.5'	11 / 126	0.0018 - 2	0.2	--	7	C	--	--	N	BSL
50293	4,4'-DDT	0.00065	J	3.9	PG	mg/kg	DP56A-9.5-10.5'	6 / 126	0.0018 - 2	3.9	--	7	C	--	--	N	BSL
2303164	Diallate	0		0		mg/kg		0 / 37	0.035 - 39	0	--	28	C	--	--	N	ND
60571	Dieldrin	0.00015	J	0.064	J	mg/kg	DP66A-9.5-10.5'	6 / 126	0.0018 - 2	0.064	--	0.004	WQ	--	--	N	IFD
959988	Endosulfan I	0.14		0.75	PG	mg/kg	DP66A-9.5-10.5'	3 / 126	0.0018 - 2	0.75	--	18	WQ	--	--	N	BSL
33213659	Endosulfan II	0.0015	J	29	PG	mg/kg	DP67A-12.5-13.5'	5 / 126	0.0018 - 2	29	--	18	WQ	--	--	N	IFD
1031078	Endosulfan sulfate	0.0018	J	0.48	PG	mg/kg	DP79A-12-13'	7 / 126	0.0018 - 2	0.48	--	18	WQ	--	--	N	BSL
72208	Endrin	0.00048	J	3.1	PG	mg/kg	DP67A-12.5-13.5'	8 / 126	0.0018 - 2	3.1	--	1	WQ	--	--	Y	ASL
7421934	Endrin aldehyde	0.0013		0.22	PG	mg/kg	DP73A-12-13'	6 / 126	0.0018 - 2	0.22	--	1	WQ	--	--	N	BSL
53494705	Endrin ketone	0.0017	J	1	PG	mg/kg	DP56A-9.5-10.5'	5 / 91	0.0018 - 0.9	1	--	1	WQ	--	--	N	BSL
76448	Heptachlor	0.074	J	0.074	J	mg/kg	DP79A-12-13'	1 / 126	0.0018 - 2	0.074	--	0.38	C	--	--	N	BSL
102473	Heptachlor epoxide	0.0001	J	0.066	J	mg/kg	DP73A-12-13'	2 / 126	0.0018 - 2	0.066	--	0.19	C	--	--	N	BSL
465736	Isodrin	0		0		mg/kg		0 / 37	0.0035 - 3.9	0	--	0.1	C	--	--	N	ND
72435	Methoxychlor	0.0017	J	5.5	PG	mg/kg	DP56A-9.5-10.5'	7 / 126	0.0035 - 3.9	5.5	--	160	WQ	--	--	N	BSL
	Inorganics																
7429905	Aluminum	211	J	14100	J	mg/kg	DP08-6'	96 / 96	0 - 0	14100	--	100000	MAX	--	--	N	BSL
7440360	Antimony	0.27	B	8.9		mg/kg	UAW04-20-10'	10 / 133	1 - 1.4	8.9	--	5.0	WQ	--	--	Y	ASL
7440382	Arsenic	0.75	J	16.2		mg/kg	STR10-1.5'	137 / 137	0 - 0	16.2	--	1.6	C	--	--	Y	ASL
74400393	Barium	2	J	691		mg/kg	DP17-13'	133 / 133	0 - 0	691	--	1600	WQ	--	--	N	BSL
7440417	Beryllium	0.043	B	1		mg/kg	STR10-1.5'	115 / 133	0.04 - 0.72	1	--	63	WQ	--	--	N	BSL

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	Inorganics (cont.)																
7440439	Cadmium	0.054	J	3.415		mg/kg	DP25-2.5'+Dup	116 / 133	0.083 - 0.26	3.415	--	8	WQ	--	--	N	BSL
7440702	Calcium	810		175000		mg/kg	STR02-12.5'	96 / 96	0 - 0	175000	--	N/A		--	--	N	NUT
16065831	Chromium	0.55	B	388		mg/kg	DP79A-12-13'	143 / 143	0 - 0	388	--	38	WQ	--	--	Y	ASL
744484	Cobalt	0.74	B	294		mg/kg	DP79A-12-13'	133 / 133	0 - 0	294	--	1900	C	--	--	N	BSL
7440508	Copper	3.8		86.85		mg/kg	DP37-19+DUP	133 / 133	0 - 0	86.85	--	41000	N	--	--	N	BSL
74908	Cyanide, Total	0.19	J	1.7		mg/kg	UAW16-10-5.5'	17 / 108	0.51 - 0.68	1.7	--	35	N	--	--	N	BSL
7439896	Iron	110		32900		mg/kg	DP23-9'	96 / 96	0 - 0	32900	--	100000	MAX	--	--	N	BSL
7439821	Lead	2		780		mg/kg	UAW21-30-1.5'	142 / 142	0 - 0	780	--	800	N	--	--	N	BSL
7439954	Magnesium	35.33	BJ	95200		mg/kg	STR02-12.5'	95 / 96	61.2 - 61.2	95200	--	N/A		--	--	N	NUT
7439965	Manganese	1.5	B	2120		mg/kg	STR05-9'	96 / 96	0 - 0	2120	--	19000	N	--	--	N	BSL
7440224	Mercury	0.006	B	2.7	J	mg/kg	DP38-14.5	97 / 133	0.01 - 0.13	2.7	--	310	N	--	--	N	BSL
7440020	Nickel	1.3	B	59		mg/kg	DP39-10'	133 / 133	0 - 0	59	--	130	WQ	--	--	N	BSL
7440097	Potassium	162	BJ	3810		mg/kg	DP44-1.5'	95 / 96	148 - 148	3810	--	N/A		--	--	N	NUT
7722492	Selenium	0.36	J	1.3	J	mg/kg	DP31-15	41 / 133	0.52 - 0.75	1.3	--	5.0	WQ	--	--	N	BSL
7487947	Silver	0.34	B	1.4		mg/kg	UAW15-20-2'+Dup	6 / 125	0.51 - 0.75	1.4	--	34	WQ	--	--	N	BSL
7440235	Sodium	73	J	2410		mg/kg	UAW20-60-1.5'	72 / 96	109 - 754	2410	--	N/A		--	--	N	NUT
7446186	Thallium	0.54	BJ	4.7		mg/kg	DP23-2.5'	49 / 133	0.75 - 2.2	4.7	--	67	N	--	--	N	BSL
7440315	Tin	0.96	J	12700	J	mg/kg	HA9-1.5'	81 / 81	0 - 0	12700	--	100000	MAX	--	--	N	BSL
7440622	Vanadium	0.52	B	30.4		mg/kg	STR10-1.5'	133 / 133	0 - 0	30.4	--	1000	N	--	--	N	BSL
7440666	Zinc	1.95	B	418	MBD	mg/kg	UAW17-40-5'	133 / 133	0 - 0	418	--	12000	WQ	--	--	N	BSL

(1) Minimum/maximum detected concentration.

(2) Maximum value used for screening concentration.

(3) "--" - background is not used for COPC screening.

(4) Screening toxicity value - Lowest value reported between the soil screening levels for groundwater protection and the the Region 9 Preliminary Remediation Goal (PRG) Industrial Screening Level (US EPA, 2004b). Additional notation indicates cancer (C) or non-cancer (N) or protection of water quality (WQ) endpoint). Screening criteria were not available for some compounds (N/A). Based on similarities in chemical and physical structure and toxicity, the following surrogate screening criteria were used:
iodomethane = methylbromide; acenaphthylene = acenaphthene; benzo(ghi)perylene = fluoranthene; 2-methylnaphthalene = naphthalene; phenanthrene = anthracene; alpha- and gamma-chlordane = chlordane; endosulfan I, endosulfan II, and endosulfan sulfate = endosulfan; endrin aldehyde and endrin ketone = endrin; isodrin = aldrin.

(5) Rationale Codes Selection Reason: Above Screening Levels (ASL); Toxicity Information Available (TX)
Deletion Reason: Infrequent Detection (IFD); Below Screening Level (BSL); Essential Nutrient (NUT); Not detected (ND)

Shaded - COPCs identified.

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
B = Method Blank Contamination. The associated method blank contains the target analyte at a reportable level. For metals, B = estimated values.
J = Estimated Value. For metals, J = Method Blank Contamination.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
PG = The percentage difference between the origial and confirmation analyses is greater than 40%
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
C = Carcinogenic
N = Non-Carcinogenic
SAT = Soil Saturation
MAX = Ceiling limit

TABLE 1.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER

Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater, Ambient and Indoor Air
Exposure Point:	On- and Off-Site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Volatile Organic Compounds															
67641	Acetone	0.79	J	45000		ug/L	UAW06-20	72 / 194	10 - 10000	45000	--	5500 N PRG	--	--	Y	ASL
71432	Benzene	0.25	J B	150	B	ug/L	UAW08-20	54 / 194	1 - 1000	150	--	5 MCL	--	--	Y	ASL
75274	Bromodichloromethane	0.2	J	1.3		ug/L	UAW09-20	4 / 194	1 - 1000	1.3	--	100 MCL	--	--	N	BSL
78933	2-Butanone	0.42	J	750	J B	ug/L	UAW06-20	13 / 170	10 - 10000	750	--	7000 N PRG	--	--	N	BSL
75150	Carbon disulfide	0.24	J	410		ug/L	UAW13-20	32 / 194	1 - 1000	410	--	1000 N PRG	--	--	N	BSL
56235	Carbon tetrachloride	1.1	J	2.2	J	ug/L	UAW15-20	3 / 170	1 - 1000	2.2	--	0.17 C PRG	--	--	N	IFD
108907	Chlorobenzene	0.23	J	4500		ug/L	MW-EPA-1	115 / 194	1 - 1000	4500	--	100 MCL	--	--	Y	ASL
67663	Chloroform	0.23	J	190		ug/L	UAW15-20	31 / 194	1 - 1000	190	--	80 MCL	--	--	Y	ASL
110827	Cyclohexane	0.13	J	3.9	J	ug/L	UAW08-20	9 / 162	1 - 1000	3.9	--	10000 N PRG	--	--	N	BSL
95-50-1	1,2-Dichlorobenzene	0.39	J	1900		ug/L	UAW12-20/MW-EPA-1	95 / 197	1 4000	1900	--	600 MCL	--	--	Y	ASL
541-73-1	1,3-Dichlorobenzene	0.21	J	46	J	ug/L	UAW12-20/MW-EPA-1	35 / 173	1 4000	46	--	180 N PRG	--	--	N	BSL
106-46-7	1,4-Dichlorobenzene	0.24	J	330		ug/L	MW-EPA-1	74 / 197	1 4000	330	--	75 MCL	--	--	Y	ASL
75718	Dichlorodifluoromethane	0.38	J	0.41	J	ug/L	UAW01-30	2 / 194	1 - 1000	0.41	--	390 N PRG	--	--	N	BSL
75343	1,1-Dichloroethane	0.17	J	66		ug/L	UAW22-20	33 / 194	1 - 1000	66	--	810 N PRG	--	--	N	BSL
107062	1,2-Dichloroethane	0.32	J	660		ug/L	UAW23-20	21 / 194	1 - 1000	660	--	5 MCL	--	--	Y	ASL
75354	1,1 -Dichloroethene	0.19	J	2.8		ug/L	UAW23-20	5 / 170	1 - 1000	2.8	--	340 N PRG	--	--	N	BSL
156592	cis-1,2-Dichloroethene	0.77		43		ug/L	MW-EPA-2	18 / 170	0.5 - 500	43	--	70 MCL	--	--	N	BSL
100414	Ethylbenzene	0.21	J	59		ug/L	UAW08-20	30 / 194	1 - 1000	59	--	700 MCL	--	--	N	BSL
98828	Isopropylbenzene	0.34	J	8.9		ug/L	UAW07-20	9 / 162	1 - 1000	8.9	--	660 N PRG	--	--	N	BSL
108101	4-Methyl-2-pentanone (MIBK)	0.71	J	66	J	ug/L	UAW08-20	13 / 170	10 - 10000	66	--	2000 N PRG	--	--	N	BSL
1634044	Methyl-tert-butyl ether	0.2	J	0.2	J	ug/L	MW-EPA-3	1 / 162	5 - 5000	0.2	--	11 C PRG	--	--	N	BSL
108872	Methylcyclohexane	0.41	J	18	J	ug/L	UAW08-20	15 / 186	1 - 1000	18	--	5200 N PRG	--	--	N	BSL
75092	Methylene chloride	0.45	J B	280	J B	ug/L	UAW04-20	40 / 194	1 - 1000	280	--	5 MCL	--	--	Y	ASL
127184	Tetrachloroethene	0.19	J	82		ug/L	UAW23-20	17 / 170	1 - 1000	82	--	5 MCL	--	--	Y	ASL
108883	Toluene	0.17	J	24000		ug/L	UAW04-20	59 / 194	1 - 1000	24000	--	1000 MCL	--	--	Y	ASL
71556	1,1,1-Trichloroethane	0.2	J	51		ug/L	UAW23-20	9 / 170	1 - 1000	51	--	200 MCL	--	--	N	BSL
79005	1,1,2-Trichloroethane	2.6		6.3	J	ug/L	UAW23-20	7 / 170	1 - 1000	6.3	--	5 MCL	--	--	N	IFD
79016	Trichloroethene	0.28	J B	8.8	J	ug/L	UAW23-20	13 / 170	1 - 1000	8.8	--	5 MCL	--	--	Y	ASL
75014	Vinyl chloride	1.3	J	15		ug/L	UAW22-20	7 / 170	1 - 2000	15	--	2 MCL	--	--	Y	ASL
1330207	Xylenes (total)	0.48	J	270		ug/L	UAW08-20	40 / 194	1 - 1000	270	--	10000 MCL	--	--	N	BSL

TABLE 1.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER

Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater, Ambient and Indoor Air
Exposure Point:	On- and Off-Site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Semi-Volatile Organic Compounds															
83329	Acenaphthene	1.2	J	6.4	J	ug/L	UAW06-20	3 / 175	10 - 4000	6.4	--	370 N PRG	--	--	N	BSL
62533	Aniline	0.69	J	12000		ug/L	UAW08-20	57 / 157	10 - 4000	12000	--	12 C PRG	--	--	Y	ASL
100527	Benzaldehyde	1.3	J	53		ug/L	UAW04-20	5 / 191	10 - 4000	53	--	3600 N PRG	--	--	N	BSL
92524	1,1-Biphenyl	7.3	J	62		ug/L	UAW07-20	4 / 167	10 - 4000	62	--	300 N PRG	--	--	N	BSL
85687	Butyl Benzyl Phthalate	2.3	J	2.7	J	ug/L	UAW18-20	2 / 175	10 - 4000	2.7	--	7300 N PRG	--	--	N	BSL
105602	Caprolactam	0.76	J	19		ug/L	UAW16-10/UAW11-10	31 / 167	10 - 4000	19	--	18000 N PRG	--	--	N	BSL
95578	2-Chlorophenol	2.7	J	16	J	ug/L	MW-EPA-1	4 / 175	10 - 4000	16	--	30 N PRG	--	--	N	BSL
120832	2,4-Dichlorophenol	0.96	J	2.8	J	ug/L	UAW05-20	2 / 175	10 - 4000	2.8	--	110 N PRG	--	--	N	BSL
84-74-2	Di-n-Butyl Phthalate	0.62	J	0.62	J	ug/L	UAW21-30	1 175	10 - 4000	0.62	--	3600 N PRG	--	--	N	BSL
117840	Di-n-Octyl phthalate	1.2	J	1.2	J	ug/L	UAW22-20	1 / 175	10 - 4000	1.2	--	1500 N PRG	--	--	N	BSL
117817	bis(2-ethylhexyl) phthalate	0.4	J	34		ug/L	MW-EPA-2	23 / 175	10 - 4000	34	--	6 MCL	--	--	Y	ASL
86737	Fluorene	0.87	J	5.9	J	ug/L	UAW06-20	2 / 175	10 - 4000	5.9	--	240 N PRG	--	--	N	BSL
95487	2-Methylphenol	0.86	J	140		ug/L	UAW04-20	7 / 199	10 - 4000	140	--	1800 N PRG	--	--	N	BSL
106445	4-Methylphenol	1.4	J	330	J	ug/L	UAW08-20	12 / 199	10 - 4000	330	--	180 N PRG	--	--	Y	ASL
91576	2-Methylnaphthalene	5.7	J	8.6	J	ug/L	UAW13-20	3 / 175	10 - 4000	8.6	--	6.2 N PRG	--	--	N	IFD
91203	Naphthalene	0.89	J	11	J	ug/L	MW-EPA-1	5 / 175	10 - 4000	11	--	6.2 N PRG	--	--	N	IFD
108952	Phenol	1.9	J	160	J	ug/L	UAW08-20	3 / 175	10 - 4000	160	--	11000 N PRG	--	--	N	BSL
120821	1,2,4-Trichlorobenzene	2.4	J	2.4	J	ug/L	UAW05-20	1 / 173	1 - 4000	2.4	--	70 MCL	--	--	N	BSL
	Pesticides and PCBs															
309002	Aldrin	0.03	J	0.42		ug/L	UAW11-10	3 / 147	0.05 - 25	0.42	--	0.004 C PRG	--	--	N	IFD
53469219	Aroclor 1242	0.45	J	130	J	ug/L	UAW16-10	3 / 123	1 - 200	130	--	0.5 MCL	--	--	N	IFD
319846	alpha-BHC	0.01	J	0.32	J	ug/L	UAW08-20	5 / 147	0.05 - 25	0.32	--	0.011 C PRG	--	--	N	IFD
319857	beta-BHC	0.017	J	12	J	ug/L	UAW16-10	29 / 147	0.05 - 25	12	--	0.037 C PRG	--	--	Y	ASL
319868	delta-BHC	0.0074	J	1		ug/L	UAW23-20	10 / 147	0.05 - 25	1	--	0.011 C PRG	--	--	Y	ASL
58899	gamma-BHC (Lindane)	0.0063	J	0.47		ug/L	UAW08-20	7 / 124	0.05 - 25	0.47	--	0.2 MCL	--	--	Y	ASL
5103719	alpha-Chlordane	0.026	J	0.053	PG	ug/L	UAW03-20	5 / 139	0.05 - 25	0.053	--	2 MCL	--	--	N	BSL
5103742	beta-Chlordane	0.009	J	0.37	J	ug/L	UAW07-20	4 / 115	0.05 - 25	0.37	--	2 MCL	--	--	N	BSL
72548	4,4'-DDD	0.0085	J	0.14	J	ug/L	UAW07-20	14 / 147	0.05 - 25	0.14	--	0.28 C PRG	--	--	N	BSL
72559	4,4'-DDE	0.016	J	0.3		ug/L	UAW12-20	8 / 147	0.05 - 25	0.3	--	0.2 C PRG	--	--	Y	ASL
50293	4,4'-DDT	0.016	J	0.036	J	ug/L	UAW12-20	3 / 147	0.05 - 25	0.036	--	0.2 C PRG	--	--	N	BSL

TABLE 1.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER

Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater, Ambient and Indoor Air
Exposure Point:	On- and Off-Site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Pesticides and PCBs (cont.)															
60571	Dieldrin	0.022	J	2.7		ug/L	UAW13-20	13 / 147	0.05 - 25	2.7	--	0.0042 C PRG	--	--	Y	ASL
959988	Endosulfan I	0.015	J	0.19	J	ug/L	UAW07-20	6 / 147	0.05 - 25	0.19	--	220 N PRG	--	--	N	BSL
33213659	Endosulfan II	0.02	J	0.27		ug/L	MW-EPA-1	18 / 147	0.05 - 25	0.27	--	220 N PRG	--	--	N	BSL
72208	Endrin	0.014	J	0.15		ug/L	UAW04-20	7 / 147	0.05 - 25	0.15	--	2 MCL	--	--	N	BSL
7421934	Endrin aldehyde	0.033	J	0.51		ug/L	UAW11-10	13 / 147	0.05 - 25	0.51	--	2 MCL	--	--	N	BSL
53494705	Endrin ketone	0.032	J	0.14	PG	ug/L	UAW03-20	4 / 139	0.05 - 25	0.14	--	2 MCL	--	--	N	BSL
76448	Heptachlor	0.0092	J	6		ug/L	UAW13-20	14 / 147	0.05 - 25	6	--	0.4 MCL	--	--	Y	ASL
102473	Heptachlor epoxide	0.018	J	0.91	PG	ug/L	UAW13-20	14 / 147	0.05 - 25	0.91	--	0.2 MCL	--	--	Y	ASL
465736	Isodrin	0.017	J	0.017	J	ug/L	UAW12-20	1 / 33	0.1 - 10	0.017	--	0.004 C PRG	--	--	N	IFD
72435	Methoxychlor	0.022	J	0.47	J	ug/L	UAW07-20	4 / 123	0.1 - 50	0.47	--	180 N PRG	--	--	N	BSL
	Inorganics															
7429905	Aluminum	35	B J	39300	J	ug/L	MW-EPA-2	121 / 186	200 - 200	39300	--	50 to 200 MCL	--	--	Y	ASL
7440360	Antimony	2.5	B	1060		ug/L	UAW11-10	27 / 194	10 - 10	1060	--	6 MCL	--	--	Y	ASL
7440382	Arsenic	2.6	B	611		ug/L	MW-EPA-1	124 / 194	10 - 10	611	--	10 MCL	--	--	Y	ASL
74400393	Barium	9.1	B	798		ug/L	UAW04-20	194 / 194	200 - 200	798	--	2,000 MCL	--	--	N	BSL
7440417	Beryllium	0.32	B	1.9	B	ug/L	MW-EPA-2	36 / 194	5 - 5	1.9	--	4 MCL	--	--	N	BSL
7440439	Cadmium	0.28	B	21.7		ug/L	UAW08-20	67 / 194	2 - 2	21.7	--	5 MCL	--	--	Y	ASL
7440702	Calcium	23600	J	1040000	J	ug/L	UAW08-20	191 / 191	5000 - 50000	1040000	--	N/A N/A	--	--	N	NUT
	Calcium-DISS	72200		935000	J	ug/L	UAW08-20	53 / 53	5000 - 50000	935000					N	NUT
16065831	Chromium	1.5	B	7230		ug/L	UAW21-30	161 / 194	5 - 5	7230	--	100 MCL	--	--	Y	ASL
744484	Cobalt	1.1	B	91.4		ug/L	UAW21-30	118 / 194	7 - 7	91.4	--	730 N PRG	--	--	N	BSL
7440508	Copper	1.8	B	4640		ug/L	Recovery Well	102 / 195	25 - 25	4640	--	1300 MCL	--	--	Y	ASL
74908	Cyanide, total	1.8	B	8.5	B	ug/L	UAW13-20	21 / 146	10 - 10	8.5	--	200 MCL	--	--	N	BSL
18540299	Hexavalent Chromium	0		0		ug/L		0 / 7	20 - 20	0		100 MCL			N	ND
7439896	Iron	55.5	B	95500		ug/L	UAW08-20	187 / 191	100 - 100	95500	--	300 MCL	--	--	Y	ASL
	Iron-DISS	109		34500		ug/L	UAW11-10	31 / 53	100 - 100	34500						
7439821	Lead	2	B	405		ug/L	Recovery Well	26 / 195	3 - 3	405	--	15 MCL	--	--	Y	ASL
7439954	Magnesium	6820	J	289000	J	ug/L	UAW08-20	191 / 191	5000 - 5000	289000	--	N/A N/A	--	--	N	NUT

TABLE 1.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER

Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater, Ambient and Indoor Air
Exposure Point:	On- and Off-Site

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Inorganic (cont.)															
	Magnesium-DISS	13800		203000		ug/L	UAW08-20	53 / 53	5000 - 5000	203000					N	NUT
7439965	Manganese	1.1	B J	13000	J	ug/L	UAW22-20	186 / 186	15 - 15	13000	--	50 MCL	--	--	Y	ASL
7439976	Mercury	0.047	B	0.3		ug/L	UAW03-20	13 / 194	0.2 - 0.21	0.3	--	2 MCL	--	--	N	BSL
7440020	Nickel	1.8	B	1950		ug/L	UAW21-30	187 / 194	40 - 40	1950	--	730 N PRG	--	--	Y	ASL
7440097	Potassium	1080	B J	29800	J	ug/L	UAW11-10	190 / 191	5000 - 5000	29800	--	N/A N/A	--	--	N	NUT
	Potassium-DISS	1300	B	26800	J	ug/L	UAW23-20	53 / 53	5000 - 5000	26800	--		--	--	N	NUT
7722492	Selenium	2.4	B	20.2		ug/L	UAW23-20	20 / 194	5 - 5	20.2	--	50 MCL	--	--	N	BSL
7440224	Silver	1.2	B	1.3	B	ug/L	UAW16-10/UAW14-10	3 / 170	5 - 5	1.3	--	180 N PRG	--	--	N	BSL
7440235	Sodium	17900		2230000		ug/L	UAW11-10	191 / 191	5000 - 50000	2230000	--	N/A N/A	--	--	N	NUT
	Sodium-DISS	31700		1610000	J	ug/L	UAW18-20	53 / 53	5000 - 50000	1610000					N	NUT
7446186	Thallium	4.6	B J	16.6	J	ug/L	UAW13-20	79 / 194	10 - 10	16.6	--	2 MCL	--	--	Y	ASL
7440315	Tin	4.7	B	11100		ug/L	UAW06-20	118 / 152	100 - 500	11100	--	22,000 N PRG	--	--	N	BSL
7440622	Vanadium	0.8	B	148		ug/L	UAW03-20	133 / 194	7 - 7	148	--	36 N PRG	--	--	Y	ASL
7440666	Zinc	6.9	B J	1100	J	ug/L	Recovery Well	81 / 195	20 - 20	1100	--	5,000 MCL	--	--	N	BSL

(1) Minimum/maximum detected concentration.

(2) Maximum value used for screening concentration.

(3) "--" - background values are not used for COPC screenings.

(4) Screening toxicity value - Maximum Contaminant Limit (MCL) (U.S. EPA 2003), or if not available, the Region 9 Preliminary Remediation Go
(PRG) for tap water (U.S. EPA, 2004b). Additional notation indicates cancer (C) or non-cancer (N).
Screening criteria were not available for some compounds (N/A). Based on similarities in chemical and physical structure and toxicity, the following surrogate screening criteria were used:
delta-BHC = Alpha-BHC; alpha chlordane = chlordane; endosulfan I and II = endosulfan; endrin aldehyde and endrin ketone = endrin; and isodrin = aldrin

(5) Rationale Codes Selection Reason: Above Screening Levels (ASL); Toxicity Information Available (TX)
Deletion Reason: Infrequent Detection (IFD); Below Screening Level (BSL); Essential Nutrient (NUT); Not detected (ND)

Shaded - COPCs identified

Definitions:

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
B = Method Blank Contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated Value

C = Carcinogenic
N = Non-Carcinogenic

TABLE 1.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SURFACE WATER
Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface Water, Ambient air, Biota
Exposure Medium:	Surface Water, Ambient air, Biota
Exposure Point:	Off-Site, Creek

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value			Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Volatile Organic Compounds																	
67641	Acetone	1.2	J	6.3	J	ug/L	WS-1A	4 / 6	10 - 10	6.3	--	5500	N	PRG	--	--	N	BSL
67663	Chloroform	0.23	J	0.26	J	ug/L	WS-6A+DUP	3 / 6	1 - 1	0.26	--	80		MCL	--	--	N	BSL
75274	Dibromochloromethane	0.82	J	0.86	J	ug/L	WS-3A	2 / 6	1 - 1	0.86	--	0.13	C	PRG	--	--	Y	ASL
156592	cis-1,2-Dichloroethene	0.26	J	0.26	J	ug/L	WS-5A	1 / 6	0.5 - 0.5	0.26	--	70		MCL	--	--	N	BSL
71556	1,1,1-Trichloroethane	0.19	J	0.4	J	ug/L	WS-6A+DUP	6 / 6	0 - 0	0.4	--	200		MCL	--	--	N	BSL
79016	Trichloroethene	0.24	J	0.33	J	ug/L	WS-2A	5 / 6	1 - 1	0.33	--	5		MCL	--	--	N	BSL
	Semi-Volatile Organic Compounds																	
123911	1,4-Dioxane	1.1	J	1.1	J	ug/L	WS-4A	1 / 6	10 - 10	1.1	--	6.1	C	PRG	--	--	N	BSL
117817	bis(2-Ethylhexyl) phthalate	0.55	J	1.4	J	ug/L	WS-3A	5 / 6	10 - 10	1.4	--	4.8	C	PRG	--	--	N	BSL
	Inorganics																	
7440382	Arsenic-DISS	3.6	B	3.6	B	ug/L	WS-6A+DUP	1 / 3	10 - 10	3.6	--	10		MCL	--	--	N	BSL
74400393	Barium	57.2	BJ	61.8	BJ	ug/L	WS-4A	3 / 3	0 - 0	61.8	--	2,000		MCL	--	--	N	BSL
74400393	Barium-DISS	54.6	BJ	56.6	BJ	ug/L	WS-1A	3 / 3	0 - 0	56.6	--	2,000		MCL	--	--	N	BSL
7440417	Beryllium	0.66	BJ	0.7	BJ	ug/L	WS-2A	3 / 3	0 - 0	0.7	--	4		MCL	--	--	N	BSL
7440417	Beryllium-DISS	0.74	BJ	0.78	BJ	ug/L	WS-1A	3 / 3	0 - 0	0.78	--	4		MCL	--	--	N	BSL
744484	Cobalt-DISS	1.1	B	1.2	B	ug/L	WS-6A+DUP	2 / 3	7 - 7	1.2	--	730	N	PRG	--	--	N	BSL
7440508	Copper	5.4	BJ	6.3	BJ	ug/L	WS-2A	3 / 3	0 - 0	6.3	--	1000			--	--	N	BSL
7440508	Copper-DISS	6.5	BJ	6.7	BJ	ug/L	WS-1A	3 / 3	0 - 0	6.7	--	1000		MCL	--	--	N	BSL
7440224	Mercury	0.077	BJ	0.094	BJ	ug/L	WS-2A	3 / 3	0 - 0	0.094	--	2		MCL	--	--	N	BSL
7440224	Mercury-DISS	0.04	BJ	0.064	BJ	ug/L	WS-5A	2 / 3	0.2 - 0.2	0.064	--	2		MCL	--	--	N	BSL
7440280	Thallium-DISS	6.8	B	6.8	B	ug/L	WS-6A+DUP	1 / 3	10 - 10	6.8	--	2.4	N	PRG	--	--	Y	ASL
7440666	Zinc	14.5	B	17.4	B	ug/L	WS-4A	3 / 3	0 - 0	17.4	--	5,000		MCL	--	--	N	BSL
7440666	Zinc-DISS	16	B	23.1		ug/L	WS-6A+DUP	3 / 3	0 - 0	23.1	--	5,000		MCL	--	--	N	BSL

(1) Minimum/maximum detected concentration.

(2) Maximum value used for screening concentration.

(3) "--" - background values are not used for COPC screenings.

(4) Screening toxicity value - Maximum Contaminant Limit (MCL) (U.S. EPA 2003), or if not available, the Region 9 Preliminary Remediation Goal (PRG) for tap water (U.S. EPA, 2004b). Additional notation indicates cancer (C) or non-cancer (N).

(5) Rationale Codes Selection Reason: Above Screening Levels (ASL); Frequent Detection (FD); Toxicity Information Available (TX); Deletion Reason: Infrequent Detection (IFD); Below Screening Level (BSL); Essential Nutrient (NUT)

Shaded - COPCs identified

Definitions: N/A = Not Applicable; SQL = Sample Quantitation Limit; COPC = Chemical of Potential Concern; ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered; MCL = Federal Maximum Contaminant Level; B = Method Blank Contamination. The associated method blank contains the target analyte at a reportable level.; J = Estimated Value; C = Carcinogenic; N = Non-Carcinogenic

TABLE 1.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SEDIMENT

Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Sediment
Exposure Medium:	Sediment, Biota
Exposure Point:	Off-site, Creek

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Volatile Organic Compounds																
67641	Acetone	0.0029	J	0.018	J	mg/kg	SS-4	9 / 29	0.019 - 0.031	0.018	--	16	WQ			N	BSL
78933	2-Butanone	0.0027	J	0.0035	J	mg/kg	CS-3A	2 / 7	0.022 - 22	0.0035		22000	N			N	BSL
71432	Benzene	0.0036	J	0.0036	J	mg/kg	SS-1	1 / 29	0.0048 - 0.0079	0.0036	--	0.03	WQ			N	BSL
75150	Carbon disulfide	0.0072		0.0072		mg/kg	SS-4	1 / 29	0.0048 - 0.0079	0.0072	--	32	WQ			N	BSL
108907	Chlorobenzene	0.0011	J	0.018		mg/kg	SS-1	6 / 29	0.0048 - 0.0079	0.018	--	1	WQ			N	BSL
95501	1,2-Dichlorobenzene	0.13	J	0.2	J	mg/kg	SS-5 ~25' South+DUP	4 / 29	0.36 - 1.9	0.20	--	17	WQ			N	BSL
100414	Ethylbenzene	0.00077	J	0.00077	J	mg/kg	SS-1	1 / 29	0.005 - 0.0079	0.00077	--	13	WQ			N	BSL
108872	Methylcyclohexane	0.00081	J	0.0011	J	mg/kg	SS-5 ~25' South+DUP	2 / 22	0.01 - 0.013	0.0011	--	2600	N			N	BSL
75092	Methylene chloride	0.0037	JB	0.0052	JB	mg/kg	CS-4A	3 / 29	0.005 - 0.0079	0.0052		0.02	WQ			N	BSL
1330207	Xylenes (total)	0.002	J	0.002	J	mg/kg	SS-1	1 / 29	0.01 - 0.014	0.002	--	210	WQ			N	BSL
	Semi-Volatile Organic Compounds																
83329	Acenaphthene	0.25	J	0.25	J	mg/kg	CS-2A	1 / 7	0.36 - 0.47	0.25	--	570	WQ			N	BSL
208968	Acenaphthylene	0.3	J	0.3	J	mg/kg	CS-2A	1 / 7	0.36 - 0.47	0.3	--	570	WQ			N	BSL
120127	Anthracene	0.033	J	1.3	J	mg/kg	CS-2A	5 / 7	0.36 - 0.39	1.3	--	12000	WQ			N	BSL
56553	Benzo(a)anthracene	0.087	J	1.4	J	mg/kg	CS-2A	5 / 7	0.36 - 0.39	1.4	--	0.62	C			Y	ASL
50328	Benzo(a)pyrene	0.1	J	1.2	J	mg/kg	CS-2A	5 / 7	0.36 - 0.39	1.2	--	0.062	C			Y	ASL
205992	Benzo(b)fluoranthene	0.027	J	1.3	J	mg/kg	CS-2A	7 / 7	0 - 0	1.3	--	0.62	C			Y	ASL
191242	Benzo(ghi)perylene	0.067	J	0.63		mg/kg	SS-12	5 / 7	0.36 - 0.39	0.63	--	2300	N			N	BSL
207089	Benzo(k)fluoranthene	0.054	J	0.62	J	mg/kg	CS-2A	5 / 7	0.36 - 0.39	0.62	--	6.2	C			N	BSL
117817	bis(2-Ethylhexyl)phthalate	0.03	J	0.13		mg/kg	SS-12	5 / 7	0.36 - 1.9	0.13	--	35	C			N	BSL
218019	Chrysene	0.16	J	1.7	J	mg/kg	CS-2A	5 / 7	0.36 - 0.39	1.7	--	62	C			N	BSL
53703	Dibenz(a,h)anthracene	0.031	J	0.19	J	mg/kg	CS-2A	3 / 7	0.36 - 0.42	0.19	--	0.062	C			Y	ASL
132649	Dibenzofuran	0.47	J	0.47	J	mg/kg	CS-2A	1 / 7	0.36 - 0.47	0.47	--	150	N			N	BSL
84662	Diethyl phthalate	0.04	J	0.04	J	mg/kg	CS-3A	1 / 7	0.19 - 0.47	0.04	--	49000	N			N	BSL
117840	Di-n-octyl phthalate	0.022	J	0.022	J	mg/kg	CS-3A	1 / 7	0.36 - 1.9	0.022	--	2400	N			N	BSL
206440	Fluoranthene	0.027	J	4.6		mg/kg	CS-2A	7 / 7	0 - 0	4.6	--	2300	N			N	BSL
86737	Fluorene	0.9	J	0.9	J	mg/kg	CS-2A	1 / 7	0.36 - 0.47	0.9	--	560	WQ			N	BSL
193395	Indeno(1,2,3-cd)pyrene	0.06	J	0.58		mg/kg	SS-12	5 / 7	0.36 - 0.39	0.58	--	0.62	C			N	BSL

TABLE 1.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SEDIMENT
Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Sediment
Exposure Medium:	Sediment, Biota
Exposure Point:	Off-site, Creek

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Semi-Volatile Organic Compounds (cont.)																
91576	2-Methylnaphthalene	0.25	J	0.25	J	mg/kg	CS-2A	1 / 7	0.36 - 0.47	0.25	--	56	N			N	BSL
108394	3-Methylphenol	0.24	J#	0.24	J#	mg/kg	CS-3A	1 / 7	0.36 - 1.9	0.24	--	3100	N			N	BSL
106445	4-Methylphenol	0.24	J#	0.24	J#	mg/kg	CS-3A	1 / 29	0.36 - 1.9	0.24	--	310	N			N	BSL
91203	Naphthalene	0.7	J	0.7	J	mg/kg	CS-2A	1 / 7	0.36 - 0.47	0.7	--	56	N			N	BSL
85018	Phenanthrene	0.2	J	4.8		mg/kg	CS-2A	5 / 7	0.36 - 0.39	4.8	--	12000	WQ			N	BSL
129000	Pyrene	0.021	J	3.1		mg/kg	CS-2A	7 / 8	0.4 - 0.4	3.1	--	2300	N			N	BSL
	Pesticides and PCBs																
309002	Aldrin	0.001	J	0.001	J	mg/kg	Creek Sed.-1	1 / 29	0.002 - 0.11	0.001	--	0.029	C			N	BSL
319857	beta-BHC	0.0046		0.094	PG	mg/kg	SS-4	4 / 29	0.002 - 0.11	0.094	--	0.003	WQ			Y	ASL
72559	4,4'-DDE	0.00091	J	0.023	PG	mg/kg	SS-12	7 / 29	0.002 - 0.11	0.023	--	1.7	C			N	BSL
50293	4,4'-DDT	0.004		0.0056		mg/kg	Creek Sed.-1	2 / 29	0.002 - 0.11	0.0056	--	1.7	C			N	BSL
60571	Dieldrin	0.002	J	0.024		mg/kg	CS-6A+DUP	4 / 29	0.002 - 0.11	0.024	--	0.004	WQ			Y	ASL
5.3E+07	Endrin ketone	0.0014	J	0.0014	J	mg/kg	Creek Sed.-2	1 / 22	0.002 - 0.022	0.0014	--	1	WQ			N	BSL
72435	Mythoxychlor	0.0034	J	0.0056	J	mg/kg	CS-6A+DUP	3 / 8	0.007 - 0.21	0.0056	--	160	WQ			N	BSL
510156	Chlorobenzilate	0.0087	J	0.024	J	mg/kg	CS-6A+DUP	2 / 7	0.037 - 0.21	0.024	--	1.8	C			N	BSL
2303164	Diallate	0.029	J	0.032	J	mg/kg	CS-1A	2 / 7	0.072 - 2.1	0.032	--	8	C			N	BSL
1.3E+07	Aroclor 1248	0.015	J	0.07		mg/kg	CS-1A	4 / 7	0.038 - 0.047	0.07	--	0.22	C			N	BSL
1.1E+07	Aroclor 1254	0.1		0.1		mg/kg	CS-3A	1 / 7	0.036 - 0.47	0.1	--	0.22	C			N	BSL
	Inorganics																
7429905	Aluminum	1690		9330		mg/kg	SS-4	22 / 22	0 - 0	9330	--	76000	N			N	BSL
7440382	Arsenic	2.8		6.3		mg/kg	SS-12	29 / 29	0 - 0	6.3	--	0.39	C			Y	ASL
7.4E+07	Barium	8.9		76.9		mg/kg	SS-4	29 / 29	0 - 0	76.9	--	1600	WQ			N	BSL
7440417	Beryllium	0.069	J	0.46		mg/kg	SS-4	29 / 29	0 - 0	0.46	--	63	WQ			N	BSL
7440439	Cadmium	0.11	J	0.54		mg/kg	SS-12	29 / 29	0 - 0	0.54	--	8	WQ			N	BSL
7440702	Calcium	18800		178000		mg/kg	Creek Sed.-4	22 / 22	0 - 0	178000	--	N/A				N	NUT
1.6E+07	Chromium	4	J	22.9		mg/kg	SS-12	29 / 29	0 - 0	22.9	--	38	WQ			N	BSL

TABLE 1.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SEDIMENT
Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Sediment
Exposure Medium:	Sediment, Biota
Exposure Point:	Off-site, Creek

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	(2) Concentration Used for Screening	(3) Background Value	(4) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(5) Rationale for Contaminant Deletion or Selection
	Inorganics (cont.)																
744484	Cobalt	2.4	J	7.8		mg/kg	SS-12	29 / 29	0 - 0	7.8	--	900	C	--	--	N	BSL
7440508	Copper	4.2		26		mg/kg	SS-12	29 / 29	0 - 0	26	--	3100	N	--	--	N	BSL
7439896	Iron	6220		17400		mg/kg	SS-4	22 / 22	0 - 0	17400	--	23000	N	--	--	N	BSL
7439821	Lead	4		38.3		mg/kg	SS-12	29 / 29	0 - 0	38.3	--	400	N	--	--	N	BSL
7439954	Magnesium	5450		64400		mg/kg	Creek Sed.-3	22 / 22	0 - 0	64400	--	N/A		--	--	N	NUT
7439965	Manganese	245		670		mg/kg	Creek Sed.-5	22 / 22	0 - 0	670	--	1800	N	--	--	N	BSL
7440224	Mercury	0.01	J	0.095	J	mg/kg	SS-12	23 / 29	0.1 - 0.13	0.095	--	23	N	--	--	N	BSL
7440020	Nickel	4.7		22		mg/kg	SS-12	29 / 29	0 - 0	22	--	130	WQ	--	--	N	BSL
7440097	Potassium	228		1230		mg/kg	SS-2	22 / 22	0 - 0	1230	--	N/A		--	--	N	NUT
7722492	Selenium	0.39	J	0.48	J	mg/kg	SS-6	2 / 29	0.55 - 0.71	0.48	--	5	WQ	--	--	N	BSL
7440224	Silver	0.2	B	0.2	B	mg/kg	CS-4A	1 / 7	0.55 - 0.63	0.2	--	34	WQ	--	--	N	BSL
7440235	Sodium	124	J	360		mg/kg	SS-12	22 / 22	0 - 0	360	--	N/A		--	--	N	NUT
7446186	Thallium	0.57	B	2.2		mg/kg	Creek Sed. -8	13 / 29	1.1 - 1.3	2.2	--	5.2	N	--	--	N	BSL
7440315	Tin	2.7	BJ	76.3	J	mg/kg	SS-2	29 / 29	0 - 0	76.3	--	47000	N	--	--	N	BSL
7440622	Vanadium	5.9	B	17		mg/kg	SS-4	29 / 29	0 - 0	17	--	78	N	--	--	N	BSL
7440666	Zinc	16.4		101		mg/kg	SS-12	29 / 29	0 - 0	101	--	12000	WQ	--	--	N	BSL

(1) Minimum/maximum detected concentration.

(2) Maximum value used for screening concentration.

(3) "--" - background is not used for COPC screening.

(4) Screening toxicity value - Lowest value reported between the soil screening levels for groundwater protection and the the Region 9 Preliminary Remedial Remediation Goal (PRG) Industrial Screening Level (US EPA, 2004b). Additional notation indicates cancer (C) or non-cancer (N) or protection of water quality (WQ) endpoint). Screening criteria were not available for some compounds (N/A). Based on similarities in chemical and physical structure and to the following surrogate screening criteria were used:
iodomethane = methylbromide; acenaphthylene = acenaphthene; benzo(ghi)perylene = fluoranthene; 2-methylnaphthalene = naphthalene; phenanthrene = anthracene; endrin ketone = endrin.

(5) Rationale Codes Selection Reason: Above Screening Levels (ASL); Toxicity Information Available (TX)
Deletion Reason: Infrequent Detection (IFD); Below Screening Level (BSL); Essential Nutrient (NUT); Not detected (ND)

Shaded - COPCs identified.

Definitions: N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Consider
MCL = Federal Maximum Contaminant Level
B = Method Blank Contamination. The associated method blank contains the target at a reportable level. For metals, B = estimated values.
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

TABLE 2
SELECTION OF EXPOSURE PATHWAYS
Rohm and Haas Chemicals LLC
Reading, Ohio

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/ Future	Soil	Soil	On-site Soil	On-site Outdoor Worker	Adult	Dermal Contact	On-site	Quant.	Industrial operations are present and will continue.
						Incidental Ingestion	On-site	Quant.	Industrial operations are present and will continue.
			On-site Soil	Construction Worker	Adult	Dermal Contact	On-site	Quant.	Industrial operations are present and will continue.
						Incidental Ingestion	On-site	Quant.	Industrial operations are present and will continue.
		Ambient Air	Fugitive Dust and Volatile COPCs from on-site soil	On-site Outdoor Worker	Adult	Inhalation	On-site	Quant.	Industrial operations are present and will continue.
				Construction Worker	Adult	Inhalation	On-site	Quant.	Industrial operations are present and will continue.
				Off-site Resident	Adult & Child	Inhalation	Off-site	Qual.	Off-site concentrations much less than on-site.
				Recreational Creek User	Adult & Child	Inhalation	Off-site	Qual.	Off-site concentrations much less than on-site.
		Indoor Air	Volatile COPCs from on-site soil	On-site Indoor Worker	Adult	Inhalation	On-site	Quant.	Industrial operations are present and will continue.
		Soil	Off-site Soil	Recreational User	Child (6-13)	Dermal Contact	Off-site	Quant.	Recreational users at the baseball fields adjacent to the site may expose to off-site soil.
						Incidental Ingestion	Off-site	Quant.	Recreational users at the baseball fields adjacent to the site may expose to off-site soil.
				Recreational User	Child (13-17)	Dermal Contact	Off-site	Quant.	Recreational users at the baseball fields adjacent to the site may expose to off-site soil.
						Incidental Ingestion	Off-site	Quant.	Recreational users at the baseball fields adjacent to the site may expose to off-site soil.
		Ambient Air	Fugitive Dust and Volatile COPCs from off-site soil	Recreational User	Child (6-13)	Inhalation	Off-site	Quant.	Recreational users at the baseball fields adjacent to the site may expose to off-site soil.
				Recreational User	Child (13-17)	Inhalation	Off-site	Quant.	Recreational users at the baseball fields adjacent to the site may expose to off-site soil.
	Groundwater	Groundwater	On-site Groundwater	Construction Worker	Adult	Dermal Contact	On-site	Quant.	Industrial operations are present and will continue.
		Ambient Air	Volatile COPCs from groundwater may be dispersed on and off site.	On-site Outdoor Worker	Adult	Inhalation	On-site	Quant.	Industrial operations are present and will continue.
				Construction Worker	Adult	Inhalation	On-site	Quant.	Industrial operations are present and will continue.
				Off-site Resident	Adult & Child	Inhalation	Off-site	Qual.	Off-site concentrations much less than on-site.
				Recreational Creek User	Adult & Child	Inhalation	Off-site	Qual.	Off-site concentrations much less than on-site.
		Indoor Air	Volatile COPCs from on-site groundwater	On-site Indoor Worker	Adult	Inhalation	On-site	Quant.	Industrial operations are present and will continue.
		Surface Water	Creek	Recreational Creek User	Adult & Child	Incidental Ingestion	Off-site	Quant.	Creek may be used for recreational purposes.
						Dermal Contact	Off-site	Quant.	Creek may be used for recreational purposes.
		Sediment	Creek	Recreational Creek User	Adult & Child	Ingestion	Off-site	Quant.	Recreational users may incidentally ingest sediment since the creek is relatively shallow (less than 5
						Dermal Contact	Off-site	Quant.	Recreational users may contact sediment since the creek is relatively shallow (less than 5 feet).

TABLE 2

SELECTION OF EXPOSURE PATHWAYS

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future (cont.)	Surface Water	Biota	COPCs may be transferred to fish tissue from Creek	Recreational Creek User	Adult & Child	Ingestion	Off-site	Quant.	Insignificant exposure pathway because the impacts from the site to surface water are minor. However, the pathway was quantitatively evaluated for an adult recreational fisherman scenario for informational purposes.
		Ambient Air	Volatile COPCs may be dispersed on and off site.	On-site Outdoor Worker	Adult	Inhalation	On-site	None	Insignificant exposure pathway because only one volatile COPC was detected at low concentration in surface water.
				Construction Worker	Adult	Inhalation	On-site	None	Insignificant exposure pathway because only one volatile COPC was detected at low concentration in surface water.
				Off-site Resident	Adult & Child	Inhalation	Off-site	None	Insignificant exposure pathway because only one volatile COPC was detected at low concentration in surface water.
				Recreational Creek User	Adult & Child	Inhalation	Off-site	None	Insignificant exposure pathway because only one volatile COPC was detected at low concentration in surface water.
	Sediment	Biota	COPCs may be transferred to fish tissue from Creek	Recreational Creek User	Adult & Child	Ingestion	Off-site	Quant.	A fish consumption advisory is enforced by Ohio EPA for the Mill Creek. However, the pathway was quantitatively evaluated for an adult recreational fisherman scenario for informational purposes.

TABLE 3.1

EXPOSURE POINT CONCENTRATION SUMMARY

SOIL

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
On-site Soil	1,2-Dichlorobenzene	mg/kg	-	-	3.65E-01	3.65E-01	mg/kg	max.	Samples are limited
(<2 feet)	1,4-Dichlorobenzene	mg/kg	-	-	3.65E-01	3.65E-01	mg/kg	max.	Samples are limited
	Acetone	mg/kg	-	-	1.50E+01	1.50E+01	mg/kg	max.	Samples are limited
	Benzene	mg/kg	-	-	1.70E-03	1.70E-03	mg/kg	max.	Samples are limited
	Chlorobenzene	mg/kg	-	-	9.20E-03	9.20E-03	mg/kg	max.	Samples are limited
	Methylene chloride	mg/kg	-	-	1.80E-03	1.80E-03	mg/kg	max.	Samples are limited
	Toluene	mg/kg	-	-	5.60E-04	5.60E-04	mg/kg	max.	Samples are limited
	Benzo(a)anthracene	mg/kg	-	-	5.40E+00	5.40E+00	mg/kg	max.	Samples are limited
	Benzo(a)pyrene	mg/kg	-	-	6.20E+00	6.20E+00	mg/kg	max.	Samples are limited
	Benzo(b)fluoranthene	mg/kg	-	-	7.00E+00	7.00E+00	mg/kg	max.	Samples are limited
	Aroclor 1254	mg/kg	-	-	9.80E-01	9.80E-01	mg/kg	max.	Samples are limited
	bis(2-Ethylhexyl) phthalate	mg/kg	-	-	4.60E-01	4.60E-01	mg/kg	max.	Samples are limited
	Endrin	mg/kg	-	-	2.10E-03	2.10E-03	mg/kg	max.	Samples are limited
	Antimony	mg/kg	-	-	6.00E-01	6.00E-01	mg/kg	max.	Samples are limited
	Arsenic	mg/kg	-	-	1.62E+01	1.62E+01	mg/kg	max.	Samples are limited
	Chromium	mg/kg	-	-	2.17E+02	2.17E+02	mg/kg	max.	Samples are limited

(1) 95% UCL was not calculated because samples are limited from the 0-2' bgs depth.

(2) max. - maximum detected value

TABLE 3.1

EXPOSURE POINT CONCENTRATION SUMMARY

SOIL

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
On-Site Soil	1,2-Dichlorobenzene	mg/kg	2.74E+01	1.82E+02	2.80E+03	1.82E+02	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	Representative data
(<15 feet)	1,4-Dichlorobenzene	mg/kg	4.00E+00	1.48E+01	1.70E+02	1.48E+01	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	Representative data
	Acetone	mg/kg	2.30E+00	1.16E+01	2.30E+01	1.16E+01	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Benzene	mg/kg	4.26E-01	2.58E+00	9.30E-01	9.30E-01	mg/kg	max.	95% UCL > max.
	Chlorobenzene	mg/kg	7.89E-01	4.65E+00	4.20E+01	4.65E+00	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Methylene chloride	mg/kg	5.85E-01	3.03E+00	1.10E+01	3.03E+00	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Toluene	mg/kg	7.09E+00	3.69E+01	2.40E+02	3.69E+01	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Benzo(a)anthracene	mg/kg	2.75E+00	8.44E+00	5.40E+00	5.40E+00	mg/kg	max.	95% UCL > max.
	Benzo(a)pyrene	mg/kg	2.76E+00	8.45E+00	6.20E+00	6.20E+00	mg/kg	max.	95% UCL > max.
	Benzo(b)fluoranthene	mg/kg	2.77E+00	8.46E+00	7.00E+00	7.00E+00	mg/kg	max.	95% UCL > max.
	Aroclor 1254	mg/kg	1.10E+00	4.19E+00	9.80E-01	9.80E-01	mg/kg	max.	95% UCL > max.
	bis(2-Ethylhexyl) phthalate	mg/kg	4.11E+00	1.41E+01	1.50E+02	1.41E+01	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	Representative data
	Endrin	mg/kg	8.21E-02	3.95E-01	3.10E+00	3.95E-01	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Antimony	mg/kg	6.62E-01	7.79E-01	8.90E+00	7.79E-01	mg/kg	Student's-t UCL	Representative data
	Arsenic	mg/kg	5.48E+00	5.96E+00	1.62E+01	5.96E+00	mg/kg	Student's-t UCL	Representative data
	Chromium	mg/kg	1.80E+01	3.36E+01	3.88E+02	3.36E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	Representative data

(1) ProUCL recommended UCL level.

(2) ProUCL recommended UCL distribution.

TABLE 3.2

EXPOSURE POINT CONCENTRATION SUMMARY

GROUNDWATER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
On-site Groundwater	Acetone	ug/l	-	-	4.50E+04	4.50E+04	ug/l	max.	Conservative assumption
	Benzene	ug/l	-	-	1.50E+02	1.50E+02	ug/l	max.	Conservative assumption
	Chlorobenzene	ug/l	-	-	4.50E+03	4.50E+03	ug/l	max.	Conservative assumption
	Chloroform	ug/l	-	-	1.90E+02	1.90E+02	ug/l	max.	Conservative assumption
	Methylene chloride	ug/l	-	-	2.80E+02	2.80E+02	ug/l	max.	Conservative assumption
	Tetrachloroethene	ug/l	-	-	8.20E+01	8.20E+01	ug/l	max.	Conservative assumption
	Toluene	ug/l	-	-	2.40E+04	2.40E+04	ug/l	max.	Conservative assumption
	Trichloroethene	ug/l	-	-	8.80E+00	8.80E+00	ug/l	max.	Conservative assumption
	Vinyl chloride	ug/l	-	-	1.50E+01	1.50E+01	ug/l	max.	Conservative assumption
	1,2-Dichlorobenzene	ug/l	-	-	1.90E+03	1.90E+03	ug/l	max.	Conservative assumption
	1,4-Dichlorobenzene	ug/l	-	-	3.30E+02	3.30E+02	ug/l	max.	Conservative assumption
	1,2-Dichloroethane	ug/l	-	-	6.60E+02	6.60E+02	ug/l	max.	Conservative assumption
	4-Methylphenol	ug/l	-	-	3.30E+02	3.30E+02	ug/l	max.	Conservative assumption
	Aniline	ug/l	-	-	1.20E+04	1.20E+04	ug/l	max.	Conservative assumption
	bis(2Ethylhexyl) phthalate	ug/l	-	-	3.40E+01	3.40E+01	ug/l	max.	Conservative assumption
	beta-BHC	ug/l	-	-	1.20E+01	1.20E+01	ug/l	max.	Conservative assumption
	delta-BHC	ug/l	-	-	1.00E+00	1.00E+00	ug/l	max.	Conservative assumption
	gamma-BHC	ug/l	-	-	4.70E-01	4.70E-01	ug/l	max.	Conservative assumption
	4,4-DDE	ug/l	-	-	3.00E-01	3.00E-01	ug/l	max.	Conservative assumption
	Dieldrin	ug/l	-	-	2.70E+00	2.70E+00	ug/l	max.	Conservative assumption
	Heptachlor	ug/l	-	-	6.00E+00	6.00E+00	ug/l	max.	Conservative assumption
	Heptachlor epoxide	ug/l	-	-	9.10E-01	9.10E-01	ug/l	max.	Conservative assumption
	Aluminum	ug/l	-	-	3.93E+04	3.93E+04	ug/l	max.	Conservative assumption
	Antimony	ug/l	-	-	1.06E+03	1.06E+03	ug/l	max.	Conservative assumption

TABLE 3.2

EXPOSURE POINT CONCENTRATION SUMMARY

GROUNDWATER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
On-site Groundwater	Arsenic	ug/l	-	-	6.11E+02	6.11E+02	ug/l	max.	Conservative assumption
(cont.)	Cadmium	ug/l	-	-	2.17E+01	2.17E+01	ug/l	max.	Conservative assumption
	Chromium	ug/l	-	-	7.23E+03	7.23E+03	ug/l	max.	Conservative assumption
	Copper	ug/l	-	-	4.64E+03	4.64E+03	ug/l	max.	Conservative assumption
	Iron	ug/l	-	-	9.55E+04	9.55E+04	ug/l	max.	Conservative assumption
	Lead	ug/l	-	-	4.05E+02	4.05E+02	ug/l	max.	Conservative assumption
	Manganese	ug/l	-	-	1.30E+04	1.30E+04	ug/l	max.	Conservative assumption
	Nickel	ug/l	-	-	1.95E+03	1.95E+03	ug/l	max.	Conservative assumption
	Thallium	ug/l	-	-	1.66E+01	1.66E+01	ug/l	max.	Conservative assumption
	Vanadium	ug/l	-	-	1.48E+02	1.48E+02	ug/l	max.	Conservative assumption

(1) The 95% UCL was not calculated as a conservative approach.

(2) max. - maximum detected value

TABLE 3.3

EXPOSURE POINT CONCENTRATION SUMMARY

SURFACE WATER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface Water
Exposure Medium:	Suface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
Mill Creek	Dibromochloromethane	ug/l	-	-	0.86 (J)	0.86 (J)	ug/l	max.	Samples are limited
	Thallium	ug/l	-	-	6.8 (B)	6.8 (B)	ug/l	max.	Samples are limited

(1) The 95% UCL was not calculated due to the limited sample size.

(2) max. - maximum detected value

TABLE 3.4

EXPOSURE POINT CONCENTRATION SUMMARY

SEDIMENT

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
Mill Creek	Benzo(a)anthracene	mg/kg	-	-	1.4 (J)	1.40E+00	mg/kg	max.	Conservative assumption
	Benzo(a)pyrene	mg/kg	-	-	1.2 (J)	1.20E+00	mg/kg	max.	Conservative assumption
	Benzo(b)fluoranthene	mg/kg	-	-	1.3 (J)	1.30E+00	mg/kg	max.	Conservative assumption
	Dibenz(a,h)anthracene	mg/kg	-	-	0.19 (J)	0.19 (J)	mg/kg	max.	Conservative assumption
	beta-BHC	mg/kg	-	-	0.094 (PG)	9.40E-02	mg/kg	max.	Conservative assumption
	Dieldrin	mg/kg	-	-	0.024	2.40E-02	mg/kg	max.	Conservative assumption
	Arsenic	mg/kg	-	-	6.3	6.30E+00	mg/kg	max.	Conservative assumption

(1) The 95% UCL was not calculated as a conservative approach.

(2) max. - maximum detected value

TABLE 3.5

EXPOSURE POINT CONCENTRATION SUMMARY

SOIL TO INDOOR AIR

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Soil, Indoor Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier) (2)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale
On-Site Building	Acetone	mg/kg	-	-	2.30E+01	2.30E+01	mg/kg	max.	Conservative assumption
	Benzene	mg/kg	-	-	9.30E-01	9.30E-01	mg/kg	max.	Conservative assumption
	Chlorobenzene	mg/kg	-	-	4.20E+01	4.20E+01	mg/kg	max.	Conservative assumption
	Methylene chloride	mg/kg	-	-	1.10E+01	1.10E+01	mg/kg	max.	Conservative assumption
	Toluene	mg/kg	-	-	2.40E+02	2.40E+02	mg/kg	max.	Conservative assumption
	1,2-Dichlorobenzene	mg/kg	-	-	2.80E+03	2.80E+03	mg/kg	max.	Conservative assumption
	1,4-Dichlorobenzene	mg/kg	-	-	1.70E+02	1.70E+02	mg/kg	max.	Conservative assumption

(1) The 95% UCL was not calculated as a conservative approach.

(2) The maximum concentration in soil was used to calculate the indoor air concentration. See Appendix I for detailed calculations.

(3) max. - maximum detected value

TABLE 3.6

EXPOSURE POINT CONCENTRATION SUMMARY

GROUNDWATER TO INDOOR AIR

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater, Indoor Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier) (2)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale
On-site Building	Acetone	ug/l	-	-	4.50E+04	4.50E+04	ug/l	max.	Conservative assumption
	Benzene	ug/l	-	-	1.50E+02	1.50E+02	ug/l	max.	Conservative assumption
	Chlorobenzene	ug/l	-	-	4.50E+03	4.50E+03	ug/l	max.	Conservative assumption
	Chloroform	ug/l	-	-	1.90E+02	1.90E+02	ug/l	max.	Conservative assumption
	Methylene chloride	ug/l	-	-	2.80E+02	2.80E+02	ug/l	max.	Conservative assumption
	Tetrachloroethene	ug/l	-	-	8.20E+01	8.20E+01	ug/l	max.	Conservative assumption
	Toluene	ug/l	-	-	2.40E+04	2.40E+04	ug/l	max.	Conservative assumption
	Trichloroethene	ug/l	-	-	8.80E+00	8.80E+00	ug/l	max.	Conservative assumption
	Vinyl Chloride	ug/l	-	-	1.50E+01	1.50E+01	ug/l	max.	Conservative assumption
	1,2-Dichlorobenzene	ug/l	-	-	1.90E+03	1.90E+03	ug/l	max.	Conservative assumption
	1,4-Dichlorobenzene	ug/l	-	-	3.30E+02	3.30E+02	ug/l	max.	Conservative assumption
	1,2-Dichloroethane	ug/l	-	-	6.60E+02	6.60E+02	ug/l	max.	Conservative assumption

(1) The 95% UCL was not calculated as a conservative approach.

(2) The maximum con (2) The maximum concentration in soil was used to calculate the indoor air concentration. See Appendix I for detailed calculations.

(3) max. - maximum detected value

TABLE 3.7

EXPOSURE POINT CONCENTRATION SUMMARY

SOIL TO AMBIENT AIR

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Soil, Ambient Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier) (2)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale
On-Site Ambient Air (<2 feet)	Acetone	mg/kg	-	-	1.50E+01	1.50E+01	mg/kg	max.	Samples are limited
	Benzene	mg/kg	-	-	1.70E-03	1.70E-03	mg/kg	max.	Samples are limited
	Chlorobenzene	mg/kg	-	-	9.20E-03	9.20E-03	mg/kg	max.	Samples are limited
	Methylene chloride	mg/kg	-	-	1.80E-03	1.80E-03	mg/kg	max.	Samples are limited
	Toluene	mg/kg	-	-	5.60E-04	5.60E-04	mg/kg	max.	Samples are limited
	1,2-Dichlorobenzene	mg/kg	-	-	3.65E-01	3.65E-01	mg/kg	max.	Samples are limited
	1,4-Dichlorobenzene	mg/kg	-	-	3.65E-01	3.65E-01	mg/kg	max.	Samples are limited
	Benzo(a)anthracene	mg/kg	-	-	5.40E+00	5.40E+00	mg/kg	max.	Samples are limited
	Benzo(a)pyrene	mg/kg	-	-	6.20E+00	6.20E+00	mg/kg	max.	Samples are limited
	Benzo(b)fluoranthene	mg/kg	-	-	7.00E+00	7.00E+00	mg/kg	max.	Samples are limited
	bis(2-Ethylhexyl) phthalate	mg/kg	-	-	4.60E-01	4.60E-01	mg/kg	max.	Samples are limited
	Endrin	mg/kg	-	-	2.10E-03	2.10E-03	mg/kg	max.	Samples are limited
	Aroclor 1254	mg/kg	-	-	9.80E-01	9.80E-01	mg/kg	max.	Samples are limited
	Antimony	mg/kg	-	-	6.00E-01	6.00E-01	mg/kg	max.	Samples are limited
	Arsenic	mg/kg	-	-	1.62E+01	1.62E+01	mg/kg	max.	Samples are limited
	Chromium	mg/kg	-	-	2.17E+02	2.17E+02	mg/kg	max.	Samples are limited

TABLE 3.7

EXPOSURE POINT CONCENTRATION SUMMARY

SOIL TO AMBIENT AIR

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Soil, Ambient Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier) (2)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale
On-Site Ambient Air (<15 feet)	Acetone	mg/kg	2.30E+00	1.16E+01	2.30E+01	1.16E+01	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Benzene	mg/kg	4.26E-01	2.58E+00	9.30E-01	9.30E-01	mg/kg	max.	95% UCL > max.
	Chlorobenzene	mg/kg	7.89E-01	4.65E+00	4.20E+01	4.65E+00	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Methylene chloride	mg/kg	5.85E-01	3.03E+00	1.10E+01	3.03E+00	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Toluene	mg/kg	7.09E+00	3.69E+01	2.40E+02	3.69E+01	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	1,2-Dichlorobenzene	mg/kg	2.74E+01	1.82E+02	2.80E+03	1.82E+02	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	Representative data
	1,4-Dichlorobenzene	mg/kg	4.00E+00	1.48E+01	1.70E+02	1.48E+01	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	Representative data
	Benzo(a)anthracene	mg/kg	2.75E+00	8.44E+00	5.40E+00	5.40E+00	mg/kg	max.	95% UCL > max.
	Benzo(a)pyrene	mg/kg	2.76E+00	8.45E+00	6.20E+00	6.20E+00	mg/kg	max.	95% UCL > max.
	Benzo(b)fluoranthene	mg/kg	2.77E+00	8.46E+00	7.00E+00	7.00E+00	mg/kg	max.	95% UCL > max.
	bis(2-Ethylhexyl) phthalate	mg/kg	4.11E+00	1.41E+01	1.50E+02	1.41E+01	mg/kg	97.5% Chebyshev (Mean, Sd) UCL	Representative data
	Endrin	mg/kg	8.21E-02	3.95E-01	3.10E+00	3.95E-01	mg/kg	99% Chebyshev (Mean, Sd) UCL	Representative data
	Aroclor 1254	mg/kg	1.10E+00	4.19E+00	9.80E-01	9.80E-01	mg/kg	max.	95% UCL > max.
	Antimony	mg/kg	6.62E-01	7.79E-01	8.90E+00	7.79E-01	mg/kg	Student's-t UCL	Representative data
	Arsenic	mg/kg	5.48E+00	5.96E+00	1.62E+01	5.96E+00	mg/kg	Student's-t UCL	Representative data
	Chromium	mg/kg	1.80E+01	3.36E+01	3.88E+02	3.36E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	Representative data

(1) The 95% UCL was not calculated for surface soil since samples are limited from the 0-2' bgs depth.

(2) The maximum concentration in surface soil was used to calcuate the ambient air concentration for a nonintrusive outdoor industrial worker.

The 95% UCL value in mixed soil was used to calculate the ambient air concentration for an intrusive construction worker. See Appendix J for detailed calculations.

(3) max. - maximum detected value

TABLE 3.8

EXPOSURE POINT CONCENTRATION SUMMARY

GROUNDWATER TO AMBIENT AIR

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater, Ambient air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier) (2)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale
On-site Ambient Air	Acetone	ug/l	-	-	4.50E+04	4.50E+04	ug/l	max.	Conservative assumption
	Benzene	ug/l	-	-	1.50E+02	1.50E+02	ug/l	max.	Conservative assumption
	Chlorobenzene	ug/l	-	-	4.50E+03	4.50E+03	ug/l	max.	Conservative assumption
	Chloroform	ug/l	-	-	1.90E+02	1.90E+02	ug/l	max.	Conservative assumption
	Methylene chloride	ug/l	-	-	2.80E+02	2.80E+02	ug/l	max.	Conservative assumption
	Tetrachloroethene	ug/l	-	-	8.20E+01	8.20E+01	ug/l	max.	Conservative assumption
	Toluene	ug/l	-	-	2.40E+04	2.40E+04	ug/l	max.	Conservative assumption
	Trichloroethene	ug/l	-	-	8.80E+00	8.80E+00	ug/l	max.	Conservative assumption
	Vinyl Chloride	ug/l	-	-	1.50E+01	1.50E+01	ug/l	max.	Conservative assumption
	1,2-Dichlorobenzene	ug/l	-	-	1.90E+03	1.90E+03	ug/l	max.	Conservative assumption
	1,4-Dichlorobenzene	ug/l	-	-	3.30E+02	3.30E+02	ug/l	max.	Conservative assumption
	1,2-Dichloroethane	ug/l	-	-	6.60E+02	6.60E+02	ug/l	max.	Conservative assumption

(1) The 95% UCL was not calculated as a conservative approach.

(2) The maximum concentration in groundwater was used to calculate the ambient air concentration. See Appendix J for detailed calculations.

(3) max. - maximum detected value

TABLE 3.9

EXPOSURE POINT CONCENTRATION SUMMARY

FISH

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface Water and Sediment
Exposure Medium:	Fish (Mill Creek)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
Fish from Mill Creek	Arsenic	mg/kg	-	-	1.08E+00	1.08E+00	mg/kg	max.	Conservative assumption
	Copper	mg/kg	-	-	1.34E+00	1.34E+00	mg/kg	max.	Conservative assumption
	Zinc	mg/kg	-	-	2.31E+01	2.31E+01	mg/kg	max.	Conservative assumption
	1,2-Dichlorobenzene	mg/kg	-	-	7.89E-01	7.89E-01	mg/kg	max.	Conservative assumption

(1) The 95% UCL was not calculated as a conservative approach.

(2) max. - maximum detected value

Detailed calculations for the determination of fish tissue concentrations are provided in Table 11.4.

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Nonintrusive Outdoor Industrial Workers	Adult	On-site surface soil	CS	Chemical Concentration in Soil	see Table 3.1	mg/kg	see Table 3.1	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Soil Ingestion Rate	100	mg/day	Default adult worker soil ingestion rate/EPA, 2002	(CS x IR x CF x FI x EF x ED)/(BW x AT)
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily soil ingestion occurs on-site.	
				EF	Exposure Frequency	250	days/year	Assume 5 days/week and absence of 10 days/year for vacation/EPA, 1991	
				ED	Exposure Duration	25	years	Upper bound time for employment at a job/EPA, 1991	
				BW	Body Weight	70	kg	Standard reference weight for adult males/EPA, 1991 and 2002	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	9125	days	Average over the exposure duration/EPA, 1991 and 2002	
Dermal Contact	Nonintrusive Outdoor Industrial Workers	Adult	On-site surface soil	CS	Chemical Concentration in Soil	see Table 3.1	mg/kg	see Table 3.1	Dermal Absorbed Dose (DAD) (mg/kg-d) =
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	(DAevent x EV x EF x ED x SA)/(BW x AT)
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004	where
				ABS	Dermal Absorption Factor	chemical-specific	unitless	EPA, 2004	Absorbed Dose per Event (DA event) (mg/cm^2-event) =
				SA	Skin Surface Area	3300	cm^2	EPA, 2004	(CS x CF) x AF x ABS
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	250	days/year	Assume 5 days/week and absence of 10 days/year for vacation/EPA, 1991	
				ED	Exposure Duration	25	years	Upper bound time for employment at a job/EPA, 1991	
				BW	Body Weight	70	kg	Standard reference weight for adult males/EPA, 1991 and 2002	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	9125	days	Average over the exposure duration/EPA, 1991 and 2002	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July 2004.

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Intrusive Construction Workers	Adult	On-site soil	CS	Chemical Concentration in Soil	see Table 3.1	mg/kg	see Table 3.1	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Soil Ingestion Rate	330	mg/day	Default intrusive worker soil ingestion rate/EPA, 2002	(CS x IR x CF x FI x EF x ED)/(BW x AT)
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily soil ingestion occurs on-site.	
				EF	Exposure Frequency	90	days/year	Assume a 4.5-month intrusive project, 5 days/week/Best Judgement	
				ED	Exposure Duration	1	years	Assume intrusive 4.5-month project occurred within a single year/Best judgement	
				BW	Body Weight	70	kg	Standard reference weight for adult males/EPA, 1991 and 2002	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	365	days	Average over the exposure duration/EPA, 1991 and 2002	
Dermal Contact	Intrusive Construction Workers	Adult	On-site soil	CS	Chemical Concentration in Soil	see Table 3.1	mg/kg	see Table 3.1	Dermal Absorbed Dose (DAD) (mg/kg-d) =
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	(DAevent x EV x EF x ED x SA)/(BW x AT)
				AF	Soil to Skin Adherence Factor	0.3	mg/cm^2	EPA, 2004	where
				ABS	Dermal Absorption Factor	chemical-specific	unitless	EPA, 2004	Absorbed Dose per Event (DA event) (mg/cm^2-event) =
				SA	Skin Surface Area	3300	cm^2	EPA, 2004	(CS x CF) x AF x ABS
				EV	Event Frequency	1	events/day	EPA, 2004	(CS x CF) x AF x ABS
				EF	Exposure Frequency	90	days/year	Assume a 4.5-month intrusive project, 5 days/week/Best Judgement	
				ED	Exposure Duration	1	years	Assume intrusive 4.5-month project occurred within a single year/Best judgement	
				BW	Body Weight	70	kg	Standard reference weight for adult males/EPA, 1991 and 2002	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	365	days	Average over the exposure duration/EPA, 1991 and 2002	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July 2004.

TABLE 4.3

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL TO AMBIENT AIR - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Ambient air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Nonintrusive Outdoor Industrial Workers	Adult	Surface soil	CA	Chemical Concentration in Air	calculated	ug/m^3	calculated	Risk = [CA x EF x ED x ET x URF]/(AT-C)
				CS	Chemical Concentration in Soil	see Table 3.1	mg/kg	see Table 3.1	HQ = (CA x EF x ED x ET)/(RfC x AT-N)
				EF	Exposure Frequency	250	days/year	Assume 5 days/week and absence of 10 days/year for vacation/EPA, 1991	CA = (1/VF+1/PEF) x CS
				ED	Exposure Duration	25	years	Upper bound time for employment at a job/EPA, 1991	$VF = Q/C \times [(3.1416 \times Da \times T)^{1/2}]/[2 \times \rho b \times Da] \times (10^{-4}\ m^2/cm^2)$
				ET	Fraction of EF in Contact with Soil	1	Unitless	professional Judgement	$PEF=Q/C \times (3600)/(0.036 \times (1-V) \times (Um/Ut)^3 \times F(x))$
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	See Appendix J for definitions and input values of Q/C, Da, T, ρb, V, Um, Ut and F(x).
				AT-N	Averaging Time-Non-Cancer	9125	days	Average over the exposure duration/EPA, 1991 and 2002	
				URF	Inhalation Unit Risk Factor	chemical-specific	$(ug/m^3)^{-1}$	see Table 6.2	
				RfC	Inhalation Reference Concentration	chemical-specific	ug/m^3	see Table 5.2	
				VF	Volatilization Factor	calculated	m^3/kg	see Appendix J	
				PEF	Particulate Emission Factor	calculated	m^3/kg	see Appendix J	

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1996b: Soil Screening Guidance: User's Guide. OSWER. Pub 9355.4-23.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL TO AMBIENT AIR - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Ambient air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Risk/Hazard Equation/ Model Name
Inhalation	Intrusive Construction Workers	Adult	On-site soil	CA	Chemical Concentration in Air	calculated	ug/m^3	calculated	Risk = [CA x EF x ED x ET x URF]/(AT-C)
				CS	Chemical Concentration in Soil	see Table 3.1	mg/kg	see Table 3.1	HQ = (CA x EF x ED x ET)/(RfC x AT-N)
				EF	Exposure Frequency	90	days/year	Assume a 4.5-month intrusive project, 5 days/week/Best Judgement	CA = (1/VF+1/PEF) x CS
				ED	Exposure Duration	1	years	Assume intrusive 4.5-month project occurred within a single year/Best judgement	$VF = Q/C \times [(3.1416 \times Da \times T)^{1/2}]/[2 \times \rho b \times Da] \times (10^{-4}\ m^2/cm^2)$
				ET	Fraction of EF in Contact with Soil	1	Unitless	professional Judgement	$PEF=Q/C \times (3600)/(0.036 \times (1-V) \times (Um/Ut)^3 \times F(x))$
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	See Appendix J for definitions and input values of Q/C, Da, T, ρb, V, Um, Ut and F(x).
				AT-N	Averaging Time-Non-Cancer	365	days	Average over the exposure duration/EPA, 1991 and 2002	
				URF	Inhalation Unit Risk Factor	chemical-specific	$(ug/m^3)^{-1}$	see Table 6.2	
				RfC	Inhalation Reference Concentration	chemical-specific	ug/m^3	see Table 5.2	
				VF	Volatilization Factor	calculated	m^3/kg	see Appendix J	
				PEF	Particulate Emission Factor	calculated	m^3/kg	see Appendix J	

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL TO INDOOR AIR - INDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Indoor air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Nonintrusive Indoor Industrial Workers	Adult	Indoor Air	Cair	Chemical Concentration in Air	calculated	mg/m^3	calculated	Risk = [CA x EF x ED x URF]/(AT-C)
				CS	Chemical Concentration in Soil	see Table 3.5	mg/kg	see Table 3.5	HQ = (CA x EF x ED)/(RfC x AT-N)
				EF	Exposure Frequency	250	days/year	EPA, 1991	CA -Johnson and Ettinger model
				ED	Exposure Duration	25	years	EPA, 1991	See Appendix I for calculations.
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	9125	days	Average over the exposure duration/EPA, 1991 and 2002	
				URF	Inhalation Unit Risk Factor	chemical-specific	$(ug/m^3)^{-1}$	see Table 6.2	
				RfC	Inhalation Reference Concentration	chemical-specific	ug/m^3	see Table 5.2	
				T_S	Average soil-groundwater temperature	11.1	°C	site specific	
				L_F	Depth below grade to bottom of enclosed space floor	15	cm	Assuming future industrial buildings will not have basements/USEPA, 2004	
				L_t	Depth below grade to top of contamination	30.48	cm	Sampling depth for subsurface soil/site-specific	
				L_b	Depth below grade to bottom of contamination	0	cm	Default if value is unknown/USEPA, 2004	
				SCS Soil Type	Soil Conservation Service Soil Type	C	g/cm^3	site-specific shallow soil	
				ρ_b	Soil dry bulk density	1.43	g/cm^3	USEPA Recommended Default Value/USEPA, 2004	
				q_T	Soil total porosity	0.459	unitless	USEPA Recommended Default Value/USEPA, 2004	
				q_{ws}	Soil water-filled porosity	0.215	(cm^3-water/cm^3-soil)	USEPA Recommended Default Value/USEPA, 2004	
				f_{oc}	Soil organic carbon fraction	0.006	unitless	Default value for shallow soil/USEPA, 1996	
				L_{crack}	Enclosed space floor thickness	10	cm	USEPA Recommended Default value/USEPA, 2004	

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL TO INDOOR AIR - INDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Indoor air

				ΔP	Soil-building pressure differential ($g/cm\text{-}s^2$)[a/]	40	($g/cm\text{-}s^2$)	USEPA Recommended Default value/USEPA, 2004	
				L_B	Enclosed space floor length	975	cm	Small On-site building	
				W_B	Enclosed space floor width	1219	cm	Small On-site building	
				H_B	Enclosed space height	488	cm	Industrial structure	
				W_B	Floor-wall seam crack width	0.1	cm	USEPA Recommended Default value/USEPA, 2004	
				ER	Indoor air exchange rate	0.83	1/hr	Indoor exchange rate for an industrial building/ASTM, 1998	

ASTM, 1998: American Society for Testing and Materials (ASTM), 1998. Standard Provisional Guide for Risk-Based Corrective Action. Designation: PS 104-98.

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1996b: Soil Screening Guidance: User's Guide. OSWER. Pub 9355.4-23.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004c: User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings, February.

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

GROUNDWATER - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal Contact	Intrusive Construction Worker	Adult	Groundwater	CW	Chemical Concentration in Groundwater	see Table 3.2	mg/l	see Table 3.2	Dermally Absorbed Dose (DAD) (mg/kg-d) =
				SA	Skin Surface Area Availabe for Contact	3300	cm^2	EPA, 2004	(DAevent x EV x EF x ED x SA)/(BW x AT)
				EV	Event Frequency	1	events/day	Professional judgement	Organics:
				EF	Exposure Frequency	90	days/year	Professional judgement	If Tevent < T*, then:
				ED	Exposure Duration	1	years	Professional judgement	DA event = $2FA \times Kp \times Cw \times (6\tau event \times Tevent/3.14)^{1/2}$
				BW	Body Weight	70	kg	EPA, 1991	If Tevent>t*, then:
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	DA event = $FA \times Kp \times Cw \times [Tevent/(1+B) + 2\tau event(1+3B+3B^2)/(1+B)^2]$
				AT-N	Averaging Time-Non-Cancer	365	days	Average over the exposure duration/EPA, 1991 and 2002	Inorganics:
				DAevent	Absorbed dose per event	chemical-specific	mg/cm^2-event	calculated	DA event = Kp x Cw x Tevent
				FA	Fraction Absorbed water	chemical-specific	dimensionless	EPA, 2004	
				Kp	Dermal permeability coefficient	chemical-specific	cm/hr	EPA, 2004	
				B	Dimensionless ration of Kp of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis.	chemical-specific	dimensionless	EPA, 2004	
				τevent	Lag time per event	chemical-specific	hrs/event	EPA, 2004	
				Tevent	Event Duration	0.5	hrs/event	Professional judgement	

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July 2004.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

GROUNDWATER TO AMBIENT AIR - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Nonintrusive Outdoor Industrial Workers	Adult	Ambient Air	Cair	Chemical Concentration in Air	calculated	mg/m^3	calculated	Chronic Daily Intake (mg/kg) =
				CW	Chemical Concentration in Groundwater	see Table 3.2	mg/l	see Table 3.2	(CairxIRairxETxEFxED)/(BWxATx365x10^3)
				ET	Exposure Time	8	hr/day	ASTM, 1998	CAair=CW x VFgw,amb x 10^{-3} m^3/L
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				IRair	Inhalation Rate	0.83	m^3/hr	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	9125	days	Average over the exposure duration/EPA, 1991 and 2002	
				VFgw,amb	volatilization factor, groundwater to ambient air	-	cm^3-water/cm^3-air	calculated	VFgw,amb=1/[(1+(DFamb x Lgw)/(Dwseff))x1/Heff]
				Dwseff	effective diffusivity - avg. water table to surface	-	cm^2/sec	calculated	Dwseff (cm^2/sec)=Lgw/[(hv/Dseff)+(hcap/Dcapeff)]
				DFamb	dispersion factor for ambient air	10	cm/s	ASTM, 1998	
				Heff	effective Henry's law coefficient	chemical-specific	cm^3 -water/cm^3 -air	see Appendix H	
				Lgw	depth to groundwater	237.74	cm	site-specific, the shallowest depth to water from the November 2004 depth to water measurement.	
				hv	vadose zone thickness	5.00	cm	Default value/ASTM, 1998	
				hcap	capillary zone thickness	232.74	cm	site-specific	
				Dseff	effective diffusivity - vadose zone soils	1.5	cm^2/sec	calculated	Dseff=Dair x ($\theta as^{3.33}/\theta t^2$) + Dwat x (1/H) x ($\theta ws^{3.33}/\theta t^2$)
				Dcapeff	effective diffusivity - capillary fringe zone	0.43	cm^2/sec	calculated	Dseff=Dair x ($\theta acap^{3.33}/\theta t^2$) + Dwat x (1/H) x ($\theta wcap^{3.33}/\theta t^2$)
				Dair	molecular diffusion coefficient in air	chemical-specific	cm^2/sec	see Appendix H	
				Dwat	molecular diffusion coefficient in water	chemical-specific	cm^2/sec	see Appendix H	
				θt	total soil porosity vadose zone	0.43	cm^3/cm^3	USEPA, 1996	

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

GROUNDWATER TO AMBIENT AIR - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
				θas	volumetric air content in vadose zone soils	0.28	(cm^3-air/cm^3-soil)	USEPA, 1996	
				θws	volumetric water content in vadose zone soils	0.15	(cm^3-water/cm^3-soil)	USEPA, 1996	
				θacap	volumetric air content in capillary zone soils	0.043	cm^3/cm^3	ASTM, 1998	
				θwcap	volumetric water content in capillary zone soils	0.387	cm^3/cm^3	ASTM, 1998	

ASTM, 1998: American Society for Testing and Materials (ASTM), 1998. Standard Provisional Guide for Risk-Based Corrective Action. Designation: PS 104-98.

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1996b: Soil Screening Guidance: User's Guide. OSWER. Pub 9355.4-23.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

GROUNDWATER TO AMBIENT AIR- CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Intrusive Construction Worker	Adult	Ambient Air	Cair	Chemical Concentration in Air	calculated	mg/m^3	calculated	Chronic Daily Intake (mg/kg) =
				CW	Chemical Concentration in Groundwater	see Table 3.2	mg/kg	see Table 3.2	$(CairxIRairxETxEFxED)/(BWxATx365x10^3)$
				ET	Exposure Time	8	hr/day	ASTM, 1998	$CAair=CW \times VFgw,amb \times 10^{-3}\ m^3/L$
				EF	Exposure Frequency	90	days/year	Professional judgement	
				ED	Exposure Duration	1	years	Professional judgement	
				IRair	Inhalation Rate	2.5	m^3/hr	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	365	days	Average over the exposure duration/EPA, 1991 and 2002	
				VFgw,amb	volatilization factor, groundwater to ambient air	-	cm^3-water/cm^3-air	calculated	$VFgw,amb=1/[(1+(DFamb \times Lgw)/(Dwseff))x1/Heff]$
				Dwseff	effective diffusivity - avg. water table to surface	-	cm^2/sec	calculated	$Dwseff\ (cm^2/sec)=Lgw/[(hv/Dseff)+(hcap/Dcapeff)]$
				DFamb	dispersion factor for ambient air	10	cm/s	ASTM, 1998	
				Heff	effective Henry's law coefficient	chemical-specific	cm^3 -water/cm^3 -air	see Appendix H	
				Lgw	depth to groundwater	237.74	cm	site-specific, the shallowest depth to water from the November 2004 depth to water measurement.	
				hv	vadose zone thickness	5.00	cm	Default value/ASTM, 1998	
				hcap	capillary zone thickness	232.74	cm	site-specific	
				Dseff	effective diffusivity - vadose zone soils	1.5	cm^2/sec	calculated	$Dseff=Dair \times (\theta as^{3.33}/\theta t^2) + Dwat \times (1/H) \times (\theta ws^{3.33}/\theta t^2)$
				Dcapeff	effective diffusivity - capillary fringe zone	0.43	cm^2/sec	calculated	$Dseff=Dair \times (\theta acap^{3.33}/\theta t^2) + Dwat \times (1/H) \times (\theta wcap^{3.33}/\theta t^2)$
				Dair	molecular diffusion coefficient in air	chemical-specific	cm^2/sec	see Appendix H	
				Dwat	molecular diffusion coefficient in water	chemical-specific	cm^2/sec	see Appendix H	
				θt	total soil porosity vadose zone	0.43	cm^3/cm^3	USEPA, 1996	

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

GROUNDWATER TO AMBIENT AIR- CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

				θas	volumetric air content in vadose zone soils	0.28	(cm^3-air/cm^3-soil)	USEPA, 1996	
				θws	volumetric water content in vadose zone soils	0.15	(cm^3-water/cm^3-soil)	USEPA, 1996	
				θacap	volumetric air content in capillary zone soils	0.043	cm^3/cm^3	ASTM, 1998	
				θwcap	volumetric water content in capillary zone soils	0.387	cm^3/cm^3	ASTM, 1998	

ASTM, 1998: American Society for Testing and Materials (ASTM), 1998. Standard Provisional Guide for Risk-Based Corrective Action. Designation: PS 104-98.

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1996b: Soil Screening Guidance: User's Guide. OSWER. Pub 9355.4-23.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.9

VALUES USED FOR DAILY INTAKE CALCULATIONS

GROUNDWATER TO INDOOR AIR - INDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Nonintrusive Indoor Industrial Workers	Adult	Indoor Air	Cair	Chemical Concentration in Air	calculated	mg/m^3	calculated	CA - Johnson and Ettinger model
				CW	Chemical Concentration in Groundwater	see Table 3.6	mg/l	see Table 3.6	Risk = [CA x EF x ED x URF]/(AT-C)
				EF	Exposure Frequency	250	days/year	EPA, 1991	HQ = (CA x EF x ED)/(RfC x AT-N)
				ED	Exposure Duration	25	years	EPA, 1991	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	9125	days	Average over the exposure duration/EPA, 1991 and 2002	
				URF	Inhalation Unit Risk Factor	chemical-specific	$(ug/m^3)^{-1}$	see Table 6.2	
				RfC	Inhalation Reference Concentration	chemical-specific	ug/m^3	see Table 5.2	
				T_S	Average soil-groundwater temperature	11.1	°C	site-specific	
				L_F	Depth below grade to bottom of enclosed space floor	15	cm	Assuming future industrial buildings will not have basements/USEPA, 2004	
				L_t	Depth below grade to top of contamination	304.80	cm	10 feet is used as the representative depth to groundwater.	
				Ha	Thickness of soil stratum A	213.36	cm	site-specific	
				Hb	Thickness of soil stratum B	91.44	cm	site-specific	
				SCS Soil Type	Soil Conservation Service Soil Type for Stratum A	C	g/cm^3	silty clay/site-specific	
				ρ_b	Soil dry bulk density	1.43	g/cm^3	USEPA Recommended Default Value/USEPA, 2004	
				q_T	Soil total porosity	0.459	unitless	USEPA Recommended Default Value/USEPA, 2004	
				q_{ws}	Soil water-filled porosity	0.215	(cm^3-water/cm^3-soil)	USEPA Recommended Default Value/USEPA, 2004	
				SCS Soil Type	Soil Conservation Service Soil Type for Stratum B	S	g/cm^3	silty sand or clayey sand/site-specific	

TABLE 4.9

VALUES USED FOR DAILY INTAKE CALCULATIONS

GROUNDWATER TO INDOOR AIR - INDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

				ρ_b	Soil dry bulk density	1.66	g/cm^3	USEPA Recommended Default Value/USEPA, 2004	
				q_T	Soil total porosity	0.375	unitless	USEPA Recommended Default Value/USEPA, 2004	
				q_{ws}	Soil water-filled porosity	0.054	(cm^3-water/cm^3-soil)	USEPA Recommended Default Value/USEPA, 2004	
				L_{crack}	Enclosed space floor thickness	10	cm	USEPA Recommended Default value/USEPA, 2004	
				ΔP	Soil-building pressure differential ($g/cm\text{-}s^2$)[a/]	40	($g/cm\text{-}s^2$)	USEPA Recommended Default value/USEPA, 2004	
				L_B	Enclosed space floor length	975	cm	Small On-site building	
				W_B	Enclosed space floor width	1219	cm	Small On-site building	
				H_B	Enclosed space height	488	cm	Industrial structure	
				W_B	Floor-wall seam crack width	0.1	cm	USEPA Recommended Default value/USEPA, 2004	
				ER	Indoor air exchange rate	0.83	1/hr	Indoor exchange rate for an industrial building/ASTM, 1998	

ASTM, 1998: American Society for Testing and Materials (ASTM), 1998. Standard Provisional Guide for Risk-Based Corrective Action. Designation: PS 104-98.

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1996b: Soil Screening Guidance: User's Guide. OSWER. Pub 9355.4-23.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004c: User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings, February.

TABLE 4.10a

VALUES USED FOR DAILY INTAKE CALCULATIONS

SURFACE WATER - ADULT RECREATIONAL WADER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface water
Exposure Medium:	Surface water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Adult	Mill Creek	CSW	Chemical Concentration in Surface Water	see Table 3.3	mg/l	see Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IRw	Ingestion Rate	0.05	L/event	EPA, 1989	Cw x IRw x ET x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	26	events/year	2 days/week, 13 weeks of the summer.	
				ED	Exposure Duration	24	years	EPA, 1997	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-nc	Averaging Time - noncancer	8760	days	EPA, 1997	
				AT-c	Averaging Time - cancer	25550	days	EPA, 1997	
				ET	Exposure Time	0.5	hours/event	Professional judgement	
Dermal Contact	Recreational Users	Adult	Mill Creek	CSW	Chemical Concentration in Surface Water	see Table 3.3	mg/l	see Table 3.3	Dermally Absorbed Dose (DAD) (mg/kg-d) =
									(DAevent x EV x EF x ED x SA)/(BW x AT)
				CF	Conversion Factor	0.001	L/cm^3	--	Organics:
				DAevent	Dermally absorbed dose per event per area of skin exposed	Chemical-Specific	mg/cm^2-event	EPA, 2004	If Tevent < T*, then:
									DA event = 2FA x Kp x Cw x $(6\tau event \times Tevent/3.14)^{1/2}$
				Tevent	Exposure Time	0.50	hr/event	Professional judgement	If Tevent>t*, then:
				FA	Fraction of absorbed dose	Chemical-Specific	dimensionless	EPA, 2004	DA event = FA x Kp x Cw x CF1 x CF2 x $[Tevent/(1+B) + 2\tau event(1+3B+3B^2)/(1+B)^2]$
				K_P	Permeability Coefficient from Wate	Chemical-Specific	cm/hr	EPA, 2004	Inorganics:
				T	Lag time per event	Chemical-Specific	hr/event	EPA, 2004	DA event = Kp x Cw x Tevent x CF1 x CF2
				t*	Time to reach steady-state	Chemical-Specific	hr	EPA, 2004	
				B	Dimensionless ration of Kp of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis.	Chemical-Specific	dimensionless	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2002	
				SA	Skin Surface Area Available for Contact	18,000	cm^2	EPA, 2004	
				EF	Exposure Frequency	26	days/year	2 days/week, 13 weeks of the summer.	
				ED	Exposure Duration	24	years	EPA, 1997	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-c	Averaging Time (Cancer)	25,550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-nc	Averaging Time (Non-Cancer)	8,760	days	Average over the exposure duration/EPA, 1991 and 2002	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1997a: Exposure Factors Handbook. v.1: General Factors. ORD. EPA/600/P-95/002Fa.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July.

TABLE 4.10b

VALUES USED FOR DAILY INTAKE CALCULATIONS

SURFACE WATER - CHILD RECREATIONAL WADER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface water
Exposure Medium:	Surface water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Users	Child	Mill Creek	CSW	Chemical Concentration in Surface Water	see Table 3.3	ug/l	see Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IRw	Ingestion Rate	0.05	L/event	EPA, 1989	Cw x IRw x ET x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	26	events/year	2 days/week, 13 weeks of the summer.	
				ED	Exposure Duration	6	years	EPA, 2004	
				BW	Body Weight	15	kg	EPA, 1997	
				AT-c	Averaging Time - cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-nc	Averaging Time - noncancer	2190	days	Average over the exposure duration/EPA, 1991 and 2002	
				ET	Exposure Time	0.5	hours/event	Professional judgement	
Dermal Contact	Recreational Users	Child	Mill Creek	CSW	Chemical Concentration in Surface Water	see Table 3.3	ug/l	see Table 3.3	Dermally Absorbed Dose (DAD) (mg/kg-d) =
				CF1	Conversion Factor 1	0.001	mg/μg	--	(DAevent x EV x EF x ED x SA)/(BW x AT)
				CF2	Conversion Factor 2	0.001	L/cm^3	--	Organics:
				DAevent	Dermally absorbed dose per event per area of skin exposed	Chemical-Specific	mg/cm^2-event	EPA, 2004	If Tevent < T*, then:
				Tevent	Exposure Time	0.50	hr/event	Professional judgement	DA event = $2FA \times Kp \times Cw \times (6\tau event \times Tevent/3.14)^{1/2}$
				FA	Fraction of absorbed dose	Chemical-Specific	dimensionless	EPA, 2004	If Tevent>t*, then:
				K_P	Permeability Coefficient from Water	Chemical-Specific	cm/hr	EPA, 2004	DA event = $FA \times Kp \times Cw \times CF1 \times CF2 \times [Tevent/(1+B) + 2\tau event(1+3B+3B^2)/(1+B)^2]$
				T	Lag time per event	Chemical-Specific	hr/event	EPA, 2004	Inorganics:
				t*	Time to reach steady-state	Chemical-Specific	hr	EPA, 2004	DA event = Kp x Cw x Tevent x CF1 x CF2
				B	Dimensionless ration of Kp of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis.	Chemical-Specific	dimensionless	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2002	
				SA	Skin Surface Area Available for	6,600	cm^2	EPA, 2004	
				EF	Exposure Frequency	26	days/year	2 days/week, 13 weeks of the summer.	
				ED	Exposure Duration	6	years	EPA, 2004	
				BW	Body Weight	15	kg	EPA, 1997	
				AT-c	Averaging Time (Cancer)	25,550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-nc	Averaging Time (Non-Cancer)	2,190	days	Average over the exposure duration/EPA, 1991 and 2002	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1997a: Exposure Factors Handbook. v.1: General Factors. ORD. EPA/600/P-95/002Fa.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July.

TABLE 4.11a

VALUES USED FOR DAILY INTAKE CALCULATIONS

SEDIMENT - ADULT RECREATIONAL WADER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Recreational Users	Adult	Mill Creek	CS	Chemical Concentration in Sediment	see Table 3.4	mg/kg	see Table 3.4	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Soil Ingestion Rate	100	mg/day	Default adult soil ingestion rate/EPA, 2002	(CS x IR x CF x FI x EF x ED)/(BW x AT)
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily soil ingestion occurs on-site.	
				EF	Exposure Frequency	26	days/year	Assume 2 days/week and 13 weeks of summer/best Judgement	
				ED	Exposure Duration	24	years	EPA, 1997	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	8760	days	Average over the exposure duration/EPA, 1991 and 2002	
Dermal Contact	Recreational Users	Adult	Mill Creek	CS	Chemical Concentration in Sediment	see Table 3.4	mg/kg	see Table 3.4	Dermal Absorbed Dose (DAD) (mg/kg-d) =
				CF	Conversion Factor	1.00E-06	kg/mg	EPA, 1989	(DAevent x EV x EF x ED x SA)/(BW x AT)
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004	where
				ABS	Dermal Absorption Factor	chemical-specific	unitless	EPA, 2004	Absorbed Dose per Event (DA event) (mg/cm^2-event) =
				SA	Skin Surface Area	1450	cm^2	Male adult foot area/EPA, 1997	(CS x CF) x AF x ABS
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	26	days/year	Assume 2 days/week and 13 weeks of summer/best Judgement	
				ED	Exposure Duration	24	years	EPA, 1997	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	8760	days	Average over the exposure duration/EPA, 1991 and 2002	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1997a: Exposure Factors Handbook. v.1: General Factors. ORD. EPA/600/P-95/002Fa.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July.

TABLE 4.11b

VALUES USED FOR DAILY INTAKE CALCULATIONS

SEDIMENT - CHILD RECREATIONAL WADER

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Recreational Users	Child	Mill Creek	CS	Chemical Concentration in Sediment	see Table 3.4	mg/kg	see Table 3.4	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Soil Ingestion Rate	200	mg/day	Default child soil ingestion rate/EPA, 2002	(CS x IR x CF x FI x EF x ED)/(BW x AT)
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily soil ingestion occurs on-site.	
				EF	Exposure Frequency	26	days/year	Assume 2 days/week and 13 weeks of summer/best Judgement	
				ED	Exposure Duration	6	years	EPA, 1997	
				BW	Body Weight	15	kg	EPA, 1997	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	2190	days	Average over the exposure duration/EPA, 1991 and 2002	
Dermal Contact	Recreational Users	Child	Mill Creek	CS	Chemical Concentration in Sediment	see Table 3.4	mg/kg	see Table 3.4	Dermal Absorbed Dose (DAD) (mg/kg-d) =
				CF	Conversion Factor	1.00E-06	kg/mg	EPA, 1989	(DAevent x EV x EF x ED x SA)/(BW x AT)
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004	where
				ABS	Dermal Absorption Factor	chemical-specific	unitless	EPA, 2004	Absorbed Dose per Event (DA event) (mg/cm^2-event) =
				SA	Skin Surface Area	725	cm^2	half of the adult foot area/EPA, 1997	(CS x CF) x AF x ABS
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	26	days/year	Assume 2 days/week and 13 weeks of summer/best Judgement	
				ED	Exposure Duration	6	years	EPA, 2004	
				BW	Body Weight	15	kg	EPA, 1997	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	2190	days	Average over the exposure duration/EPA, 1991 and 2002	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1997a: Exposure Factors Handbook. v.1: General Factors. ORD. EPA/600/P-95/002Fa.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July.

TABLE 4.12a

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL - BALL FIELD RECREATIONAL USER (AGE 6-13)

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Receptor	Child 6-13	Off-site surface soil	CS	Chemical Concentration in Soil	see Table E-2	mg/kg	see Table E-2, Part E of Appendix J	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Soil Ingestion Rate	200	mg/day	Default child soil ingestion rate/EPA, 2002	(CS x IR x CF x FI x EF x ED)/(BW x AT)
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily soil ingestion occurs on-site.	
				EF	Exposure Frequency	64	days/year	Assume 2 days/week for 8 months between April to November baseball season.	
				ED	Exposure Duration	8	years	Age 6-13	
				BW	Body Weight	35	kg	Calculated average body weight for child age 6-13 (USEPA Exposure Factors Handbook, 1997, Table 7-3)	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	2920	days	Average over the exposure duration	
Dermal Contact	Recreational Receptor	Child 6-13	Off-site surface soil	CS	Chemical Concentration in Soil	see Table E-2	mg/kg	see Table E-2, Part E of Appendix J	Dermal Absorbed Dose (DAD) (mg/kg-d) =
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	(DAevent x EV x EF x ED x SA)/(BW x AT)
				AF	Soil to Skin Adherence Factor	0.3	mg/cm^2	EPA, 2004	where
				ABS	Dermal Absorption Factor	chemical-specific	unitless	EPA, 2004	Absorbed Dose per Event (DA event) (mg/cm^2-event) =
				SA	Skin Surface Area	2626	cm^2	Calculated for child age 6-13 (EPA, 2004, Exhibit C-1).	(CS x CF) x AF x ABS
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	64	days/year	Assume 2 days/week for 8 months between April to November baseball season.	
				ED	Exposure Duration	8	years	Age 6-13	
				BW	Body Weight	35	kg	Calculated average body weight for child age 6-13 (USEPA Exposure Factors Handbook, 1997, Table 7-3)	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	2920	days	Average over the exposure duration	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July 2004.

TABLE 4.12b

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL - BALL FIELD RECREATIONAL USER (AGE 13-17)

Rohm and Haas Chemicals LLC

Reading, Ohio

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

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational Receptor	Child 13-17	Off-site surface soil	CS	Chemical Concentration in Soil	see Table E-2	mg/kg	see Table E-2, Part E of Appendix J	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Soil Ingestion Rate	200	mg/day	Default child soil ingestion rate/EPA, 2002	(CS x IR x CF x FI x EF x ED)/(BW x AT)
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily soil ingestion occurs on-site.	
				EF	Exposure Frequency	96	days/year	Assume 3 days/week for 8 months between April to November baseball season.	
				ED	Exposure Duration	5	years	Age 13-17	
				BW	Body Weight	58.1	kg	Calculated average body weight for child age 13-17 (USEPA Exposure Factors Handbook, 1997, Table 7-3)	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	1825	days	Average over the exposure duration	
Dermal Contact	Recreational Receptor	Child 13-17	Off-site surface soil	CS	Chemical Concentration in Soil	see Table E-2	mg/kg	see Table E-2, Part E of Appendix J	Dermal Absorbed Dose (DAD) (mg/kg-d) =
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	(DAevent x EV x EF x ED x SA)/(BW x AT)
				AF	Soil to Skin Adherence Factor	0.3	mg/cm^2	EPA, 2004	where
				ABS	Dermal Absorption Factor	chemical-specific	unitless	EPA, 2004	Absorbed Dose per Event (DA event) (mg/cm^2-event) =
				SA	Skin Surface Area	4003	cm^2	Calculated for child age 13-17 (EPA, 2004, Exhibit C-1).	(CS x CF) x AF x ABS
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	96	days/year	Assume 3 days/week for 8 months between April to November baseball season.	
				ED	Exposure Duration	5	years	Age 13-17	
				BW	Body Weight	58.1	kg	Calculated average body weight for child age 13-17 (USEPA Exposure Factors Handbook, 1997, Table 7-3)	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-N	Averaging Time-Non-Cancer	1825	days	Average over the exposure duration	

USEPA, 1989a: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual (Part A).

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July 2004.

TABLE 4.13a

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL TO AMBIENT AIR - BALL FIELD RECREATIONAL USER (AGE 6-13)

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Ambient air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational Receptor	Child 6-13	Surface soil	CA	Chemical Concentration in Air	calculated	ug/m^3	calculated	Risk = [CA x EF x ED x ET x URF]/(AT-C)
				CS	Chemical Concentration in Soil	see Table E-2	mg/kg	see Table E-2, Part E of Appdix J	HQ = (CA x EF x ED x ET)/(RfC x AT-N)
				EF	Exposure Frequency	64	days/year	Assume 2 days/week for 8 months between April to November baseball season.	CA = (1/VF) x CS (organics); CA=(1/PEF) x CS (inorganics)
				ED	Exposure Duration	8	years	Age 6-13	$VF = Q/C \times [(3.1416 \times Da \times T)^{1/2}]/[2 \times \rho b \times Da] \times (10^{-4}\ m^2/cm^2)$
				ET	Fraction of EF in Contact with Soil	1	Unitless	professional Judgement	$PEF=Q/C \times (3600)/(0.036 \times (1-V) \times (Um/Ut)^3 \times F(x))$
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	See Appendix J for definitions and input values of Q/C, Da, T, ρb, V, Um, Ut and F(x).
				AT-N	Averaging Time-Non-Cancer	2920	days	Average over the exposure duration	
				URF	Inhalation Unit Risk Factor	chemical-specific	$(ug/m^3)^{-1}$	see Table 6.2	
				RfC	Inhalation Reference Concentration	chemical-specific	ug/m^3	see Table 5.2	
				VF	Volatilization Factor	calculated	m^3/kg	see Appendix J	
				PEF	Particulate Emission Factor	calculated	m^3/kg	see Appendix J	

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1996b: Soil Screening Guidance: User's Guide. OSWER. Pub 9355.4-23.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.13b

VALUES USED FOR DAILY INTAKE CALCULATIONS

SOIL TO AMBIENT AIR - BALL FIELD RECREATIONAL USER (AGE 13-17)

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure Medium:	Ambient air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational Receptor	Child 13-17	Surface soil	CA	Chemical Concentration in Air	calculated	ug/m^3	calculated	Risk = [CA x EF x ED x ET x URF]/(AT-C)
				CS	Chemical Concentration in Soil	see Table E-2	mg/kg	see Table E-2, Part E of Appendix J	HQ = (CA x EF x ED x ET)/(RfC x AT-N)
				EF	Exposure Frequency	96	days/year	Assume 3 days/week for 8 months between April to November baseball season.	CA = (1/VF) x CS (organics); CA=(1/PEF) x CS (inorganics)
				ED	Exposure Duration	5	years	Age 13-17	$VF = Q/C \times [(3.1416 \times Da \times T)^{1/2}]/[2 \times \rho b \times Da] \times (10^{-4}\ m^2/cm^2)$
				ET	Fraction of EF in Contact with Soil	1	Unitless	professional Judgement	$PEF=Q/C \times (3600)/(0.036 \times (1-V) \times (Um/Ut)^3 \times F(x))$
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	See Appendix J for definitions and input values of Q/C, Da, T, ρb, V, Um, Ut and F(x).
				AT-N	Averaging Time-Non-Cancer	1825	days	Average over the exposure duration	
				URF	Inhalation Unit Risk Factor	chemical-specific	$(ug/m^3)^{-1}$	see Table 6.2	
				RfC	Inhalation Reference Concentration	chemical-specific	ug/m^3	see Table 5.2	
				VF	Volatilization Factor	calculated	m^3/kg	see Appendix J	
				PEF	Particulate Emission Factor	calculated	m^3/kg	see Appendix J	

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1996b: Soil Screening Guidance: User's Guide. OSWER. Pub 9355.4-23.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.14

VALUES USED FOR DAILY INTAKE CALCULATIONS

SURFACE WATER AND SEDIMENT - ADULT RECREATIONAL FISHERMAN

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface Water and Sediment
Exposure Medium:	Fish (Mill Creek)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Fish Ingestion	Recreational Fisherman	Adult	Fish	CF	Chemical Concentration in Fish	see Table 3.9	mg/kg	see Table 3.9	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Fish Ingestion Rate	0.228	kg/meal	USEPA, 2000b	(CF x IR x FI x EF x ED)/(BW x AT)
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily fish ingestion occurs.	
				EF	Exposure Frequency	20	meals/year	Professional Judgement based on 5 months (May, June, July, August, and September) that are likely to have fishing activities. One meal per week during the fishing season.	
				ED	Exposure Duration	30	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991/2002	
				AT-N	Averaging Time-Non-Cancer	10950	days	Average over the exposure duration/EPA, 2004	
Incidental Ingestion	Recreational Fisherman	Adult	Mill Creek	CSW	Chemical Concentration in Surface Water	see Table 3.3	mg/l	see Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IRw	Ingestion Rate	0.05	L/event	EPA, 1989	Cw x IRw x ET x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	20	events/year	1 days/week, 20 weeks of fishing season (May through September).	
				ED	Exposure Duration	30	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-nc	Averaging Time - noncancer	10950	days	EPA, 2004	
				AT-c	Averaging Time - cancer	25550	days	EPA, 1997	
				ET	Exposure Time	0.5	hours/event	Professional judgement	

TABLE 4.14

VALUES USED FOR DAILY INTAKE CALCULATIONS

SURFACE WATER AND SEDIMENT - ADULT RECREATIONAL FISHERMAN

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface Water and Sediment
Exposure Medium:	Fish (Mill Creek)

Dermal Contact	Recreational Fisherman	Adult	Mill Creek	CSW	Chemical Concentration in Surface Water	see Table 3.3	mg/l	see Table 3.3	Dermally Absorbed Dose (DAD) (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)
				CF	Conversion Factor	0.001	L/cm^3	--	Organics:
				DAevent	Dermally absorbed dose per event per area of skin exposed	Chemical-Specific	mg/cm^2-even	EPA, 2004	If Tevent < T*, then: DA event = $2FA \times Kp \times Cw \times (6\tau event \times Tevent/3.14)^{1/2}$
				Tevent	Exposure Time	0.50	hr/event	Professional judgement	If Tevent>t*, then:
				FA	Fraction of absorbed dose	Chemical-Specific	dimensionless	EPA, 2004	DA event = $FA \times Kp \times Cw \times CF1 \times CF2 \times [Tevent/(1+B) + 2\tau event(1+3B+3B^2)/(1+B)^2]$
				K_P	Permeability Coefficient from Water	Chemical-Specific	cm/hr	EPA, 2004	Inorganics:
				T	Lag time per event	Chemical-Specific	hr/event	EPA, 2004	DA event = $Kp \times Cw \times Tevent \times CF1 \times CF2$
				t*	Time to reach steady-state	Chemical-Specific	hr	EPA, 2004	
				B	Dimensionless ration of Kp of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis.	Chemical-Specific	dimensionless	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2002	
				SA	Skin Surface Area Available for Contact	18,000	cm^2	EPA, 2004	
				EF	Exposure Frequency	20	days/year	1 days/week, 20 weeks of fishing season (May through September).	
				ED	Exposure Duration	30	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-c	Averaging Time (Cancer)	25,550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and 2002	
				AT-nc	Averaging Time (Non-Cance	10,950	days	Average over the exposure duration/EPA, 2004	

TABLE 4.14

VALUES USED FOR DAILY INTAKE CALCULATIONS

SURFACE WATER AND SEDIMENT - ADULT RECREATIONAL FISHERMAN

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Surface Water and Sediment
Exposure Medium:	Fish (Mill Creek)

Incidental Ingestion	Recreational Fisherman	Adult	Mill Creek	CS	Chemical Concentration in Sediment	see Table 3.4	mg/kg	see Table 3.4	Chronic Daily Intake(CDI) (mg/kg-d) =
				IR	Ingestion Rate	100	mg/day	Default adult soil ingestion rate/EPA, 2002	(CS x IR x CF x FI x EF x ED)/(BW x AT)
				CF	Conversion Factor	1.00E-06	kg/mg	Unit conversion factor/EPA, 1989	
				FI	Fraction Ingested	1	unitless	Conservatively assume 100 % of daily soil ingestion occurs on-site.	
				EF	Exposure Frequency	20	days/year	1 days/week, 20 weeks of fishing season (May through September).	
				ED	Exposure Duration	30	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and	
				AT-N	Averaging Time-Non-Cancer	10950	days	Average over the exposure duration/EPA, 2004	
Dermal Contact	Recreational Fisherman	Adult	Mill Creek	CS	Chemical Concentration in Sediment	see Table 3.4	mg/kg	see Table 3.4	Dermal Absorbed Dose (DAD) (mg/kg-d) =
				CF	Conversion Factor	1.00E-06	kg/mg	EPA, 1989	(DAevent x EV x EF x ED x SA)/(BW x AT)
				AF	Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004	where
				ABS	Dermal Absorption Factor	chemical-specific	unitless	EPA, 2004	Absorbed Dose per Event (DA event) (mg/cm^2-event) =
				SA	Skin Surface Area	1450	cm^2	Male adult foot area/EPA, 1997	(CS x CF) x AF x ABS
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	20	days/year	1 days/week, 20 weeks of fishing season (May through September).	
				ED	Exposure Duration	30	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1997	
				AT-C	Averaging Time -Cancer	25550	days	Conventional human lifespan (exposure averaged over lifespan)/EPA, 1991 and	
				AT-N	Averaging Time-Non-Cancer	10950	days	Average over the exposure duration/EPA, 2004	

USEPA, 1991b: Risk Assessment Guidance for Superfund. v.1: Human Health Evaluation Manual. Supplemental Guidance, "Standard Default Exposure Factors". OERR. OSWER 9285.6-03.

USEPA, 1997a: Exposure Factors Handbook. v.1: General Factors. ORD. EPA/600/P-95/002Fa.

USEPA, 2000b: Guidance for Assessing Chemical Contamiant Data for Use in Fish Advisories Volume 2. EPA 823-B-00-008, November.

USEPA, 2002b: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

USEPA, 2004a: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance Dermal Risk Assessment, Final, July.

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Rohm and Haas Chemicals LLC

Reading, Ohio

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/ Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value	Units			Source(s) (2)	Date(s) (MM/DD/YYYY)
Volatile Organic Constituents										
1,2-Dichlorobenzene	Chronic	9.00E-02	mg/kg-day	1	9.00E-02	mg/kg-day	N/A	1000	IRIS	08/09/07
1,4-Dichlorobenzene	Chronic	3.00E-02	mg/kg-day	1	3.00E-02	mg/kg-day	N/A	N/A	NCEA	10/01/04
1,2-Dichloroethane	Chronic	2.00E-02	mg/kg-day	1	2.00E-02	mg/kg-day	N/A	N/A	NCEA	10/01/04
Acetone	Chronic	9.00E-01	mg/kg-day	1	9.00E-01	mg/kg-day	Liver, Kidney	1000	IRIS	08/09/07
Benzene	Chronic	4.00E-03	mg/kg/day	1	4.00E-03	mg/kg/day	Blood	300	IRIS	08/09/07
Chlorobenzene	Chronic	2.00E-02	mg/kg-day	0.31	6.20E-03	mg/kg-day	Liver	1000	IRIS	08/09/07
Chloroform	Chronic	1.00E-02	mg/kg-day	0.20	2.00E-03	mg/kg-day	Liver	1000	IRIS	08/09/07
Dibromochloromethane	Chronic	2.00E-02	mg/kg-day	1	2.00E-02	mg/kg-day	Liver	1000	IRIS	08/09/07
Methylene chloride	Chronic	6.00E-02	mg/kg-day	1	6.00E-02	mg/kg-day	Liver	100	IRIS	08/09/07
Tetrachloroethene	Chronic	1.00E-02	mg/kg-day	1	1.00E-02	mg/kg-day	Liver	1000	IRIS	08/09/07
Toluene	Chronic	8.00E-02	mg/kg/day	1	8.00E-02	mg/kg/day	Liver/kidney	3000	IRIS	09/23/05
Trichloroethylene	Chronic	6.00E-03	mg/kg/day	0.15	9.00E-04	mg/kg/day	Liver/kidney	N/A	W	see footnote for "W"
Vinyl chloride	Chronic	3.00E-03	mg/kg/day	1	3.00E-03	mg/kg/day	Liver	30	IRIS	08/09/07
Semi-Volatile Organic Constituents										
Aniline	Chronic	7.00E-03	mg/kg/day	1	7.00E-03	mg/kg/day	N/A	N/A	PPRTV	10/01/04
Benzo(a)anthracene	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-ethylhexyl)phthalate	Chronic	2.00E-02	mg/kg-day	0.19	3.80E-02	mg/kg-day	Liver	1000	IRIS	08/09/07
Dibenz(a,h)anthracene	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
4-Methylphenol	Chronic	5.00E-03	mg/kg-day	1	5.00E-03	mg/kg-day	N/A	N/A	HEAST	10/01/04
Pesticides										
4,4-DDE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N	N/A
Aroclor 1254	Chronic	2.00E-05	mg/kg-day	1	2.00E-05	mg/kg-day	Eyes, Nails, Immune System	300	IRIS	08/09/07

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Rohm and Haas Chemicals LLC

Reading, Ohio

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/ Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value	Units			Source(s) (2)	Date(s) (MM/DD/YYYY)
beta-BHC	Chronic	2.00E-04	mg/kg-day	1	2.00E-04	mg/kg-day	Liver/Kidney	1000	NCEA	10/01/04
delta-BHC	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
gamma-BHC	Chronic	3.00E-04	mg/kg-day	1	3.00E-04	mg/kg-day	Liver/Kidney	1000	IRIS	08/09/07
Dieldrin	Chronic	5.00E-05	mg/kg-day	0.5	2.50E-05	mg/kg-day	Liver	100	IRIS	08/09/07
Endrin	Chronic	3.00E-04	mg/kg-day	0.02	6.00E-06	mg/kg-day	Liver	100	IRIS	08/09/07
Heptachlor	Chronic	5.00E-04	mg/kg-day	1	5.00E-04	mg/kg-day	Liver	300	IRIS	08/09/07
Heptachlor epoxide	Chronic	1.30E-05	mg/kg-day	1	1.30E-05	mg/kg-day	Liver	1000	IRIS	08/09/07
Metals										
Aluminum	Chronic	1	mg/kg-day	1	1	mg/kg-day	N/A	N/A	PPRTV	10/01/04
Antimony	Chronic	4.00E-04	mg/kg-day	0.15	6.00E-05	mg/kg-day	Blood	1000	IRIS	08/09/07
Arsenic	Chronic	3.00E-04	mg/kg-day	1	3.00E-04	mg/kg-day	Skin	3	IRIS	08/09/07
Cadmium	Chronic	1E-03(food)/ 5E-	mg/kg-day	0.025	2.5E-05/ 1.3E-05	mg/kg-day	Kidney	10	IRIS	08/09/07
Chromium	Chronic	1.50E+00	mg/kg-day	0.013	1.95E-02	mg/kg-day	N/A	1000	IRIS	08/09/07
Copper	Chronic	4.00E-02	mg/kg-day	0.3	1.20E-02	mg/kg-day	Gastrointestinal	N/A	HEAST	10/01/04
Iron	Chronic	3.00E-01	mg/kg-day	1	3.00E-01	mg/kg-day	N/A	N/A	NCEA	10/01/04
Lead	N/A	N/A	mg/kg-day	N/A	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Manganese	Chronic	1.40E-01	mg/kg-day	0.04	5.60E-03	mg/kg-day	CNS	1	IRIS	08/09/07
Nickel	Chronic	2.00E-02	mg/kg-day	0.04	8.00E-04	mg/kg-day	Various	300	IRIS	08/09/07
Thallium	Chronic	6.60E-05	mg/kg-day	1	6.60E-05	mg/kg-day	Blood	3000	IRIS	08/09/07
Vanadium	Chronic	1.00E-03	mg/kg-day	0.026	2.60E-05	mg/kg-day	Liver	100	NCEA	10/01/04

N/A = Not Applicable or Not Available

(1) RfD_{ABS} = RfD. X ABS_{GI}

(2) For IRIS values, the date IRIS was searched is provided.
For HEAST, NCEA, PPRTV and RE values, a reference to the PRG date is provided.

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

PRG = U.S. EPA Region 9 Preliminary Remediation Goals

NCEA = National Center for Environmental Assessment

PPRTV - Provisional Peer Reviewed Toxicity Values

RE = Route Extrapolation

W= withdraw value from U.S. EPA region 9 (2000) PRG table.

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
Rohm and Haas Chemicals LLC
Reading, Ohio

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD (1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s) (2)	Date(s) (MM/DD/YYYY)
Volatile Organic Constituents									
1,2-Dichlorobenzene	Chronic	2.00E-01	mg/m^3	5.70E-02	mg/kg-day	Whole Body	1000	HEAST	10/1/04
1,4-Dichlorobenzene	Chronic	8.00E-01	mg/m^3	2.29E-01	mg/kg-day	Liver	100	IRIS	8/9/07
1,2-Dichloroethane	Chronic	4.90E-03	mg/m^3	1.40E-03	mg/kg-day	N/A	N/A	NCEA	10/1/04
Acetone	N/A	N/A	N/A	9.00E-01	mg/kg-day	N/A	N/A	RE	10/1/04
Benzene	chronic	3.00E-02	mg/m^3	8.57E-03	mg/kg/day	Blood	300	IRIS	8/9/07
Chlorobenzene	Chronic	5.95E-02	mg/m^3	1.70E-02	mg/kg-day	Liver/Kidney	10000	NCEA	10/1/04
Chloroform	N/A	4.90E-02	mg/m^3	1.40E-02	mg/kg-day	N/A	N/A	NCEA	10/1/04
Dibromochloromethane	N/A	N/A	N/A	2.00E-02	mg/kg-day	N/A	N/A	RE	10/1/04
Methylene chloride	Chronic	3.00E+00	mg/m^3	8.60E-01	mg/kg-day	Liver	100	HEAST	10/1/04
Tetrachloroethene	Chronic	3.50E-02	mg/m^3	1.00E-01	mg/kg-day	N/A	N/A	CAL	2004
Toluene	Chronic	5.00E+00	mg/m^3	1.43E+00	mg/kg/day	Neuro	10	IRIS	8/9/07
Trichlorothylene	Chronic	6.00E-01	mg/m^3	1.70E-01	mg/kg-day	Neuro	N/A	CAL	2004
Vinyl chloride	Chronic	1.00E-01	mg/m^3	2.86E-02	mg/kg-day	Liver	30	IRIS	8/9/07
Semi-Volatile Organic Constituents									
Aniline	Chronic	1.00E-03	mg/m^3	2.90E-04	mg/kg-day	Spleen	3000	IRIS	8/9/07
Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-ethylhexyl)phthalate	N/A	N/A	N/A	2.00E-02	mg/kg-day	N/A	N/A	RE	10/1/04
Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Methylphenol	Chronic	N/A	N/A	5.00E-03	mg/kg-day	N/A	N/A	RE	10/1/04
Pesticides									
4,4-DDE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aroclor 1254	Chronic	7.00E-05	mg/m^3	2.00E-05	mg/kg-day	N/A	N/A	RE	10/1/04
beta-BHC	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8/9/07
delta-BHC	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8/9/07

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
Rohm and Haas Chemicals LLC
Reading, Ohio

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD (1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s) (2)	Date(s) (MM/DD/YYYY)
gamma-BHC	Chronic	N/A	N/A	3.00E-04	mg/kg-day	N/A	N/A	RE	10/1/04
Dieldrin	Chronic	N/A	N/A	5.00E-05	mg/kg-day	N/A	N/A	RE	10/1/04
Endrin	Chronic	N/A	N/A	3.00E-04	mg/kg-day	N/A	N/A	RE	10/1/04
Heptachlor	Chronic	N/A	N/A	5.00E-04	mg/kg-day	N/A	N/A	RE	10/1/04
Heptachlor epoxide	Chronic	N/A	N/A	1.30E-05	mg/kg-day	N/A	N/A	RE	10/1/04
Metals									
Aluminum	Chronic	N/A	N/A	1.40E-03	mg/kg-day	N/A	N/A	PRG	10/1/04
Antimony	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium	Chronic	7.00E-04	N/A	2.00E-04	mg/kg-day	N/A	N/A	IRIS	8/9/07
Copper	Chronic	N/A	N/A	3.70E-02	mg/kg-day	N/A	N/A	RE	10/1/04
Iron	Chronic	N/A	N/A	3.00E-01	mg/kg-day	N/A	N/A	RE	10/1/04
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	Chronic	5.00E-05	mg/m^3	1.40E-05	mg/kg-day	CNS	1000	IRIS	8/9/07
Nickel	Chronic	N/A	N/A	2.00E-02	mg/kg-day	N/A	N/A	RE	8/9/07
Thallium	Chronic	N/A	N/A	6.60E-05	mg/kg-day	N/A	N/A	RE	8/9/07
Vanadium	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A = Not Applicable or Not Available

(1) RfD = RfC x 20 m^3/day/70 kg or oral RfD (RE) or inhalation RfD (PRG)

(2) For IRIS values, the date IRIS was searched is provided.
For HEAST, NCEA, and PPRTV values, a reference to the PRGs is provided.
For RE values, a reference to either IRIS or PRG is provided.

IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
PRG = U.S. EPA Region 9 Preliminary Remediation Goals
NCEA = National Center for Environmental Assessment
Cal = California Toxicity Criteria Database
RE = Route Extrapolation

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Rohm and Haas Chemicals LLC

Reading, Ohio

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s) (2)	Date(s) (MM/DD/YYYY)
Volatile Organic Constituents								
1,2-Dichlorobenzene	N/A	N/A	N/A	N/A	N/A	D	IRIS	8/9/07
1,4-Dichlorobenzene	2.40E-02	$(mg/kg\text{-}day)^{-1}$	1	2.40E-02	$(mg/kg\text{-}day)^{-1}$	N/A	HEAST	10/1/04
1,2-Dichloroethane	9.10E-02	$(mg/kg\text{-}day)^{-1}$	1	9.10E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Acetone	N/A	N/A	1	N/A	N/A	D	IRIS	8/9/07
Benzene	5.50E-02	$(mg/kg\text{-}day)^{-1}$	1	5.50E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/9/07
Chlorobenzene	N/A	N/A	0.31	N/A	N/A	D	IRIS	8/9/07
Chloroform	N/A	N/A	0.2	N/A	N/A	B2	IRIS	8/9/07
Dibromochloromethane	8.40E-02	$(mg/kg\text{-}day)^{-1}$	1	8.40E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Methylene chloride	7.50E-03	$(mg/kg\text{-}day)^{-1}$	1	7.50E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Tetrachloroethene	5.40E-01	$(mg/kg\text{-}day)^{-1}$	1	5.40E-01	$(mg/kg\text{-}day)^{-1}$	N/A	CAL	2004
Toluene	N/A	N/A	1	N/A	N/A	D	IRIS	8/9/07
Trichloroethylene	1.30E-02	$(mg/kg\text{-}day)^{-1}$	0.15	8.70E-02	$(mg/kg\text{-}day)^{-1}$	N/A	CAL	2004
Vinyl chloride	7.20E-01	$(mg/kg\text{-}day)^{-1}$	1	7.20E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/9/07
Semi-Volatile Constituents								
Aniline	5.70E-03	$(mg/kg\text{-}day)^{-1}$	1	5.70E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Benzo(a)anthracene	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	10/1/04
Benzo(a)pyrene*	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1	7.30E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Benzo(b)fluoranthene	7.30E-01	$(mg/kg\text{-}day)^{-1}$	1	7.30E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	10/1/04
Bis(2-ethylhexyl)phthalate	1.40E-02	$(mg/kg\text{-}day)^{-1}$	0.19	7.40E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Dibenz(a,h)anthracene	7.30E+00	$(mg/kg\text{-}day)^{-1}$	1	7.30E+00	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	8/9/07
4-Methyl phenol	N/A	N/A	N/A	N/A	N/A	C	IRIS	8/9/07
Pesticides								
4,4-DDE	3.40E-01	$(mg/kg\text{-}day)^{-1}$	1	3.40E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Aroclor 1254	2.00E+00	$(mg/kg\text{-}day)^{-1}$	1	2.00E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
beta-BHC	1.80E+00	$(mg/kg\text{-}day)^{-1}$	1	1.80E+00	$(mg/kg\text{-}day)^{-1}$	C	IRIS	8/9/07
delta-BHC	N/A	N/A	N/A	N/A	N/A	D	IRIS	8/9/07

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Rohm and Haas Chemicals LLC

Reading, Ohio

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s) (2)	Date(s) (MM/DD/YYYY)
gamma-BHC	1.30E+00	$(mg/kg\text{-}day)^{-1}$	1	1.30E+00	$(mg/kg\text{-}day)^{-1}$	N/A	HEAST	10/1/04
Dieldrin	1.60E+01	$(mg/kg\text{-}day)^{-1}$	1	1.60E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Endrin	N/A	N/A	N/A	N/A	N/A	D	IRIS	8/9/07
Heptachlor	4.50E+00	$(mg/kg\text{-}day)^{-1}$	1	4.50E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Heptachlor epoxide	9.10E+00	$(mg/kg\text{-}day)^{-1}$	1	9.10E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	8/9/07
Metals								
Aluminum	N/A	N/A	N/A	N/A	N/A	D	NCEA	N/A
Antimony	N/A	N/A	0.15	N/A	N/A	N/A	N/A	N/A
Arsenic	1.50E+00	$(mg/kg\text{-}day)^{-1}$	1	1.50E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	8/9/07
Cadmium	N/A	N/A	0.025	N/A	N/A	B1	IRIS	8/9/07
Chromium	N/A	N/A	0.013	N/A	N/A	D	IRIS	8/9/07
Copper	N/A	N/A	N/A	N/A	N/A	D	IRIS	8/9/07
Iron	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead	N/A	N/A	N/A	N/A	N/A	B2	IRIS	8/9/07
Manganese	N/A	N/A	0.04	N/A	N/A	D	IRIS	8/9/07
Nickel	N/A	N/A	0.04	N/A	N/A	A	IRIS	8/9/07
Thallium	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A
Vanadium	N/A	N/A	0.026	N/A	N/A	N/A	N/A	N/A

(1) $SF_{ABS} = \frac{SF_O}{ABS_{GI}}$

(2) IRIS = Integrated Risk Information System

NCEA = National Center for Environmental Assessme

HEAST= Health Effects Assessment Summary Tables

PRG = U.S. EPA Region 9 Preliminary Remediation G

For HEAST and NCEA values, a reference to the PRGs is provided.

Weight of Evidence/EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen D - Not classifiable as a human carcinogen E - Evidence of noncarcinogenici

* a factor of 3 applied to benzo(a)pyrene toxicity values for child age 2-1

N/A = Not Applicable or Not Available

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Rohm and Haas Chemicals LLC
Reading, Ohio

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Volatile Organic Constituents							
1,2-Dichlorobenzene	N/A	N/A	N/A	N/A	D	IRIS	12/1/04
1,4-Dichlorobenzene	6.29E-06	$(\mu g/m^3)^{-1}$	2.20E-02	$(mg/kg\text{-}day)^{-1}$	C	NCEA	10/1/04
1,2-Dichloroethane	2.60E-05	$(\mu g/m^3)^{-1}$	9.10E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
Acetone	N/A	N/A	N/A	N/A	D	IRIS	12/1/04
Benzene	7.80E-06	$(\mu g/m^3)^{-1}$	2.73E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/1/04
Chlorobenzene	N/A	N/A	N/A	N/A	D	IRIS	12/1/04
Chloroform	2.30E-05	$(\mu g/m^3)^{-1}$	8.05E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
Dibromochloromethane	N/A	N/A	N/A	N/A	B2	N/A	N/A
Methylene chloride	4.70E-07	$(\mu g/m^3)^{-1}$	1.60E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
Tetrachloroethene	5.90E-06	$(\mu g/m^3)^{-1}$	2.07E-02	$(mg/kg\text{-}day)^{-1}$	N/A	CAL	2004
Toluene	N/A	N/A	N/A	N/A	D	IRIS	12/1/04
Trichloroethylene	2.00E-06	$(\mu g/m^3)^{-1}$	7.00E-03	$(mg/kg\text{-}day)^{-1}$	N/A	CAL	6/26/05
Vinyl chloride	4.40E-06	$(\mu g/m^3)^{-1}$	1.54E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/1/04
Semi-Volatile Constituents							
Aniline	N/A	N/A	5.70E-03	$(mg/kg\text{-}day)^{-1}$	B2	RE	12/1/04
Benzo(a)anthracene	N/A	NA	NA	NA	B2	IRIS	12/1/04
Benzo(a)pyrene	N/A	NA	NA	NA	B2	IRIS	12/1/04
Benzo(b)fluoranthene	N/A	NA	NA	NA	B2	IRIS	12/1/04
Bis(2-ethylhexyl)phthalate	N/A	N/A	1.40E-02	$(mg/kg\text{-}day)^{-1}$	B2	RE	10/1/04
Dibenz(a,h)anthracene	N/A	NA	NA	NA	B2	IRIS	12/1/04
4-Methylphenol	N/A	N/A	N/A	N/A	C	N/A	N/A
Pesticides							
4,4-DDE	N/A	N/A	3.40E-01	$(mg/kg\text{-}day)^{-1}$	B2	RE	10/1/04
Aroclor 1254	1.00E-04	$(\mu g/m^3)^{-1}$	3.50E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
beta-BHC	5.30E-04	$(\mu g/m^3)^{-1}$	1.80E+00	$(mg/kg\text{-}day)^{-1}$	C	IRIS	12/1/04
delta-BHC	N/A	N/A	N/A	N/A	D	IRIS	12/1/04

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Rohm and Haas Chemicals LLC
Reading, Ohio

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
gamma-BHC	N/A	N/A	1.30E+00	$(mg/kg\text{-}day)^{-1}$	N/A	RE	10/1/04
Dieldrin	4.60E-03	$(\mu g/m^3)^{-1}$	1.60E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
Endrin	N/A	N/A	N/A	N/A	D	IRIS	12/1/04
Heptachlor	1.30E-03	$(\mu g/m^3)^{-1}$	4.60E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
Heptachlor epoxide	2.59E-03	$(\mu g/m^3)^{-1}$	9.10E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
Metals							
Aluminum	N/A	N/A	N/A	N/A	D	NCEA	N/A
Antimony	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	4.30E-03	$(\mu g/m^3)^{-1}$	1.50E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/1/04
Cadmium	1.80E-03	$(\mu g/m^3)^{-1}$	6.30E+00	$(mg/kg\text{-}day)^{-1}$	B1	IRIS	12/1/04
Chromium	1.71E-03	$(\mu g/m^3)^{-1}$	5.99E+00	$(mg/kg\text{-}day)^{-1}$	D	IRIS	12/1/04
Copper	N/A	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	12/1/04
Iron	N/A	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	N/A	N/A
Lead	N/A	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	12/1/04
Manganese	N/A	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	12/1/04
Nickel	2.40E-04	$(\mu g/m^3)^{-1}$	8.40E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	12/1/04
Thallium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) SFi = Unit Risk x 70/20 x 1000

(2) IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment
PRG = U.S. EPA Region 9 Preliminary Remediation Goals
RE = Route extrapolation N/A = Not applicable or Not availab

(3) For IRIS values, the date IRIS was searched is prc For NCEA and RE values, a reference of the PRGs is provided.

Weight of Evidence/EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence
C - Possible human carcinogen D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 7.1

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - INDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Industrial Worker (Indoor)
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Soil	On-site building	Inhalation	1,2-Dichlorobenzene	2.80E+06	ug/kg	7.33E+01	ug/m^3	--	$(ug/m^3)^{-1}$	--	7.33E+01	ug/m^3	2.0E-01	mg/m^3	2.5E-01
				1,4-Dichlorobenzene	1.70E+05	ug/kg	2.71E+01	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.71E+01	ug/m^3	8.0E-01	mg/m^3	2.3E-02
				Acetone	2.30E+04	ug/kg	2.03E+00	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.03E+00	ug/m^3	3.5E-01	mg/m^3	4.0E-03
				Benzene	9.30E+02	ug/kg	3.27E+00	ug/m^3	7.8E-06	$(ug/m^3)^{-1}$	6.2E-06	3.27E+00	ug/m^3	3.0E-02	mg/m^3	7.5E-02
				Chlorobenzene	4.20E+04	ug/kg	3.04E+01	ug/m^3	--	$(ug/m^3)^{-1}$	--	3.04E+01	ug/m^3	6.0E-02	mg/m^3	3.5E-01
				Methylene Chloride	1.10E+04	ug/kg	3.82E+01	ug/m^3	4.7E-07	$(ug/m^3)^{-1}$	4.4E-06	3.82E+01	ug/m^3	3.0E+00	mg/m^3	8.7E-03
				Toluene	2.40E+05	ug/kg	3.85E+02	ug/m^3	--	$(ug/m^3)^{-1}$	--	3.85E+02	ug/m^3	4.0E-01	mg/m^3	5.3E-02
			Exp. Route Total								1.1E-05					7.6E-01
		Exposure Point Total									1.1E-05					7.6E-01
	Exposure Medium Total										1.1E-05					7.6E-01
Medium Total											1.1E-05					7.6E-01
Groundwater	Groundwater	On-site building	Inhalation	1,2-Dichlorobenzene	1.90E+03	ug/l	7.64E-01	ug/m^3	--	$(ug/m^3)^{-1}$	--	7.64E-01	ug/m^3	2.0E-01	mg/m^3	2.6E-03
				1,4-Dichlorobenzene	3.30E+02	ug/l	1.74E-01	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.74E-01	ug/m^3	8.0E-01	mg/m^3	1.5E-04
				1,2-Dichloroethane	6.60E+02	ug/l	1.87E-01	ug/m^3	2.6E-05	$(ug/m^3)^{-1}$	1.2E-06	1.87E-01	ug/m^3	--	mg/m^3	--
				Acetone	4.50E+04	ug/l	5.68E-01	ug/m^3	--	$(ug/m^3)^{-1}$	--	5.68E-01	ug/m^3	3.5E-01	mg/m^3	1.1E-03
				Benzene	1.50E+02	ug/l	2.44E-01	ug/m^3	7.8E-06	$(ug/m^3)^{-1}$	4.7E-07	2.44E-01	ug/m^3	3.0E-02	mg/m^3	5.6E-03
				Chlorobenzene	4.50E+03	ug/l	4.15E+00	ug/m^3	--	$(ug/m^3)^{-1}$	--	4.15E+00	ug/m^3	6.0E-02	mg/m^3	4.8E-02
				Chloroform	1.90E+02	ug/l	2.18E-01	ug/m^3	2.3E-05	$(ug/m^3)^{-1}$	1.2E-06	2.18E-01	ug/m^3	--	mg/m^3	--
				Methylene Chloride	2.80E+02	ug/l	2.00E-01	ug/m^3	4.7E-07	$(ug/m^3)^{-1}$	2.3E-08	2.00E-01	ug/m^3	3.0E+00	mg/m^3	4.6E-05
				Tetrachloroethene	8.20E+01	ug/l	3.82E-01	ug/m^3	5.9E-06	$(ug/m^3)^{-1}$	5.5E-07	3.82E-01	ug/m^3	6.0E-01	mg/m^3	4.4E-04
				Toluene	2.40E+04	ug/l	4.28E+01	ug/m^3	--	$(ug/m^3)^{-1}$	--	4.28E+01	ug/m^3	4.0E-01	mg/m^3	5.9E-03
				Trichloroethene	8.80E+00	ug/l	2.53E-02	ug/m^3	2.0E-06	$(ug/m^3)^{-1}$	1.2E-08	2.53E-02	ug/m^3	6.0E-01	mg/m^3	2.9E-05
				Vinyl Chloride	1.50E+01	ug/l	1.57E-01	ug/m^3	8.8E-06	$(ug/m^3)^{-1}$	3.4E-07	1.57E-01	ug/m^3	1.0E-01	mg/m^3	1.1E-03
			Exp. Route Total								3.8E-06					6.5E-02
		Exposure Point Total									3.8E-06					6.5E-02
	Exposure Medium Total										3.8E-06					6.5E-02
Medium Total											3.8E-06					6.5E-02
Total of Receptor Risks Across All Media											1.4E-05	Total of Receptor Hazards Across All Media				8.3E-01

TABLE 7.2

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Industrial Worker (Outdoor)
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
Soil	Soil	On-site soil	Ingestion	1,2-Dichlorobenzene	3.7E-01	mg/kg	1.3E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	3.57E-07	mg/kg-d	9.0E-02	mg/kg-d	4.0E-06
				1,4-Dichlorobenzene	3.7E-01	mg/kg	1.3E-07	mg/kg-d	2.4E-02	$(mg/kg-d)^{-1}$	3.1E-09	3.57E-07	mg/kg-d	3.0E-02	mg/kg-d	1.2E-05
				Acetone	1.5E+01	mg/kg	5.2E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.47E-05	mg/kg-d	9.0E-01	mg/kg-d	1.6E-05
				Benzene	1.7E-03	mg/kg	5.9E-10	mg/kg-d	5.5E-02	$(mg/kg-d)^{-1}$	3.3E-11	1.66E-09	mg/kg-d	4.0E-03	mg/kg-d	4.2E-07
				Chlorobenzene	9.2E-03	mg/kg	3.2E-09	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	9.00E-09	mg/kg-d	2.0E-02	mg/kg-d	4.5E-07
				Methylene Chloride	1.8E-03	mg/kg	6.3E-10	mg/kg-d	7.5E-03	$(mg/kg-d)^{-1}$	4.7E-12	1.76E-09	mg/kg-d	6.0E-02	mg/kg-d	2.9E-08
				Toluene	5.6E-04	mg/kg	2.0E-10	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	5.48E-10	mg/kg-d	8.0E-02	mg/kg-d	6.8E-09
				Benzo(a)anthracene	5.4E+00	mg/kg	1.9E-06	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.4E-06	5.28E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	6.2E+00	mg/kg	2.2E-06	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	1.6E-05	6.07E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	7.0E+00	mg/kg	2.4E-06	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.8E-06	6.85E-06	mg/kg-d	--	mg/kg-d	--
				PCB-1254 (Arochlor 1254)	9.8E-01	mg/kg	3.4E-07	mg/kg-d	2.0E+00	$(mg/kg-d)^{-1}$	6.8E-07	9.59E-07	mg/kg-d	2.0E-05	mg/kg-d	4.8E-02
				bis(2-Ethylhexyl) Phthalate	4.6E-01	mg/kg	1.6E-07	mg/kg-d	1.4E-02	$(mg/kg-d)^{-1}$	2.3E-09	4.50E-07	mg/kg-d	2.0E-02	mg/kg-d	2.3E-05
				Endrin	2.1E-03	mg/kg	7.3E-10	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.05E-09	mg/kg-d	3.0E-04	mg/kg-d	6.8E-06
				Antimony	6.0E-01	mg/kg	2.1E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	5.87E-07	mg/kg-d	4.0E-04	mg/kg-d	1.5E-03
				Arsenic	1.6E+01	mg/kg	5.7E-06	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	8.5E-06	1.59E-05	mg/kg-d	3.0E-04	mg/kg-d	5.3E-02
				Chromium, Total	2.2E+02	mg/kg	7.6E-05	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.12E-04	mg/kg-d	2.1E-02	mg/kg-d	1.0E-02
			Exp. Route Total								2.8E-05					1.1E-01
			Dermal Contact	1,2-Dichlorobenzene	3.7E-01	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	9.0E-02	mg/kg-d	--
				1,4-Dichlorobenzene	3.7E-01	mg/kg	--	mg/kg-d	2.4E-02	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	3.0E-02	mg/kg-d	--
				Acetone	1.5E+01	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	9.0E-01	mg/kg-d	--
				Benzene	1.7E-03	mg/kg	--	mg/kg-d	5.5E-02	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	4.0E-03	mg/kg-d	--
				Chlorobenzene	9.2E-03	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	6.2E-03	mg/kg-d	--
				Methylene Chloride	1.8E-03	mg/kg	--	mg/kg-d	7.5E-03	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	6.0E-02	mg/kg-d	--
				Toluene	5.6E-04	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	8.0E-02	mg/kg-d	--
				Benzo(a)anthracene	5.4E+00	mg/kg	1.6E-06	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.2E-06	4.5E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	6.2E+00	mg/kg	1.9E-06	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	1.4E-05	5.2E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	7.0E+00	mg/kg	2.1E-06	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.5E-06	5.9E-06	mg/kg-d	--	mg/kg-d	--
				PCB-1254 (Arochlor 1254)	9.8E-01	mg/kg	3.2E-07	mg/kg-d	2.0E+00	$(mg/kg-d)^{-1}$	6.3E-07	8.9E-07	mg/kg-d	2.0E-05	mg/kg-d	4.4E-02
				bis(2-Ethylhexyl) Phthalate	4.6E-01	mg/kg	1.1E-07	mg/kg-d	7.4E-02	$(mg/kg-d)^{-1}$	7.8E-09	3.0E-07	mg/kg-d	3.8E-03	mg/kg-d	7.8E-05

TABLE 7.2

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Industrial Worker (Outdoor)
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
Soil	Soil	On-site soil	Dermal Contact (cont.)	Endrin	2.1E-03	mg/kg	4.8E-10	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.4E-09	mg/kg-d	6.0E-06	mg/kg-d	2.3E-04
				Antimony	6.0E-01	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	6.0E-05	mg/kg-d	--
				Arsenic	1.6E+01	mg/kg	1.1E-06	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	1.7E-06	3.1E-06	mg/kg-d	3.0E-04	mg/kg-d	1.0E-02
				Chromium, Total	2.2E+02	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	2.7E-04	mg/kg-d	--
			Exp. Route Total								1.9E-05					5.5E-02
			Inhalation	1,2-Dichlorobenzene	3.7E+02	ug/kg	4.0E-02	ug/m^3	--	$(ug/m^3)^{-1}$	--	4.0E-02	ug/m^3	2.0E+02	ug/m^3	1.4E-04
				1,4-Dichlorobenzene	3.7E+02	ug/kg	4.6E-02	ug/m^3	6.3E-06	$(ug/m^3)^{-1}$	7.0E-08	4.6E-02	ug/m^3	8.0E+02	ug/m^3	3.9E-05
				Acetone	1.5E+04	ug/kg	1.9E+00	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.9E+00	ug/m^3	--	ug/m^3	--
				Benzene	1.7E+00	ug/kg	1.0E-03	ug/m^3	7.8E-06	$(ug/m^3)^{-1}$	1.9E-09	1.0E-03	ug/m^3	3.0E+01	ug/m^3	2.3E-05
				Chlorobenzene	9.2E+00	ug/kg	2.4E-03	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.4E-03	ug/m^3	6.0E+01	ug/m^3	2.7E-05
				Methylene Chloride	1.8E+00	ug/kg	1.2E-03	ug/m^3	4.7E-07	$(ug/m^3)^{-1}$	1.4E-10	1.2E-03	ug/m^3	3.0E+03	ug/m^3	2.7E-07
				Toluene	5.6E-01	ug/kg	2.2E-04	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.2E-04	ug/m^3	5.0E+03	ug/m^3	3.1E-08
				Benzo(a)anthracene	5.4E+03	ug/kg	9.3E-04	ug/m^3	--	$(ug/m^3)^{-1}$	--	9.3E-04	ug/m^3	--	ug/m^3	--
				Benzo(a)pyrene	6.2E+03	ug/kg	4.1E-04	ug/m^3	--	$(ug/m^3)^{-1}$	--	4.1E-04	ug/m^3	--	ug/m^3	--
				Benzo(b)fluoranthene	7.0E+03	ug/kg	2.4E-03	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.4E-03	ug/m^3	--	ug/m^3	--
				PCB-1254 (Arochlor 1254)	9.8E+02	ug/kg	2.1E-03	ug/m^3	1.0E-04	$(ug/m^3)^{-1}$	5.1E-08	2.1E-03	ug/m^3	7.0E-02	ug/m^3	2.0E-02
				bis(2-Ethylhexyl) Phthalate	4.6E+02	ug/kg	3.5E-06	ug/m^3	--	$(ug/m^3)^{-1}$	--	3.5E-06	ug/m^3	--	ug/m^3	--
				Endrin	2.1E+00	ug/kg	1.5E-06	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.5E-06	ug/m^3	--	ug/m^3	--
				Antimony	6.0E+02	ug/kg	9.6E-07	ug/m^3	--	$(ug/m^3)^{-1}$	--	9.6E-07	ug/m^3	--	ug/m^3	--
				Arsenic	1.6E+04	ug/kg	2.6E-05	ug/m^3	4.3E-03	$(ug/m^3)^{-1}$	2.7E-08	2.6E-05	ug/m^3	--	ug/m^3	--
				Chromium, Total	2.2E+05	ug/kg	3.5E-04	ug/m^3	1.7E-03	$(ug/m^3)^{-1}$	1.5E-07	3.5E-04	ug/m^3	7.0E-01	ug/m^3	3.4E-04
			Exp. Route Total								3.0E-07					2.1E-02
		Exposure Point Total									4.7E-05					1.9E-01
	Exposure Medium Total										4.7E-05					1.9E-01
Medium Total											4.7E-05					1.9E-01

TABLE 7.2

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Industrial Worker (Outdoor)
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
Groundwater	Groundwater	On-site	Inhalation	1,2-Dichlorobenzene	1.9E+03	ug/l	1.8E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	5.0E-06	mg/kg-d	5.7E-02	mg/kg-d	8.8E-05
				1,4-Dichlorobenzene	3.3E+02	ug/l	3.5E-07	mg/kg-d	2.2E-02	$(mg/kg-d)^{-1}$	7.7E-09	9.8E-07	mg/kg-d	2.3E-01	mg/kg-d	4.3E-06
				1,2-Dichloroethane	6.6E+02	ug/l	6.3E-07	mg/kg-d	9.1E-02	$(mg/kg-d)^{-1}$	5.7E-08	1.8E-06	mg/kg-d	1.4E-03	mg/kg-d	1.3E-03
				Acetone	4.5E+04	ug/l	6.2E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.7E-05	mg/kg-d	9.0E-01	mg/kg-d	1.9E-05
				Benzene	1.5E+02	ug/l	3.2E-07	mg/kg-d	2.7E-02	$(mg/kg-d)^{-1}$	8.7E-09	8.9E-07	mg/kg-d	8.6E-03	mg/kg-d	1.0E-04
				Chlorobenzene	4.5E+03	ug/l	6.4E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.8E-05	mg/kg-d	1.7E-02	mg/kg-d	1.0E-03
				Chloroform	1.9E+02	ug/l	3.5E-07	mg/kg-d	8.1E-02	$(mg/kg-d)^{-1}$	2.8E-08	9.8E-07	mg/kg-d	1.4E-02	mg/kg-d	7.0E-05
				Methylene chloride	2.8E+02	ug/l	4.2E-07	mg/kg-d	1.6E-03	$(mg/kg-d)^{-1}$	6.7E-10	1.2E-06	mg/kg-d	8.6E-01	mg/kg-d	1.4E-06
				Tetrachloroethene	8.2E+01	ug/l	3.5E-07	mg/kg-d	2.1E-02	$(mg/kg-d)^{-1}$	7.2E-09	9.7E-07	mg/kg-d	1.0E-01	mg/kg-d	9.7E-06
				Toluene	2.4E+04	ug/l	5.4E-05	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.5E-04	mg/kg-d	1.4E+00	mg/kg-d	1.1E-04
				Trichloroethene	8.8E+00	ug/l	2.6E-08	mg/kg-d	7.0E-03	$(mg/kg-d)^{-1}$	1.8E-10	7.2E-08	mg/kg-d	1.7E-01	mg/kg-d	4.3E-07
				Vinyl chloride	1.5E+01	ug/l	1.3E-07	mg/kg-d	1.5E-02	$(mg/kg-d)^{-1}$	2.0E-09	3.6E-07	mg/kg-d	2.9E-02	mg/kg-d	1.3E-05
			Exp. Route Total								1.1E-07					2.7E-03
		Exposure Point Total									1.1E-07					2.7E-03
Exposure Medium Total											1.1E-07					2.7E-03
Medium Total											1.1E-07					2.7E-03
											Total of Receptor Risks Across All Media					1.9E-01
											4.7E-05			Total of Receptor Hazards Across All Media		

TABLE 7.3

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
Soil	Soil	On-site soil	Ingestion	1,2-Dichlorobenzene	1.8E+02	mg/kg	3.0E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.12E-04	mg/kg-d	9.0E-02	mg/kg-d	2.4E-03
				1,4-Dichlorobenzene	1.5E+01	mg/kg	2.5E-07	mg/kg-d	2.4E-02	$(mg/kg-d)^{-1}$	5.9E-09	1.72E-05	mg/kg-d	3.0E-02	mg/kg-d	5.7E-04
				Acetone	1.2E+01	mg/kg	1.9E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.35E-05	mg/kg-d	9.0E-01	mg/kg-d	1.5E-05
				Benzene	9.3E-01	mg/kg	1.5E-08	mg/kg-d	5.5E-02	$(mg/kg-d)^{-1}$	8.5E-10	1.08E-06	mg/kg-d	4.0E-03	mg/kg-d	2.7E-04
				Chlorobenzene	4.7E+00	mg/kg	7.7E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	5.41E-06	mg/kg-d	2.0E-02	mg/kg-d	2.7E-04
				Methylene Chloride	3.0E+00	mg/kg	5.0E-08	mg/kg-d	7.5E-03	$(mg/kg-d)^{-1}$	3.8E-10	3.53E-06	mg/kg-d	6.0E-02	mg/kg-d	5.9E-05
				Toluene	3.7E+01	mg/kg	6.1E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	4.29E-05	mg/kg-d	8.0E-02	mg/kg-d	5.4E-04
				Benzo(a)anthracene	5.4E+00	mg/kg	9.0E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	6.5E-08	6.28E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	6.2E+00	mg/kg	1.0E-07	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	7.5E-07	7.21E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	7.0E+00	mg/kg	1.2E-07	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	8.5E-08	8.14E-06	mg/kg-d	--	mg/kg-d	--
				PCB-1254 (Arochlor 1254)	9.8E-01	mg/kg	1.6E-08	mg/kg-d	2.0E+00	$(mg/kg-d)^{-1}$	3.3E-08	1.14E-06	mg/kg-d	2.0E-05	mg/kg-d	5.7E-02
				bis(2-Ethylhexyl) Phthalate	1.4E+01	mg/kg	2.3E-07	mg/kg-d	1.4E-02	$(mg/kg-d)^{-1}$	3.3E-09	1.64E-05	mg/kg-d	2.0E-02	mg/kg-d	8.2E-04
				Endrin	4.0E-01	mg/kg	6.6E-09	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	4.59E-07	mg/kg-d	3.0E-04	mg/kg-d	1.5E-03
				Antimony	7.8E-01	mg/kg	1.3E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	9.06E-07	mg/kg-d	4.0E-04	mg/kg-d	2.3E-03
				Arsenic	6.0E+00	mg/kg	9.9E-08	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	1.5E-07	6.93E-06	mg/kg-d	3.0E-04	mg/kg-d	2.3E-02
				Chromium, Total	3.4E+01	mg/kg	5.6E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	3.91E-05	mg/kg-d	2.1E-02	mg/kg-d	1.9E-03
			Exp. Route Total								1.1E-06					9.1E-02
			Dermal Contact	1,2-Dichlorobenzene	1.8E+02	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	9.0E-02	mg/kg-d	--
				1,4-Dichlorobenzene	1.5E+01	mg/kg	--	mg/kg-d	2.4E-02	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	3.0E-02	mg/kg-d	--
				Acetone	1.2E+01	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	9.0E-01	mg/kg-d	--
				Benzene	9.3E-01	mg/kg	--	mg/kg-d	5.5E-02	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	4.0E-03	mg/kg-d	--
				Chlorobenzene	4.7E+00	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	6.2E-03	mg/kg-d	--
				Methylene Chloride	3.0E+00	mg/kg	--	mg/kg-d	7.5E-03	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	6.0E-02	mg/kg-d	--
				Toluene	3.7E+01	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	8.0E-02	mg/kg-d	--
				Benzo(a)anthracene	5.4E+00	mg/kg	3.5E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	2.6E-08	2.4E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	6.2E+00	mg/kg	4.0E-08	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	2.9E-07	2.8E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	7.0E+00	mg/kg	4.5E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	3.3E-08	3.2E-06	mg/kg-d	--	mg/kg-d	--
				PCB-1254 (Arochlor 1254)	9.8E-01	mg/kg	6.8E-09	mg/kg-d	2.0E+00	$(mg/kg-d)^{-1}$	1.4E-08	4.8E-07	mg/kg-d	2.0E-05	mg/kg-d	2.4E-02

TABLE 7.3

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration		RfD/RfC		Hazard
Soil	Soil	On-site soil	Dermal	bis(2-Ethylhexyl) Phthalate	1.4E+01	mg/kg	7.0E-08	mg/kg-d	7.4E-02	$(mg/kg-d)^{-1}$	5.2E-09	4.9E-06	mg/kg-d	3.8E-03	mg/kg-d	1.3E-03
(cont.)			Contact	Endrin	4.0E-01	mg/kg	2.0E-09	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.4E-07	mg/kg-d	6.0E-06	mg/kg-d	2.3E-02
				Antimony	7.8E-01	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	6.0E-05	mg/kg-d	--
				Arsenic	6.0E+00	mg/kg	8.9E-09	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	1.3E-08	6.2E-07	mg/kg-d	3.0E-04	mg/kg-d	2.1E-03
				Chromium, Total	3.4E+01	mg/kg	--	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	--	mg/kg-d	2.7E-04	mg/kg-d	--
			Exp. Route Total								3.8E-07					5.0E-02
			Inhalation	1,2-Dichlorobenzene	1.8E+05	ug/kg	2.0E+01	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.0E+01	ug/m^3	2.0E+02	ug/m^3	2.5E-02
				1,4-Dichlorobenzene	1.5E+04	ug/kg	1.8E+00	ug/m^3	6.3E-06	$(ug/m^3)^{-1}$	4.1E-08	1.8E+00	ug/m^3	8.0E+02	ug/m^3	5.7E-04
				Acetone	1.2E+04	ug/kg	1.5E+00	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.5E+00	ug/m^3	--	ug/m^3	--
				Benzene	9.3E+02	ug/kg	5.5E-01	ug/m^3	7.8E-06	$(ug/m^3)^{-1}$	1.5E-08	5.5E-01	ug/m^3	3.0E+01	ug/m^3	4.5E-03
				Chlorobenzene	4.7E+03	ug/kg	1.2E+00	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.2E+00	ug/m^3	6.0E+01	ug/m^3	4.9E-03
				Methylene Chloride	3.0E+03	ug/kg	2.0E+00	ug/m^3	4.7E-07	$(ug/m^3)^{-1}$	3.3E-09	2.0E+00	ug/m^3	3.0E+03	ug/m^3	1.7E-04
				Toluene	3.7E+04	ug/kg	1.5E+01	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.5E+01	ug/m^3	5.0E+03	ug/m^3	7.3E-04
				Benzo(a)anthracene	5.4E+03	ug/kg	9.2E-04	ug/m^3	--	$(ug/m^3)^{-1}$	--	9.2E-04	ug/m^3	--	ug/m^3	--
				Benzo(a)pyrene	6.2E+03	ug/kg	4.1E-04	ug/m^3	--	$(ug/m^3)^{-1}$	--	4.1E-04	ug/m^3	--	ug/m^3	--
				Benzo(b)fluoranthene	7.0E+03	ug/kg	2.4E-03	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.4E-03	ug/m^3	--	ug/m^3	--
				PCB-1254 (Arochlor 1254)	9.8E+02	ug/kg	2.1E-03	ug/m^3	1.0E-04	$(ug/m^3)^{-1}$	7.3E-10	2.1E-03	ug/m^3	7.0E-02	ug/m^3	7.3E-03
				bis(2-Ethylhexyl) Phthalate	1.4E+04	ug/kg	1.1E-04	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.1E-04	ug/m^3	--	ug/m^3	--
				Endrin	4.0E+02	ug/kg	2.8E-04	ug/m^3	--	$(ug/m^3)^{-1}$	--	2.8E-04	ug/m^3	--	ug/m^3	--
				Antimony	7.8E+02	ug/kg	1.2E-06	ug/m^3	--	$(ug/m^3)^{-1}$	--	1.2E-06	ug/m^3	--	ug/m^3	--
				Arsenic	6.0E+03	ug/kg	9.5E-06	ug/m^3	4.3E-03	$(ug/m^3)^{-1}$	1.4E-10	9.5E-06	ug/m^3	--	ug/m^3	--
				Chromium, Total	3.4E+04	ug/kg	5.4E-05	ug/m^3	1.7E-03	$(ug/m^3)^{-1}$	3.2E-10	5.4E-05	ug/m^3	7.0E-01	ug/m^3	1.9E-05
			Exp. Route Total								6.0E-08					4.3E-02
		Exposure Point Total									1.5E-06					1.8E-01
Exposure Medium Total											1.5E-06					1.8E-01
Medium Total											1.5E-06					1.8E-01

TABLE 7.3

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
Groundwater	Groundwater	On-site groundwater	Inhalation	1,2-Dichlorobenzene	1.9E+00	mg/l	7.8E-08	mg/kg-d	-	$(mg/kg-d)^{-1}$	-	2.2E-07	mg/kg-d	5.7E-02	mg/kg-d	3.8E-06
				1,4-Dichlorobenzene	3.3E-01	mg/l	1.5E-08	mg/kg-d	2.2E-02	$(mg/kg-d)^{-1}$	3.4E-10	4.3E-08	mg/kg-d	2.3E-01	mg/kg-d	1.9E-07
				1,2-Dichloroethane	6.6E-01	mg/l	2.7E-08	mg/kg-d	9.1E-02	$(mg/kg-d)^{-1}$	2.5E-09	7.6E-08	mg/kg-d	1.4E-03	mg/kg-d	5.4E-05
				Acetone	4.5E+01	mg/l	2.7E-07	mg/kg-d	-	$(mg/kg-d)^{-1}$	-	7.5E-07	mg/kg-d	9.0E-01	mg/kg-d	8.4E-07
				Benzene	1.5E-01	mg/l	1.4E-08	mg/kg-d	2.7E-02	$(mg/kg-d)^{-1}$	3.8E-10	3.9E-08	mg/kg-d	8.6E-03	mg/kg-d	4.5E-06
				Chlorobenzene	4.5E+00	mg/l	2.8E-07	mg/kg-d	-	$(mg/kg-d)^{-1}$	-	7.7E-07	mg/kg-d	1.7E-02	mg/kg-d	4.6E-05
				Chloroform	1.9E-01	mg/l	1.5E-08	mg/kg-d	8.1E-02	$(mg/kg-d)^{-1}$	1.2E-09	4.2E-08	mg/kg-d	1.4E-02	mg/kg-d	3.0E-06
				Methylene chloride	2.8E-01	mg/l	1.8E-08	mg/kg-d	1.6E-03	$(mg/kg-d)^{-1}$	2.9E-11	5.1E-08	mg/kg-d	8.6E-01	mg/kg-d	5.9E-08
				Tetrachloroethene	8.2E-02	mg/l	1.5E-08	mg/kg-d	2.1E-02	$(mg/kg-d)^{-1}$	3.1E-10	4.2E-08	mg/kg-d	1.0E-01	mg/kg-d	4.2E-07
				Toluene	2.4E+01	mg/l	2.3E-06	mg/kg-d	-	$(mg/kg-d)^{-1}$	-	6.6E-06	mg/kg-d	1.4E+00	mg/kg-d	4.6E-06
				Trichloroethene	8.8E-03	mg/l	1.1E-09	mg/kg-d	7.0E-03	$(mg/kg-d)^{-1}$	7.8E-12	3.1E-09	mg/kg-d	1.7E-01	mg/kg-d	1.8E-08
				Vinyl chloride	1.5E-02	mg/l	5.6E-09	mg/kg-d	1.5E-02	$(mg/kg-d)^{-1}$	8.7E-11	1.6E-08	mg/kg-d	2.9E-02	mg/kg-d	5.5E-07
			Exp. Route Total								4.8E-09					1.2E-04
			Dermal Contact	1,2-Dichlorobenzene	1.9E+00	mg/l	2.1E-05	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.5E-03	mg/kg-d	9.0E-02	mg/kg-d	1.7E-02
				1,4-Dichlorobenzene	3.3E-01	mg/l	3.7E-06	mg/kg-d	2.4E-02	$(mg/kg-d)^{-1}$	8.9E-08	2.6E-04	mg/kg-d	3.0E-02	mg/kg-d	8.6E-03
				1,2-Dichloroethane	6.6E-01	mg/l	5.5E-07	mg/kg-d	9.1E-02	$(mg/kg-d)^{-1}$	5.0E-08	3.9E-05	mg/kg-d	2.0E-02	mg/kg-d	1.9E-03
				Acetone	4.5E+01	mg/l	3.9E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.7E-04	mg/kg-d	9.0E-01	mg/kg-d	3.0E-04
				Benzene	1.5E-01	mg/l	3.9E-07	mg/kg-d	5.5E-02	$(mg/kg-d)^{-1}$	2.2E-08	2.8E-05	mg/kg-d	4.0E-03	mg/kg-d	6.9E-03
				Chlorobenzene	4.5E+00	mg/l	2.8E-05	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.9E-03	mg/kg-d	6.2E-03	mg/kg-d	3.1E-01
				Chloroform	1.9E-01	mg/l	3.0E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.1E-05	mg/kg-d	2.0E-03	mg/kg-d	1.0E-02
				Methylene chloride	2.8E-01	mg/l	1.8E-07	mg/kg-d	7.5E-03	$(mg/kg-d)^{-1}$	1.3E-09	1.3E-05	mg/kg-d	6.0E-02	mg/kg-d	2.1E-04
				Tetrachloroethene	8.2E-02	mg/l	8.4E-07	mg/kg-d	5.4E-01	$(mg/kg-d)^{-1}$	4.5E-07	5.9E-05	mg/kg-d	1.0E-02	mg/kg-d	5.9E-03
				Toluene	2.4E+01	mg/l	1.4E-04	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.0E-02	mg/kg-d	8.0E-02	mg/kg-d	1.3E-01
				Trichloroethene	8.8E-03	mg/l	2.6E-08	mg/kg-d	8.7E-02	$(mg/kg-d)^{-1}$	2.3E-09	1.8E-06	mg/kg-d	9.0E-04	mg/kg-d	2.0E-03
				Vinyl chloride	1.5E-02	mg/l	1.3E-08	mg/kg-d	7.2E-01	$(mg/kg-d)^{-1}$	9.6E-09	9.4E-07	mg/kg-d	3.0E-03	mg/kg-d	3.1E-04
				bis-(2-ethylhexyl) phtha	3.4E-02	mg/l	9.0E-07	mg/kg-d	7.4E-02	$(mg/kg-d)^{-1}$	6.7E-08	6.3E-05	mg/kg-d	3.8E-02	mg/kg-d	1.7E-03
				4-Methylphenol	3.3E-01	mg/l	5.0E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	3.5E-05	mg/kg-d	5.0E-03	mg/kg-d	7.0E-03
				Aniline	1.2E+01	mg/l	4.4E-06	mg/kg-d	5.7E-03	$(mg/kg-d)^{-1}$	2.5E-08	3.1E-04	mg/kg-d	7.0E-03	mg/kg-d	4.4E-02
				beta-BHC	1.2E-02	mg/l	1.8E-07	mg/kg-d	1.8E+00	$(mg/kg-d)^{-1}$	3.3E-07	1.3E-05	mg/kg-d	2.0E-04	mg/kg-d	6.4E-02
				delta-BHC	1.0E-03	mg/l	1.5E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.1E-06	mg/kg-d	--	mg/kg-d	--
				gamma-BHC	4.7E-04	mg/l	7.2E-09	mg/kg-d	1.3E+00	$(mg/kg-d)^{-1}$	9.4E-09	5.0E-07	mg/kg-d	3.0E-04	mg/kg-d	1.7E-03
				4,4-DDE	3.0E-04	mg/l	3.2E-08	mg/kg-d	3.4E-01	$(mg/kg-d)^{-1}$	1.1E-08	2.2E-06	mg/kg-d	--	mg/kg-d	--
				Dieldrin	2.7E-03	mg/l	3.2E-08	mg/kg-d	1.6E+01	$(mg/kg-d)^{-1}$	5.1E-07	2.3E-06	mg/kg-d	2.5E-05	mg/kg-d	9.0E-02
				Heptachlor	6.0E-03	mg/l	4.9E-08	mg/kg-d	4.5E+00	$(mg/kg-d)^{-1}$	2.2E-07	3.4E-06	mg/kg-d	5.0E-04	mg/kg-d	6.8E-03

TABLE 7.3

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
Groundwater (cont.)	Groundwater	On-site groundwater	Dermal Contact	Heptachlor epoxide	9.7E-04	mg/l	7.4E-09	mg/kg-d	9.1E+00	$(mg/kg-d)^{-1}$	6.7E-08	5.2E-07	mg/kg-d	1.3E-05	mg/kg-d	4.0E-02
				Aluminum	3.9E+01	mg/l	3.3E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.3E-04	mg/kg-d	1.0E+00	mg/kg-d	2.3E-04
				Antimony	1.1E+00	mg/l	8.8E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	6.2E-06	mg/kg-d	6.0E-05	mg/kg-d	1.0E-01
				Arsenic	6.1E-01	mg/l	5.1E-08	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	7.6E-08	3.6E-06	mg/kg-d	3.0E-04	mg/kg-d	1.2E-02
				Cadmium	2.2E-02	mg/l	1.8E-09	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.3E-07	mg/kg-d	1.3E-05	mg/kg-d	1.0E-02
				Chromium	7.2E+00	mg/l	6.0E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	4.2E-05	mg/kg-d	2.0E-02	mg/kg-d	2.2E-03
				Copper	4.6E+00	mg/l	3.9E-07	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.7E-05	mg/kg-d	1.2E-02	mg/kg-d	2.2E-03
				Iron	9.6E+01	mg/l	7.9E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	5.6E-04	mg/kg-d	3.0E-01	mg/kg-d	1.9E-03
				Lead	4.1E-01	mg/l	3.4E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.4E-06	mg/kg-d	--	mg/kg-d	--
				Manganese	1.3E+01	mg/l	1.1E-06	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	7.6E-05	mg/kg-d	5.6E-03	mg/kg-d	1.3E-02
				Nickel	2.0E+00	mg/l	3.2E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.3E-06	mg/kg-d	8.0E-04	mg/kg-d	2.8E-03
				Thallium	1.7E-02	mg/l	1.4E-09	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	9.7E-08	mg/kg-d	6.6E-05	mg/kg-d	1.5E-03
				Vanadium	1.5E-01	mg/l	1.2E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	8.6E-07	mg/kg-d	2.6E-05	mg/kg-d	3.3E-02
			Exp. Route Total								1.9E-06					9.3E-01
		Exposure Point Total									2.0E-06					9.3E-01
Exposure Medium Total											2.0E-06					9.3E-01
Medium Total											2.0E-06					9.3E-01
											Total of Receptor Risks Across All Media	3.5E-06		Total of Receptor Hazards Across All Media		1.1E+00

TABLE 7.4

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIOAL USER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational User
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration		RfD/RfC		Hazard
Surface Water	Surface Water	Mill Creek	Ingestion	Dibromochloromethane	8.6E-04	mg/l	7.5E-09	mg/kg-d	8.4E-02	$(mg/kg-d)^{-1}$	6.3E-10	2.19E-08	mg/kg-d	2.00E-02	mg/kg-d	1.1E-06
				Thallium	6.8E-03	mg/l	5.9E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.73E-07	mg/kg-d	6.60E-05	mg/kg-d	2.6E-03
			Exp. Route Total								6.3E-10					2.6E-03
			Dermal Contact	Dibromochloromethane	8.6E-04	mg/l	5.0E-11	mg/kg-d	8.4E-02	$(mg/kg-d)^{-1}$	4.2E-12	1.5E-10	mg/kg-d	2.0E-02	mg/kg-d	7.3E-09
				Thallium	6.8E-03	mg/l	2.1E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	6.2E-08	mg/kg-d	6.6E-05	mg/kg-d	9.4E-04
			Exp. Route Total								4.2E-12					9.4E-04
		Exposure Point Total									6.3E-10					3.6E-03
	Exposure Medium Total										6.3E-10					3.6E-03
Medium Total											6.3E-10					3.6E-03
Sediment	Sediment	Mill Creek	Incidental Ingestion	Benzo(a)anthracene	1.4E+00	mg/kg	4.9E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	3.6E-08	1.4E-07	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	1.2E+00	mg/kg	4.2E-08	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	3.1E-07	1.2E-07	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	1.3E+00	mg/kg	4.5E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	3.3E-08	1.3E-07	mg/kg-d	--	mg/kg-d	--
				beta-BHC	9.4E-02	mg/kg	3.3E-09	mg/kg-d	1.8E+00	$(mg/kg-d)^{-1}$	5.9E-09	9.6E-09	mg/kg-d	2.0E-04	mg/kg-d	4.8E-05
				e	1.9E-01	mg/kg	6.6E-09	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	4.8E-08	1.9E-08	mg/kg-d	--	mg/kg-d	--
				Dieldrin	2.4E-02	mg/kg	8.4E-10	mg/kg-d	1.6E+01	$(mg/kg-d)^{-1}$	1.3E-08	2.4E-09	mg/kg-d	5.0E-05	mg/kg-d	4.9E-05
				Arsenic	6.3E+00	mg/kg	2.2E-07	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	3.3E-07	6.4E-07	mg/kg-d	3.0E-04	mg/kg-d	2.1E-03
			Exp. Route Total								7.7E-07					2.2E-03
			Dermal Contact	Benzo(a)anthracene	1.4E+00	mg/kg	1.8E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.3E-08	5.4E-08	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	1.2E+00	mg/kg	1.6E-08	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	1.2E-07	4.6E-08	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.7E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.2E-08	5.0E-08	mg/kg-d	--	mg/kg-d	--
				beta-BHC	9.4E-02	mg/kg	9.5E-10	mg/kg-d	1.8E+00	$(mg/kg-d)^{-1}$	1.7E-09	2.8E-09	mg/kg-d	2.0E-04	mg/kg-d	1.4E-05
				e	1.9E-01	mg/kg	2.5E-09	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	1.8E-08	7.3E-09	mg/kg-d	--	mg/kg-d	--
				Dieldrin	2.4E-02	mg/kg	2.4E-10	mg/kg-d	1.6E+01	$(mg/kg-d)^{-1}$	3.9E-09	7.1E-10	mg/kg-d	2.5E-05	mg/kg-d	2.8E-05
				Arsenic	6.3E+00	mg/kg	1.9E-08	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	2.9E-08	5.6E-08	mg/kg-d	3.0E-04	mg/kg-d	1.9E-04
			Exp. Route Total								1.9E-07					2.3E-04
		Exposure Point Total									9.7E-07					2.5E-03
Exposure Medium Total											9.7E-07					2.5E-03
Medium Total											9.7E-07					2.5E-03
										Total of Receptor Risks Across All Media	9.7E-07			Total of Receptor Hazards Across All Media		6.0E-03

TABLE 7.5

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - CHILD RECREATIOAL WADER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational User
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration		RfD/RfC		Hazard
Surface Water	Surface Water	Mill Creek	Ingestion	Dibromochloromethane	8.6E-04	mg/l	8.8E-09	mg/kg-d	6.2E-02	(mg/kg-d)$^{-1}$	5.4E-10	1.02E-07	mg/kg-d	2.00E-02	mg/kg-d	5.1E-06
				Thallium	6.8E-03	mg/l	6.9E-08	mg/kg-d	--	(mg/kg-d)$^{-1}$	--	8.07E-07	mg/kg-d	6.60E-05	mg/kg-d	1.2E-02
			Exp. Route Total								5.4E-10					1.2E-02
		Exposure Point Total									5.4E-10					1.2E-02
	Exposure Medium Total										5.4E-10					1.2E-02
	Surface Water	Mill Creek	Dermal Contact	Dibromochloromethane	8.6E-04	mg/l	2.1E-11	mg/kg-d	7.3E-01	(mg/kg-d)$^{-1}$	1.6E-11	2.5E-10	mg/kg-d	2.0E-02	mg/kg-d	1.2E-08
				Thallium	6.8E-03	mg/l	9.1E-09	mg/kg-d	--	(mg/kg-d)$^{-1}$	--	1.1E-07	mg/kg-d	6.6E-05	mg/kg-d	1.6E-03
			Exp. Route Total								1.6E-11					1.6E-03
		Exposure Point Total									1.6E-11					1.6E-03
	Exposure Medium Total										1.6E-11					1.6E-03
Medium Total											5.6E-10					1.4E-02
Sediment	Sediment	Mill Creek	Incidental Ingestion	Benzo(a)anthracene	1.4E+00	mg/kg	1.1E-07	mg/kg-d	7.3E-01	(mg/kg-d)$^{-1}$	8.3E-08	1.3E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	1.2E+00	mg/kg	9.8E-08	mg/kg-d	2.2E+01	(mg/kg-d)$^{-1}$	2.1E-06	1.1E-06	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.1E-07	mg/kg-d	7.3E-01	(mg/kg-d)$^{-1}$	7.7E-08	1.2E-06	mg/kg-d	--	mg/kg-d	--
				beta-BHC	9.4E-02	mg/kg	7.7E-09	mg/kg-d	1.8E+00	(mg/kg-d)$^{-1}$	1.4E-08	8.9E-08	mg/kg-d	2.0E-04	mg/kg-d	4.5E-04
				e	1.9E-01	mg/kg	1.5E-08	mg/kg-d	7.3E+00	(mg/kg-d)$^{-1}$	1.1E-07	1.8E-07	mg/kg-d	--	mg/kg-d	--
				Dieldrin	2.4E-02	mg/kg	2.0E-09	mg/kg-d	1.8E+00	(mg/kg-d)$^{-1}$	1.4E-08	2.3E-08	mg/kg-d	5.0E-05	mg/kg-d	4.6E-04
				Arsenic	6.3E+00	mg/kg	5.1E-07	mg/kg-d	1.5E+00	(mg/kg-d)$^{-1}$	7.7E-07	6.0E-06	mg/kg-d	3.0E-04	mg/kg-d	2.0E-02
			Exp. Route Total								3.2E-06					2.1E-02
		Exposure Point Total									3.2E-06					2.1E-02
	Exposure Medium Total										3.2E-06					2.1E-02
	Sediment	Mill Creek	Dermal Contact	Benzo(a)anthracene	1.4E+00	mg/kg	2.1E-08	mg/kg-d	7.3E-01	(mg/kg-d)$^{-1}$	1.6E-08	2.5E-07	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	1.2E+00	mg/kg	1.8E-08	mg/kg-d	2.2E+01	(mg/kg-d)$^{-1}$	4.0E-07	2.1E-07	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	1.3E+00	mg/kg	2.0E-08	mg/kg-d	7.3E-01	(mg/kg-d)$^{-1}$	1.5E-08	2.3E-07	mg/kg-d	--	mg/kg-d	--
				beta-BHC	9.4E-02	mg/kg	1.1E-09	mg/kg-d	1.8E+00	(mg/kg-d)$^{-1}$	2.0E-09	1.3E-08	mg/kg-d	2.0E-04	mg/kg-d	6.5E-05
				e	1.9E-01	mg/kg	2.9E-09	mg/kg-d	7.3E+00	(mg/kg-d)$^{-1}$	2.1E-08	3.4E-08	mg/kg-d	--	mg/kg-d	--
				Dieldrin	2.4E-02	mg/kg	2.8E-10	mg/kg-d	1.6E+01	(mg/kg-d)$^{-1}$	4.5E-09	3.3E-09	mg/kg-d	2.5E-05	mg/kg-d	1.3E-04
				Arsenic	6.3E+00	mg/kg	2.2E-08	mg/kg-d	1.5E+00	(mg/kg-d)$^{-1}$	3.3E-08	2.6E-07	mg/kg-d	3.0E-04	mg/kg-d	8.7E-04
			Exp. Route Total								4.9E-07					1.1E-03
		Exposure Point Total									4.9E-07					1.1E-03
	Exposure Medium Total										4.9E-07					1.1E-03
Medium Total											3.7E-06					2.2E-02
										Total of Receptor Risks Across All Media	3.7E-06				Total of Receptor Hazards Across All Media	3.6E-02

TABLE 7.6

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - OFF-SITE RECREATIONAL USER (AGE 6-13)

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Receptor (Outdoor)
Receptor Age:	Child Age 6-13

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC (maximum)		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard
Soil	Soil	Off-site soil	Ingestion	Benzo(a)pyrene	7.60E-02	mg/kg	8.7E-09	mg/kg-d	2.2E+01	$(mg/kg-d)^{-1}$	1.9E-07	7.6E-08	mg/kg-d	--	mg/kg-d	--
				Arsenic	1.00E+01	mg/kg	1.1E-06	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	1.7E-06	1.0E-05	mg/kg-d	3.0E-04	mg/kg-d	3.3E-02
			Exp. Route Total								1.9E-06					3.3E-02
			Dermal Contact	Benzo(a)pyrene	7.60E-02	mg/kg	1.0E-09	mg/kg-d	2.2E+01	$(mg/kg-d)^{-1}$	2.3E-08	9.0E-09	mg/kg-d	--	mg/kg-d	--
				Arsenic	1.00E+01	mg/kg	1.4E-07	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	2.0E-07	1.2E-06	mg/kg-d	3.0E-04	mg/kg-d	3.9E-03
			Exp. Route Total								2.3E-07					3.9E-03
			Inhalation	benzo(a)pyrene	7.6E+02	ug/kg	4.2E-06	ug/m^3	--	$(ug/m^3)^{-1}$	--	4.2E-06	ug/m^3	--	ug/m^3	--
				Arsenic	1.0E+04	ug/kg	1.4E-05	ug/m^3	4.3E-03	$(ug/m^3)^{-1}$	1.2E-09	1.4E-05	ug/m^3	--	ug/m^3	--
			Exp. Route Total								1.2E-09					--
		Exposure Point Total									2.1E-06					3.7E-02
	Exposure Medium Total										2.1E-06					3.7E-02
Medium Total											2.1E-06					3.7E-02
										Total of Receptor Risks Across All Media	2.1E-06			Total of Receptor Hazards Across All Media		3.7E-02

TABLE 7.7

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - OFF-SITE RECREATIONAL USER (AGE 13-17)

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Receptor (Outdoor)
Receptor Age:	Child Age 13-17

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC (maximum) Value	EPC (maximum) Units	Cancer Risk Calculations: Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration		RfD/RfC		Hazard
Soil	Soil	Off-site soil	Ingestion	Benzo(a)pyrene	7.60E-02	mg/kg	4.9E-09	mg/kg-d	2.2E+01	$(mg/kg-d)^{-1}$	1.1E-07	6.9E-08	mg/kg-d	--	mg/kg-d	--
				Arsenic	1.00E+01	mg/kg	6.5E-07	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	9.7E-07	9.1E-06	mg/kg-d	3.0E-04	mg/kg-d	3.0E-02
			Exp. Route Total								1.1E-06					3.0E-02
			Dermal Contact	Benzo(a)pyrene	7.60E-02	mg/kg	8.9E-10	mg/kg-d	2.2E+01	$(mg/kg-d)^{-1}$	1.9E-08	1.2E-08	mg/kg-d	--	mg/kg-d	--
				Arsenic	1.00E+01	mg/kg	1.2E-07	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	1.7E-07	1.6E-06	mg/kg-d	3.0E-04	mg/kg-d	5.4E-03
			Exp. Route Total								1.9E-07					5.4E-03
			Inhalation	benzo(a)pyrene	7.6E+02	ug/kg	4.2E-06	ug/m^3	--	$(ug/m^3)^{-1}$	--	4.2E-06	ug/m^3	--	ug/m^3	--
				Arsenic	1.0E+04	ug/kg	1.4E-05	ug/m^3	4.3E-03	$(ug/m^3)^{-1}$	1.1E-09	1.4E-05	ug/m^3	--	ug/m^3	--
			Exp. Route Total								1.1E-09					0.0E+00
		Exposure Point Total									1.3E-06					3.6E-02
	Exposure Medium Total										1.3E-06					3.6E-02
Medium Total											1.3E-06					3.6E-02
										Total of Receptor Risks Across All Media	1.3E-06			Total of Receptor Hazards Across All Media		3.6E-02

TABLE 7.8

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIOAL FISHERMAN

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Fisherman
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard
Surface Water	Fish	Fish from Mill Creek	Ingestion	Arsenic	1.1E+00	mg/kg	8.3E-05	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	1.2E-04	1.93E-04	mg/kg-d	3.0E-04	mg/kg-d	6.4E-01
				Copper	1.3E+00	mg/kg	1.0E-04	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	2.39E-04	mg/kg-d	4.0E-02	mg/kg-d	6.0E-03
				Zinc	2.3E+01	mg/kg	1.8E-03	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	4.12E-03	mg/kg-d	3.0E-01	mg/kg-d	1.4E-02
Sediment				1,2-Dichlorobenzene	7.9E-01	mg/kg	6.0E-05	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.4E-04	mg/kg-d	9.0E-02	mg/kg-d	1.6E-03
			Exp. Route Total								1.2E-04					6.6E-01
		Exposure Point Total									1.2E-04					6.6E-01
	Exposure Medium Total										1.2E-04					6.6E-01
Medium Total											1.2E-04					6.6E-01

TABLE 7.8

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIOAL FISHERMAN

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Fisherman
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake		CSF		Cancer Risk	Non-Cancer Hazard Calculations: Intake		RfD		Hazard
Surface Water	Surface Water	Mill Creek	Ingestion	Dibromochloromethane	8.6E-04	mg/l	7.5E-09	mg/kg-d	8.4E-02	$(mg/kg-d)^{-1}$	6.3E-10	2.19E-08	mg/kg-d	2.00E-02	mg/kg-d	1.1E-06
				Thallium	6.8E-03	mg/l	5.9E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	1.73E-07	mg/kg-d	6.60E-05	mg/kg-d	2.6E-03
			Exp. Route Total								6.3E-10					2.6E-03
		Exposure Point Total									6.3E-10					2.6E-03
	Exposure Medium Total										6.3E-10					2.6E-03
	Surface Water	Mill Creek	Dermal Contact	Dibromochloromethane	8.6E-04	mg/l	4.8E-11	mg/kg-d	8.4E-02	$(mg/kg-d)^{-1}$	4.0E-12	1.1E-10	mg/kg-d	2.0E-02	mg/kg-d	5.6E-09
				Thallium	6.8E-03	mg/l	2.1E-08	mg/kg-d	--	$(mg/kg-d)^{-1}$	--	4.8E-08	mg/kg-d	6.6E-05	mg/kg-d	7.3E-04
			Exp. Route Total								4.0E-12					7.3E-04
		Exposure Point Total									4.0E-12					7.3E-04
	Exposure Medium Total										4.0E-12					7.3E-04
Medium Total											6.3E-10					3.3E-03
Sediment	Sediment	Mill Creek	Incidental Ingestion	Benzo(a)anthracene	1.4E+00	mg/kg	4.7E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	3.4E-08	1.1E-07	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	1.2E+00	mg/kg	4.0E-08	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	2.9E-07	9.4E-08	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	1.3E+00	mg/kg	4.4E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	3.2E-08	1.0E-07	mg/kg-d	--	mg/kg-d	--
				beta-BHC	9.4E-02	mg/kg	3.2E-09	mg/kg-d	1.8E+00	$(mg/kg-d)^{-1}$	5.7E-09	7.4E-09	mg/kg-d	2.0E-04	mg/kg-d	3.7E-05
				Dibenz(a,h)anthracene	1.9E-01	mg/kg	6.4E-09	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	4.7E-08	1.5E-08	mg/kg-d	--	mg/kg-d	--
				Dieldrin	2.4E-02	mg/kg	8.1E-10	mg/kg-d	1.6E+01	$(mg/kg-d)^{-1}$	1.3E-08	1.9E-09	mg/kg-d	5.0E-05	mg/kg-d	3.8E-05
				Arsenic	6.3E+00	mg/kg	2.1E-07	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	3.2E-07	4.9E-07	mg/kg-d	3.0E-04	mg/kg-d	1.6E-03
			Exp. Route Total								7.4E-07					1.7E-03
		Exposure Point Total									7.4E-07					1.7E-03
	Exposure Medium Total										7.4E-07					1.7E-03

TABLE 7.8

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIOAL FISHERMAN

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Fisherman
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake		CSF		Cancer Risk	Non-Cancer Hazard Calculations: Intake		RfD		Hazard
	Sediment	Mill Creek	Dermal Contact	Benzo(a)anthracene	1.4E+00	mg/kg	1.8E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.3E-08	5.2E-08	mg/kg-d	--	mg/kg-d	--
				Benzo(a)pyrene	1.2E+00	mg/kg	1.5E-08	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	1.1E-07	4.4E-08	mg/kg-d	--	mg/kg-d	--
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.6E-08	mg/kg-d	7.3E-01	$(mg/kg-d)^{-1}$	1.2E-08	4.8E-08	mg/kg-d	--	mg/kg-d	--
				beta-BHC	9.4E-02	mg/kg	9.1E-10	mg/kg-d	1.8E+00	$(mg/kg-d)^{-1}$	1.6E-09	2.7E-09	mg/kg-d	2.0E-04	mg/kg-d	1.3E-05
				Dibenz(a,h)anthracene	1.9E-01	mg/kg	2.4E-09	mg/kg-d	7.3E+00	$(mg/kg-d)^{-1}$	1.8E-08	7.0E-09	mg/kg-d	--	mg/kg-d	--
				Dieldrin	2.4E-02	mg/kg	2.3E-10	mg/kg-d	1.6E+01	$(mg/kg-d)^{-1}$	3.7E-09	6.8E-10	mg/kg-d	2.5E-05	mg/kg-d	2.7E-05
				Arsenic	6.3E+00	mg/kg	1.8E-08	mg/kg-d	1.5E+00	$(mg/kg-d)^{-1}$	2.8E-08	5.4E-08	mg/kg-d	3.0E-04	mg/kg-d	1.8E-04
			Exp. Route Total								1.9E-07					2.2E-04
		Exposure Point Total									1.9E-07					2.2E-04
	Exposure Medium Total										1.9E-07					2.2E-04
Medium Total											9.3E-07					1.9E-03
										Total of Receptor Risks Across All Media	1.2E-04			Total of Receptor Hazards Across All Media		6.7E-01

TABLE 8.1

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - INDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Indoor Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	On-site building	1,2-Dichlorobenzene	--	--	--	--	Whole Body	--	2.5E-01	--	2.5E-01
			1,4-Dichlorobenzene	--	--	--	--	Liver	--	2.3E-02	--	2.3E-02
			Acetone	--	--	--	--	NA	--	4.0E-03	--	4.0E-03
			Benzene	--	6.2E-06	--	6.2E-06	Blood	--	7.5E-02	--	7.5E-02
			Chlorobenzene	--	--	--	--	Liver, Kidney	--	3.5E-01	--	3.5E-01
			Methylene Chloride	--	4.4E-06	--	4.4E-06	Liver	--	8.7E-03	--	8.7E-03
			Toluene	--	--	--	--	neuro	--	5.3E-02	--	5.3E-02
			Chemical Total		1.1E-05		1.1E-05			7.6E-01		7.6E-01
		Exposure Point Total					1.1E-05					7.6E-01
	Exposure Medium Total						1.1E-05					7.6E-01
Medium Total							1.1E-05					7.6E-01
Groundwater	Groundwater	On-site building	1,2-Dichlorobenzene	--	--	--	--	Whole Body	--	2.6E-03	--	2.6E-03
			1,4-Dichlorobenzene	--	--	--	--	Liver	--	1.5E-04	--	1.5E-04
			1,2-Dichloroethane	--	1.2E-06	--	1.2E-06	NA	--	--	--	--
			Acetone	--	--	--	--	NA	--	1.1E-03	--	1.1E-03
			Benzene	--	4.7E-07	--	4.7E-07	Blood	--	5.6E-03	--	5.6E-03
			Chlorobenzene	--	--	--	--	Liver, Kidney	--	4.8E-02	--	4.8E-02
			Chloroform	--	1.2E-06	--	1.2E-06	NA	--	--	--	--
			Methylene Chloride	--	2.3E-08	--	2.3E-08	Liver	--	4.6E-05	--	4.6E-05
			Tetrachloroethene	--	5.5E-07	--	5.5E-07	NA	--	4.4E-04	--	4.4E-04
			Toluene	--	--	--	--	neuro	--	5.9E-03	--	5.9E-03
			Trichloroethene	--	1.2E-08	--	1.2E-08	neuro	--	2.9E-05	--	2.9E-05
			Vinyl Chloride	--	3.4E-07	--	3.4E-07	Liver	--	1.1E-03	--	1.1E-03
			Chemical Total		3.8E-06		3.8E-06			6.5E-02		6.5E-02
		Exposure Point Total					3.8E-06					6.5E-02
	Exposure Medium Total						3.8E-06					6.5E-02
Medium Total							3.8E-06					6.5E-02
Receptor Total							1.4E-05				Receptor HI Total	8.3E-01

Total neuro HI Across All Media = 5.9E-02

TABLE 8.2

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Outdoor Worker (maximum concentration)
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	On-site soil	1,2-Dichlorobenzene	--	--	--	--	Whole Body	2.6E-06	1.4E-04	--	1.4E-04
			1,4-Dichlorobenzene	1.7E-09	7.0E-08	--	7.2E-08	Liver	1.5E-04	3.9E-05	--	1.9E-04
			Acetone	--	--	--	--	Liver, Kidney	1.6E-05	--	--	1.6E-05
			Benzene	3.3E-11	1.9E-09	--	1.9E-09	blood	4.2E-07	2.3E-05	--	2.3E-05
			Chlorobenzene	--	--	--	--	Liver	4.5E-07	2.7E-05	--	2.8E-05
			Methylene Chloride	4.7E-12	1.4E-10	--	1.4E-10	Liver	2.9E-08	2.7E-07	--	3.0E-07
			Toluene	--	--	--	--	neuro,Liver, Kidney	2.7E-09	3.1E-08	--	3.3E-08
			Benzo(a)anthracene	1.4E-06	--	1.2E-06	2.6E-06	NA	--	--	--	--
			Benzo(a)pyrene	1.6E-05	--	1.4E-05	2.9E-05	NA	--	--	--	--
			Benzo(b)fluoranthene	1.8E-06	--	1.5E-06	3.3E-06	NA	--	--	--	--
			PCB-1254 (Arochlor 1254)	6.8E-07	5.1E-08	6.3E-07	1.4E-06	Eye, Nail, Immune System	4.8E-02	2.0E-02	4.4E-02	1.1E-01
			bis(2-Ethylhexyl) Phthalate	2.3E-09	--	7.8E-09	1.0E-08	Liver	2.3E-05	--	7.8E-05	1.0E-04
			Endrin	--	--	--	--	Liver	6.8E-06	--	2.3E-04	2.3E-04
			Antimony	--	--	--	--	blood	1.5E-03	--	--	1.5E-03
			Arsenic	8.5E-06	2.7E-08	1.7E-06	1.0E-05	Skin	5.3E-02	--	1.0E-02	6.3E-02
			Chromium, Total	--	1.5E-07	--	1.5E-07	NA	1.0E-02	3.4E-04	--	1.0E-02
			Chemical Total	2.8E-05	3.0E-07	1.9E-05	4.7E-05		1.1E-01	2.1E-02	5.5E-02	1.9E-01
		Exposure Point Total					4.7E-05					1.9E-01
	Exposure Medium Total						4.7E-05					1.9E-01
Medium Total							4.7E-05					1.9E-01

TABLE 8.2

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - OUTDOOR WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Outdoor Worker (maximum concentration)
Receptor Age:	Adult

Groundwater	Groundwater	Ambient Air	1,2-Dichlorobenzene	--	--	--	--	Whole Body	--	8.8E-05	--	8.8E-05
			1,4-Dichlorobenzene	--	7.7E-09	--	7.7E-09	Liver	--	4.3E-06	--	4.3E-06
			1,2-Dichloroethane	--	5.7E-08	--	5.7E-08	NA	--	1.3E-03	--	1.3E-03
			Acetone	--	--	--	--	NA	--	1.9E-05	--	1.9E-05
			Benzene	--	8.7E-09	--	8.7E-09	blood	--	1.0E-04	--	1.0E-04
			Chlorobenzene	--	--	--	--	Liver, Kidney	--	1.0E-03	--	1.0E-03
			Chloroform	--	2.8E-08	--	2.8E-08	NA	--	7.0E-05	--	7.0E-05
			Methylene chloride	--	6.7E-10	--	6.7E-10	Liver	--	1.4E-06	--	1.4E-06
			Tetrachloroethene	--	7.2E-09	--	7.2E-09	NA	--	9.7E-06	--	9.7E-06
			Toluene	--	--	--	--	neuro	--	1.1E-04	--	1.1E-04
			Trichloroethene	--	1.8E-10	--	1.8E-10	neuro	--	4.3E-07	--	4.3E-07
			Vinyl chloride	--	2.0E-09	--	2.0E-09	Liver		1.3E-05	--	1.3E-05
			Chemical Total		1.1E-07	--	1.1E-07			2.7E-03	--	2.7E-03
		Exposure Point Total					1.1E-07					2.7E-03
	Exposure Medium Total						1.1E-07					2.7E-03
Medium Total							1.1E-07					2.7E-03
Receptor Total							4.7E-05				Receptor HI Total	1.9E-01

Total Eye, Nail, Immune System HI Across All Media =	1.1E-01
Total Skin HI Across All Media =	6.3E-02

TABLE 8.3

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Construction Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	On-site	1,2-Dichlorobenzene	--	--	--	--	Whole Body	2.4E-03	2.5E-02	--	2.7E-02
			1,4-Dichlorobenzene	5.9E-09	4.1E-08	--	4.7E-08	Liver	5.7E-04	5.7E-04	--	1.1E-03
			Acetone	--	--	--	--	Liver, Kidney	1.5E-05	--	--	1.5E-05
			Benzene	8.5E-10	1.5E-08	--	1.6E-08	blood	2.7E-04	4.5E-03	--	4.8E-03
			Chlorobenzene	--	--	--	--	Liver	2.7E-04	4.9E-03	--	5.2E-03
			Methylene Chloride	3.8E-10	3.3E-09	--	3.7E-09	Liver	5.9E-05	1.7E-04	--	2.2E-04
			Toluene	--	--	--	--	neuro,Liver, Kidney	5.4E-04	7.3E-04	--	1.3E-03
			Benzo(a)anthracene	6.5E-08	--	2.6E-08	9.1E-08	NA	--	--	--	--
			Benzo(a)pyrene	7.5E-07	--	2.9E-07	1.0E-06	NA	--	--	--	--
			Benzo(b)fluoranthene	8.5E-08	--	3.3E-08	1.2E-07	NA	--	--	--	--
			PCB-1254 (Arochlor 1254)	3.3E-08	7.3E-10	1.4E-08	4.7E-08	Eye, Nail, Immune System	5.7E-02	7.3E-03	2.4E-02	8.8E-02
			bis(2-Ethylhexyl) Phthalate	3.3E-09	--	5.2E-09	8.5E-09	Liver	8.2E-04	--	1.3E-03	2.1E-03
			Endrin	--	--	--	--	Liver	1.5E-03	--	2.3E-02	2.5E-02
			Antimony	--	--	--	--	blood	2.3E-03	--	--	2.3E-03
			Arsenic	1.5E-07	1.4E-10	1.3E-08	1.6E-07	Skin	2.3E-02	--	2.1E-03	2.5E-02
			Chromium, Total	--	3.2E-10	--	3.2E-10	NA	1.9E-03	1.9E-05	--	1.9E-03
			Chemical Total	1.1E-06	6.0E-08	3.8E-07	1.5E-06		9.1E-02	4.3E-02	5.0E-02	1.8E-01
		Exposure Point Total					1.5E-06					1.8E-01
	Exposure Medium Total						1.5E-06					1.8E-01
Medium Total							1.5E-06					1.8E-01
Groundwater	Groundwater	On-site	1,2-Dichlorobenzene	--	-	--	--	Whole Body	--	3.8E-06	1.7E-02	1.7E-02
			1,4-Dichlorobenzene	--	3.4E-10	8.9E-08	8.9E-08	Liver	--	1.9E-07	8.6E-03	8.6E-03
			1,2-Dichloroethane	--	2.5E-09	5.0E-08	5.3E-08	NA	--	5.4E-05	1.9E-03	2.0E-03
			Acetone	--	-	--	--	NA	--	8.4E-07	3.0E-04	3.1E-04
			Benzene	--	3.8E-10	2.2E-08	2.2E-08	blood	--	4.5E-06	6.9E-03	6.9E-03
			Chlorobenzene	--	-	--	--	Liver/Kidney	--	4.6E-05	3.1E-01	3.1E-01
			Chloroform	--	1.2E-09	--	1.2E-09	NA	--	3.0E-06	1.0E-02	1.0E-02
			Methylene chloride	--	2.9E-11	1.3E-09	1.4E-09	Liver	--	5.9E-08	2.1E-04	2.1E-04
			Tetrachloroethene	--	3.1E-10	4.5E-07	4.5E-07	NA	--	4.2E-07	5.9E-03	5.9E-03
			Toluene	--	-	--	--	neuro	--	4.6E-06	1.3E-01	1.3E-01
			Trichloroethene	--	7.8E-12	2.3E-09	2.3E-09	Liver, Kidney	--	1.8E-08	2.0E-03	2.0E-03
			Vinyl chloride	--	8.7E-11	9.6E-09	9.7E-09	Liver		5.5E-07	3.1E-04	3.1E-04
			bis-(2Ethylhexyl) phthalate	--	--	6.7E-08	6.7E-08	Liver	--	--	1.7E-03	1.7E-03
			4-Methylphenol	--	--	--	--	NA	--	--	7.0E-03	7.0E-03
			Aniline	--	--	2.5E-08	2.5E-08	NA	--	--	4.4E-02	4.4E-02

TABLE 8.3

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - CONSTRUCTION WORKER

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future											
Receptor Population:	Construction Worker											
Receptor Age:	Adult											
Groundwater (cont.)	Groundwater	On-site	beta-BHC	--	--	3.3E-07	3.3E-07	Liver, Kidney	--	--	6.4E-02	6.4E-02
			delta-BHC	--	--	--	--	NA	--	--	--	5.4E-03
			gamma-BHC	--	--	9.4E-09	9.4E-09	Liver, Kidney	--	--	1.7E-03	1.7E-03
			4,4-DDE	--	--	1.1E-08	1.1E-08	NA	--	--	--	--
			Dieldrin	--	--	5.1E-07	5.1E-07	Liver	--	--	--	9.0E-02
			Heptachlor	--	--	2.2E-07	2.2E-07	Liver	--	--	9.0E-02	6.8E-03
			Heptachlor epoxide	--	--	6.7E-08	6.7E-08	Liver	--	--	6.8E-03	4.0E-02
			Aluminum	--	--	--	--	NA	--	--	4.0E-02	2.3E-04
			Antimony	--	--	--	--	Blood	--	--	2.3E-04	1.0E-01
			Arsenic	--	--	7.6E-08	7.6E-08	Skin	--	--	1.0E-01	1.2E-02
			Cadmium	--	--	--	--	Kidney	--	--	1.2E-02	1.0E-02
			Chromium	--	--	--	--	NA	--	--	1.0E-02	2.2E-03
			Copper	--	--	--	--	Gastrointestinal	--	--	2.2E-03	2.2E-03
			Iron	--	--	--	--	NA	--	--	2.2E-03	1.9E-03
			Lead	--	--	--	--	NA	--	--	1.9E-03	--
			Manganese	--	--	--	--	CNS	--	--	--	1.3E-02
			Nickel	--	--	--	--	Various	--	--	1.3E-02	2.8E-03
			Thallium	--	--	--	--	Blood	--	--	2.8E-03	1.5E-03
			Vanadium	--	--	--	--	Liver	--	--	1.5E-03	3.3E-02
			Chemical Total		4.8E-09	1.9E-06	2.0E-06			1.2E-04	9.0E-01	9.3E-01
		Exposure Point Total					2.0E-06					9.3E-01
	Exposure Medium Total						2.0E-06					9.3E-01
Medium Total							2.0E-06					9.3E-01
Receptor Total							3.5E-06				Receptor HI Total	1.1E+00

Total Liver HI Across All Media =	6.2E-01
Total Kidney HI Across All Media =	1.0E-02
Total Blood HI Across All Media =	1.2E-01
Total Other HI Across All Media =	3.9E-01

TABLE 8.4

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIONAL USERS

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Users
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Wate	Surface Water	Mill Creek	Dibromochloromethane	6.3E-10	--	4.2E-12	5.0E-10	Liver	1.1E-06	--	7.3E-09	1.1E-06
			Thallium	--	--	--	--	Blood	2.6E-03	--	9.4E-04	3.6E-03
			Chemical Total	6.3E-10		4.2E-12	5.0E-10		2.6E-03		9.4E-04	3.6E-03
		Exposure Point Total					5.0E-10					3.6E-03
	Exposure Medium Total						5.0E-10					3.6E-03
Medium Total							5.0E-10					3.6E-03
Sediment	Sediment	Mill Creek	Benzo(a)anthracene	3.6E-08	--	1.3E-08	4.9E-08	--	--	--	--	--
			Benzo(a)pyrene	3.1E-07	--	1.2E-07	4.2E-07	--	--	--	--	--
			Benzo(b)fluoranthene	3.3E-08	--	1.2E-08	4.6E-08	--	--	--	--	--
			beta-BHC	5.9E-09	--	1.7E-09	7.6E-09	Liver, Kidney	4.8E-05	--	1.4E-05	6.2E-05
			Dibenz(a,h)anthracene	4.8E-08	--	1.8E-08	6.7E-08	--	--	--	--	--
			Dieldrin	1.3E-08	--	3.9E-09	1.7E-08	Liver	4.9E-05	--	2.8E-05	7.7E-05
			Arsenic	3.3E-07	--	2.9E-08	3.6E-07	Skin	2.1E-03	--	1.9E-04	2.3E-03
			Chemical Total	7.7E-07		1.9E-07	9.7E-07		2.2E-03		2.3E-04	2.5E-03
		Exposure Point Total					9.7E-07					2.5E-03
	Exposure Medium Total						9.7E-07					2.5E-03
Medium Total							9.7E-07					2.5E-03
Receptor Total							9.7E-07				Receptor HI Total	6.0E-03

Total Blood HI Across All Media =	3.6E-03
Total Skin HI Across All Media =	2.3E-03

TABLE 8.5

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - CHILD RECREATIONAL USERS

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Users
Receptor Age:	Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Wate	Surface Water	Mill Creek	Dibromochloromethane	7.4E-10	--	1.8E-12	7.4E-10	Liver	5.1E-06	--	1.2E-08	5.1E-06
			Thallium	--	--	--	--	Blood	1.2E-02	--	1.6E-03	1.4E-02
			Chemical Total	7.4E-10		1.8E-12	7.4E-10		1.2E-02		1.6E-03	1.4E-02
		Exposure Point Total					7.4E-10					1.4E-02
	Exposure Medium Total						7.4E-10					1.4E-02
Medium Total							7.4E-10					1.4E-02
Sediment	Sediment	Mill Creek	Benzo(a)anthracene	8.3E-08	--	1.6E-08	9.9E-08	--	--	--	--	--
			Benzo(a)pyrene	2.1E-06	--	4.0E-07	2.5E-06	--	--	--	--	--
			Benzo(b)fluoranthene	7.7E-08	--	1.5E-08	9.2E-08	--	--	--	--	--
			beta-BHC	1.4E-08	--	2.0E-09	1.6E-08	Liver, Kidney	4.5E-04	--	6.5E-05	5.1E-04
			Dibenz(a,h)anthracene	1.1E-07	--	2.1E-08	1.3E-07	--	--	--	--	--
			Dieldrin	3.1E-08	--	4.5E-09	3.6E-08	Liver	4.6E-04	--	1.3E-04	5.9E-04
			Arsenic	7.7E-07	--	3.3E-08	8.0E-07	Skin	2.0E-02	--	8.7E-04	2.1E-02
			Chemical Total	3.2E-06		5.0E-07	3.7E-06		2.1E-02		1.1E-03	2.2E-02
		Exposure Point Total					3.7E-06					2.2E-02
	Exposure Medium Total						3.7E-06					2.2E-02
Medium Total							3.7E-06					2.2E-02
Receptor Total							3.7E-06				Receptor HI Total	3.6E-02

Total Skin HI Across All Media =	2.1E-02
Total Blood HI Across All Media =	1.4E-02
Total Liver HI Across All Media =	1.1E-03

TABLE 8.6

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - OFF-SITE RECREATIONAL USER (AGE 6-13)

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Receptor
Receptor Age:	Child (Age 6-13)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Off-site soil	Benzo(a)pyrene	1.9E-07	--	2.3E-08	2.1E-07	NA	--	--	--	--
			Arsenic	1.7E-06	1.2E-09	2.0E-07	1.9E-06	Liver	3.3E-02	--	3.9E-03	3.7E-02
			Chemical Total	1.7E-06	1.2E-09	2.0E-07	2.1E-06		3.3E-02	0.0E+00	3.9E-03	3.7E-02
		Exposure Point Total					2.1E-06					3.7E-02
	Exposure Medium Total						2.1E-06					3.7E-02
Medium Total							2.1E-06					3.7E-02
Receptor Total							2.1E-06				Receptor HI Total	3.7E-02

Total Liver HI Across All Media = 3.7E-02

TABLE 8.7

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - OFF-SITE RECREATIONAL USER (AGE 13-17)

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Receptor
Receptor Age:	Child (Age 13-17)

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Off-site soil	Benzo(a)pyrene	1.1E-07	--	1.9E-08	1.3E-07	NA	--	--	--	--
			Arsenic	9.7E-07	1.1E-09	1.7E-07	1.1E-06	Liver	3.0E-02	--	5.4E-03	3.6E-02
			Chemical Total	9.7E-07	1.1E-09	1.7E-07	1.3E-06		3.0E-02	0.0E+00	5.4E-03	3.6E-02
		Exposure Point Total					1.3E-06					3.6E-02
	Exposure Medium Total						1.3E-06					3.6E-02
Medium Total							1.3E-06					3.6E-02
Receptor Total							1.3E-06				Receptor HI Total	3.6E-02

Total Liver HI Across All Media = 3.6E-02

TABLE 8.8

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE - ADULT RECREATIONAL FISHERMAN

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Receptor Population:	Recreational Fisherman
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Fish	Mill Creek	Arsenic	1.2E-04	--	--	1.2E-04	Liver	6.4E-01	--	--	6.4E-01
			Copper	--	--	--	--	Gastrointestinal	6.0E-03	--	--	6.0E-03
			Zinc	--	--	--	--	Whole Body	1.4E-02	--	--	1.4E-02
Sediment			1,2-Dichlorobenzene	--	--	--	--	--	1.6E-03	--	--	1.6E-03
			Chemical Total	1.2E-04	--	--	1.2E-04		6.6E-01	--	--	6.6E-01
		Exposure Point Total					1.2E-04					6.6E-01
	Exposure Medium Total						1.2E-04					6.6E-01
Medium Total							1.2E-04					6.6E-01
Surface Water	Surface Water	Mill Creek	Dibromochloromethane	6.3E-10	--	4.0E-12	6.3E-10	Liver	1.1E-06	--	5.6E-09	1.1E-06
			Thallium	--	--	--	--	--	2.6E-03	--	7.3E-04	3.3E-03
			Chemical Total	6.3E-10		4.0E-12	6.3E-10		2.6E-03		7.3E-04	3.3E-03
		Exposure Point Total					6.3E-10					3.3E-03
	Exposure Medium Total						6.3E-10					3.3E-03
Medium Total							6.3E-10					3.3E-03
Sediment	Sediment	Mill Creek	Benzo(a)anthracene	3.4E-08	--	1.3E-08	4.7E-08	--	--	--	--	--
			Benzo(a)pyrene	2.9E-07	--	1.1E-07	4.0E-07	--	--	--	--	--
			Benzo(b)fluoranthene	3.2E-08	--	1.2E-08	4.4E-08	--	--	--	--	--
			beta-BHC	5.7E-09	--	1.6E-09	7.3E-09	--	3.7E-05	--	1.3E-05	5.0E-05
			Dibenz(a,h)anthracene	4.7E-08	--	1.8E-08	6.4E-08	--	--	--	--	--
			Dieldrin	1.3E-08	--	3.7E-09	1.7E-08	--	3.8E-05	--	2.7E-05	6.5E-05
			Arsenic	3.2E-07	--	2.8E-08	3.4E-07	Skin	1.6E-03	--	1.8E-04	1.8E-03
			Chemical Total	7.4E-07		1.9E-07	9.3E-07		1.7E-03		2.2E-04	1.9E-03
		Exposure Point Total					9.3E-07					1.9E-03
	Exposure Medium Total						9.3E-07					1.9E-03
Medium Total							9.3E-07					1.9E-03
Receptor Total							1.2E-04				Receptor HI Total	6.7E-01

Total Liver HI Across All Media =	6.4E-01
Total Whole Body HI Across All Media =	1.4E-02

TABLE 8.9
Comparison of Seep Water Analytical Results and Human Health Surface Water Screening Values
Rohm and Haas Chemicals LLC
Reading, Ohio

Chemicals	NRWQC	MCL	RSLs	Ohio EPA	Maximum Concentrations	Locations	Exceedance
Volatile Organic Compounds							
Acetone			22000		3.1	SS-5	No
Benzene	2.2			5	1.1	SS-1	No
Carbon disulfide			1000		1.1	SS-5	No
Chlorobenzene	130			100	24	SS-5	No
1,1-Dichloroethane			2.4		1	SS-1	No
Ethylbenzene	530			700	0.39	SS-1	No
Methylcyclohexane^			5200^		0.49	SS-1	No
Toluene	1300			1000	0.55	SS-5	No
Xylenes (total)		10000		10000	1.7	SS-1	No
Semi-Volatile Organic Compounds							
1,2-Dichlorobenzene	420			600	21	SS-1	No
1,4-Dichlorobenzene	63			75	2.6	SS-1	No
Pesticides							
beta-BHC	0.0091				0.056	SS-5	Yes
alpha-Chlordane	0.0008			0.021	0.02	SS-5	Yes
4,4'-DDE	0.00022			0.0059	0.025	SS-5	Yes
4,4'-DDT	0.00022			0.0059	0.028	SS-1	Yes
Dieldrin	0.00052			0.0014	0.053	SS-1	Yes
Endosulfan I	62			110	0.03	SS-5	No
Endosulfan II	62			110	0.046	SS-1	No
Heptachlor epoxide	0.000039			0.001	0.033	SS-1	Yes
Isodrin					0.005	SS-1	Screening Level not available
Inorganics							
Aluminum		50-200			48300	SS-1	Yes
Arsenic	0.018			10	25.7	SS-1	Yes
Barium	1000			2000	494	SS-1	No
Beryllium	4			4	3.1	SS-1	No
Cadmium	5			5	1.7	SS-1	No
Calcium					430000	SS-1	No, essential nutrient
Chromium		100		100	174	SS-1	Yes
Cobalt			11		43.8	SS-1	Yes
Copper	1300			1300 (non-drinking)	104	SS-1	No
Iron	300			300	90100	SS-1	Yes
Lead		15			126	SS-1	Yes
Magnesium					90100	SS-1	No, essential nutrient
Manganese		50			2730	SS-5	Yes
Mercury		2		0.012	0.18	SS-5	Yes
Nickel	610			610	214	SS-1	No
Potassium					14200	SS-1	No, essential nutrient
Sodium					375000	SS-5	No, essential nutrient
Tin			22000		1340	SS-5	No
Vanadium			180		124	SS-1	Yes
Zinc	7400			9100	411	SS-1	No

Unit: ug/l

- Maximum concentration exceeds the screening level.
- Maximum concentration exceeds the Ohio EPA criteria.

Concentrations in red indicate the Ohio EPA screening levels are lower than NRWCC, MCL or RSLs.
NRWQC - National Recommended Water Quality Criterion (2009)
MCL - Maximum Contaminant Level (2010)
RSLs - Regional screening levels for tapwater May 2010.
Ohio EPA - Ohio EPA Ohio River Basin Human Health Drinking Water Criteria or non-Drinking Water Criteria (2009)
^ These constituents were included in the 2004 PRG tables, but not included in the 2010 RSL tables.

TABLE 8.10
Comparison of Surface Water Analytical Results and Human Health Surface Water Screening Values
Rohm and Haas Chemicals LLC
Reading, Ohio

Chemicals	NRWQC	MCL	RSLs	Ohio EPA	Maximum Concentrations	Locations
Volatile Organic Compounds						
Acetone			22000		6.3	WS-1A
Chloroform	5.7			57	0.26	WS-6A+DUP
cis-1,2-Dichloroethene		70		70	0.26	WS-5A
Dibromochloromethane	0.55			4.1	0.86	WS-3A
1,1,1-Trichloroethane	200			200	0.4	WS-6A+DUP
Trichloroethene	2.5			5	0.33	WS-2A
Semi-Volatile Organic Compounds						
1,4-Dioxane			6.1		1.1	WS-4A
bis(2-Ethylhexyl) phthalate	1.2			6	1.4	WS-3A
Inorganics						
Arsenic	0.018			10	3.6	WS-6A (Dup)
Barium	1000			2000	61.8	WS-4A
Beryllium	4			4	0.78	WS-1A
Cobalt			11		1.2	WS-6A (Dup)
Copper	1300			1300 (non-drinking)	6.7	WS-1A
Mercury		2		0.012	0.094	WS-2A
Thallium	0.24			1.7	6.8	WS-6A (Dup)
Zinc	7400			9100	23.1	WS-6A (Dup)

Unit: ug/l

- Maximum concentration exceeds the screening level.
- Maximum concentration exceeds the Ohio EPA criteria.

Concentrations in red indicate the Ohio EPA screening levels are lower than NRWCC, MCL or RSLs.
NRWQC - National Recommended Water Quality Criterion (2009)
MCL - Maximum Contaminant Level (2010)
RSLs - Regional screening levels for tapwater May 2010.
Ohio EPA - Ohio EPA Ohio River Basin Human Health Drinking Water Criteria or non-Drinking Water Criteria (2009)
(when drinking water criteria is exceeded or not available)

TABLE 8.11
Comparison of Groundwater Analytical Results and Human Health Surface Water Screening Values
Rohm and Haas Chemicals LLC
Reading, Ohio

Chemicals	NRWQC	MCL	RSLs	Ohio EPA	Maximum Concentrations - All Wells	Locations	Exceedance
VOCs (ug/l)							
1,1,1-Trichloroethane	200			200	56	UAW20-60	No
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)			59000		3.9	MW-EPA-2	No
1,1,2-Trichloroethane	0.59			5	5	MW-EPA-2	Yes
1,2-Dichlorobenzene	420			600	1000	MW-EPA-1	Yes
1,3-Dichlorobenzene	320			400	46	MW-EPA-1	No
1,4-Dichlorobenzene	63			75	330	MW-EPA-1	Yes
1,1-Dichloroethane			2.4		26	UAW20-60	Yes
1,1-Dichloroethene	330			0.57/32 (non-drinking)	9.8	UAW20-60	Yes
1,2-Dichloroethane	0.38			3.8	1600	UAW20-60	Yes
cis-1,2-Dichloroethene		70		70	63	UAW20-60	No
4-Methyl-2-pentanone			2000		44	UAW08-20	No
Benzene	2.2			5	87	UAW08-20	Yes
Bromodichloromethane	0.55			5.6	1.3	UAW09-20	Yes
Carbon disulfide			1000		95	UAW13-20	No
Carbon tetrachloride	0.23			2.5	1.1	UAW15-20	Yes
Chlorobenzene	130			100	4400	MW-EPA-1	Yes
Chloroethane^			4.6^		0.61	UAW10-80	No
Chloroform	5.7			57	82	UAW20-60	Yes
Cyclohexane			13000		1.9	UAW8-20	No
Ethylbenzene	530			700	30	UAW08-20	No
Isopropylbenzene			680		1.1	UAW07-20	No
Methylcyclohexane^			5200^		8	UAW08-20	No
Methyl ethyl ketone			7100		4.6	UAW015-50	No
Methylene chloride	4.6			5	10	UAW05-20	Yes
Tetrachloroethene	0.69			5	55	UAW20-60	Yes
Toluene	1300			1000	4000	UAW04-20	Yes
trans-1,2-Dichloroethene	140			100	2.2	UAW02-40	No
Trichloroethene	2.5			5	6	MW-EPA-2	Yes
Vinyl chloride	0.025			2	4.1	UAW01-80	Yes
Xylenes (total)		10000		10000	130	UAW08-20	No
SVOCs (ug/l)							
2-Chlorophenol	81			0.1/400 (non-drinking)	16	MW-EPA-1	Yes
2-Methylnaphthalene*			0.14		5.7	UAW13-20	Yes
2-Methylphenol^			1800^		12	UAW04-20	No
4-Methylphenol^			180^		12	UAW04-20	No
Acenaphthene	670			1200	1.2	UAW06-20	No
Aniline			12		1700	UAW08-20	Yes
bis(2-Ethylhexyl) phthalate	1.2			6	1.1	UAW27-50	Yes

TABLE 8.11
Comparison of Groundwater Analytical Results and Human Health Surface Water Screening Values
Rohm and Haas Chemicals LLC
Reading, Ohio

Chemicals	NRWQC	MCL	RSLs	Ohio EPA	Maximum Concentrations - All Wells	Locations	Exceedance
Caprolactam^			18000^		16	UAW11-10	No
Di-n-Butyl phthalate	2000			2700	0.62	UAW21-30	No
Naphthalene			0.14		11	MW-EPA-1	Yes
Metals (ug/l)							
Aluminum		50-200			7270	UAW21-30	Yes
Antimony	5.6			6	21.4	UAW04-20	Yes
Arsenic	0.018			10	293	MW-EPA-1	Yes
Barium	1000			2000	528	UAW15-50	No
Beryllium	4			4	0.75	UAW21-30	No
Cadmium	5			5	5.3	MW-EPA-2	Yes
Calcium					878000	UAW13-20	No
Chromium	100	100		100	7230	UAW21-30	Yes
Cobalt			11		91.4	UAW21-30	Yes
Copper	1300			1300 (non-drinking)	157	UAW21-30	No
Iron	300			300	56500	UAW21-30	Yes
Lead		15			22.8	UAW03-20	Yes
Magnesium					143000	UAW08-20	No
Manganese		50			7620	UAW22-20	Yes
Mercury		2		0.012	0.12	UAW03-20	Yes
Nickel	610			610	1950	UAW21-30	Yes
Potassium					23900	UAW23-20	No
Selenium	170			50	18.5	UAW23-20	No
Silver			180	50	9.9	UAW10-50	No
Sodium					1400000	UAW15-20	No
Thallium	0.24			1.7	11.9	UAW22-20	Yes
Tin			22000		4950	UAW08-20	No
Vanadium			36		39.3	UAW21-30	Yes
Zinc	7400			9100	244	UAW03-20	No

- Maximum concentration exceeds the screening level.
- Maximum concentration exceeds the Ohio EPA drinking water criteria.

Concentrations in red indicate the Ohio EPA screening levels are lower than NRWCC, MCL or RSLs.
NRWQC - National Recommended Water Quality Criterion (2009)
MCL - Maximum Contaminant Level (2010)
RSLs - Regional screening levels for tapwater (May 2010).
Ohio EPA - Ohio EPA Ohio River Basin Human Health Drinking Water Criteria or non-Drinking Water Criteria (2009)
(when drinking water criteria is exceeded or not available)
* - Naphthalene screening level is used as a surrogate for 2-methylnaphthalene.
^ These constituents were included in the 2004 PRG tables, but not included in the 2010 RSL tables.

TABLE 9.1
PLANTS IDENTIFIED BY COVER TYPE
DURING SITE RECONNAISSANCE
Rohm and Haas Chemicals LLC
Reading, Ohio

Common Name	Scientific Name	Cover Type
Black locust	*Robinia pseudo-acacia*	1
Box elder	*Acer negundo*	1, 2
Burdock	*Arctium minus*	2
Canada thistle	*Cirsium arvense*	3
Chickweed	*Stellaria media*	3
Chinese elm	*Solanum nigrum*	3
Choke cherry	*Prunus*	4
Coltsfoot	*Tussilago farfara*	3
Common cinquefoil	*Potenilla simplex*	3
Common plantain	*Plantago major*	3, 4
Cottonwood	*Populus deltoides*	1, 2
Crab grass	*Digitaria sanguinalis*	3
Curled dock	*Rumex crispus*	1
Dandelion	*Taraxacum officinale*	3, 4
English plantain	*Plantago lanceolata*	3, 4
Gill-over-the ground	*Glechoma hederacea*	3
Goldenrod	*Solidago sp.*	1, 2, 3
Hackberry	*Celtis occidentalis*	1
Holly	*Ilex opaca*	4
Moth mullein	*Verbascum thapsus*	1
Mugwort	*Gleditsia triacanthos*	3
Mulberry	*Morus rubra*	1, 3
Norway spruce	*Picea abies*	3
Poison ivy	*Rhus radicans*	1, 3
Privet	*Ligustrum vulgare*	3
Queen Anne's lace	*Daucus carrota*	1
Raspberry	*Rubus allegheniensis*	1
Red fescue	*Festuca rubra*	3
Red maple	*Acer rubra*	1, 2
Reed canary grass	*Phalaris arundinacea*	2
Sandbar willow	*Salix interior*	2
Scotch pine	*Pinus sylvestris*	3
Slippery elm	*Ulmas rubra*	2
Smooth sumac	*Rhus glabra*	2
Sycamore	*Platanus occidentalis*	2
Tartarian honeysuckle	*Lonicera tatarica*	1, 2

TABLE 9.1
PLANTS IDENTIFIED BY COVER TYPE
DURING SITE RECONNAISSANCE
Rohm and Haas Chemicals LLC
Reading, Ohio

Common Name	Scientific Name	Cover Type
Teasel	*Dipsacus sylvestris*	1
Virginia creeper	*Parthenocissus quinquefolia*	1
Weeping willow	*Salix babylonica*	2
White birch	*Betula papyrifera*	3
White campion	*Lychnis alba*	3
White clover	*Trifolium repens*	1, 3, 4
White honeysuckle	*Acer saccharum*	2
White pine	*Pinus strobes*	3
Wild grape	*Vitis aestivalis*	1
Wild parsnip	*Pastinaca sativa*	1
Wood sorrel	*Oxalis Montana*	3
Yellow hop clover	*Trifolium agrarium*	3
Yellow sweet clover	*Melilotus officinalis*	1, 3
Yew	*Taxus canadensis*	4

Notes:

Cover Types:

1 = Successional Old Field
2 = Riparian Forest
3 = Residential/Recreational Area
4 = Industrial Area

Reconnaissance performed by Geomatrix Consultants, Inc. on May 29 and 30, 2001.

Results are representative of conditions present at the time of reconnaissance.

TABLE 9.2
REPTILES AND AMPHIBIANS THAT MAY POTENTIALLY OCCUR
ON OR ADJACENT TO THE SITE BASED ON HABITAT TYPES PRESENT
Rohm and Haas Chemicals LLC
Reading, Ohio

Common Name	Scientific Name	Habitat Requirements
American toad	*Bufo americanus*	Woods, gardens, open fields
Black rat snake	*Elaphe obsoleta obsoleta*	Woodlands, thickets, field edges
Box turtle	*Terrapene carolina*	Woodland, field edges
Eastern garter snake	*Thamnophis sirtalis sirtalis*	Ubiquitous
Eastern milk snake	*Lampropeltis triangulum triangulum*	Various habitat, usually with brushy cover
Fowler's toad	*Bufo woodhousii*	Sandy soil, roadsides
Gray treefrog	*Hyla versicolor*	Small trees and shrubs near water
Green Frog	*Rana clamitans*	Riparian habitat
Kirtland's snake	*Clonophis kirtlandii*	Parks and urban areas
Midland painted turtle	*Chrysemys picta marginata*	Shallow ponds, woodland streams
Northern leopard frog	*Rana pipiens*	Meadows, grassy fields near water
Northern water snake	*Nerodia sipedon sipedon*	Aquatic area with rocks for basking
Racer	*Coluber constrictor*	Wooded areas, roadsides, fields
Red-spotted newt	*Notophthalmus viridescens*	Weedy areas of slow moving streams
Snapping turtle	*Chelydra serpentina*	Streams, rivers, lakes, ponds
Spiny softshell	*Apalone spinifera*	Large water systems
Spring peepers	*Pseudacris crucifer*	Woodlots near water

Reference:

Conat and Collins, 1975

TABLE 9.3
BIRDS SPECIES THAT MAY POTENTIALLY OCCUR ON OR ADJACENT TO THE SITE BASED ON HABITAT TYPES PRESENT

Rohm and Haas Chemicals LLC
Reading, Ohio

Common Name	Scientific Name	Habitat Requirements
Birds Observed by Sight or Song		
American crow	*Corvus brachyrhynchos*	Forest edges
American goldfinch	*Carduelis tristis*	Open weedy fields
Barn swallow	*Hirundo rustica*	Man-made structures
Black-capped chickadee	*Poecile atricapillus*	Mixed woodlands
Blue jay	*Cyanocitta cristata*	Mixed woodlands, suburbs, parks
Cardinal	*Cardinalis cardinalis*	Forest edges, residential areas
Cedar waxwing	*Bombycilla cedrorum*	Open woodlands near water
Chipping sparrow	*Spizella passerina*	Open woodlands, forest edge, suburban residential areas
Downy Woodpecker	*Picoides pubescens*	Edge of open mixed woodlots
Gray catbird	*Dumatella carolinensis*	Dense thickets along woodland edges, shrubbery around dwellings
Great crested flycatcher	*Myiarchus crinitus*	Forest edge
House sparrow	*Passer domesticus*	Urban settings
Indigo bunting	*Passerina cyanea*	Woodland edges
Mockingbird	*Mimus polygloottus*	Woodland edges, often in cities
Mourning dove	*Zenaida macroura*	Open mixed woodlands, suburbs
Northern oriole	*Icterus galbula*	Roadsides, open woodlands, suburban shade trees
Purple finch	*Carpodacus purpureus*	Woods, groves, suburbs
Robin	*Turdus migratorius*	Woodland edges and clearings, shade trees
Rock dove	*Columba livia*	Common near human habitation
Song sparrow	*Melospiza melodia*	Brushy fields, cities, suburbs, forest edges
Starling	*Sturnus vulgaris*	Urban settings
Tree swallow	*Tachycineta bicolor*	Open country near water
Yellow warbler	*Dendroica petechia*	Farmlands, roadsides
Birds That May Potentially Occur		
American black duck	*Anas rubripes*	Lakes, river, ponds
American kestrel	*Falco sparverius*	Open areas, forest edges, farm buildings

TABLE 9.3
BIRDS SPECIES THAT MAY POTENTIALLY OCCUR ON OR ADJACENT TO THE SITE BASED ON HABITAT TYPES PRESENT
Rohm and Haas Chemicals LLC
Reading, Ohio

Common Name	Scientific Name	Habitat Requirements
American redstart	*Setophaga ruticilla*	Sapling woodlots, shade trees and shrubbery around dwellings
American tree sparrow	*Spizella arborea*	Brushy roadsides, weedy edges
Belted kingfisher	*Ceryle alcyon*	Streams, lakes
Bewick's wren	*Thryomanes bewickii*	Thickets, gardens
Black-crowned night-heron	*Nycticorax nycticorax*	Marshes, shores, roosts in trees
Blue-winged warbler	*Vermivora pinus*	Edges of woods, brushy overgrown fields
Brown thrasher	*Toxostooma rufum*	Woodland edges, bushes, low trees
Brown-headed cowbird	*Molothrus ater*	Forest edges, suburban areas
Canada Goose	*Branta candensis*	Lakes, ponds, rivers, fields
Carolina wren	*Thryothorus ludovicianus*	Brushy undergrowth, gardens
Chimney swift	*Chaetura pelagica*	Near buildings
Common grackle	*Quiscalus quiscula*	Farmlands, suburbs
Common nighthawk	*Chordeiles minor*	Open areas, cities
Cooper's hawk	*Accipiter cooperii*	Broken woodlands
Eastern bluebird	*Sialia sialis*	Roadsides, open country, woodland edges
Eastern kingbird	*Tyrannus tyrannus*	Forest edge, pastures
Eastern phoebe	*Sayornis phoebe*	Woodlands, suburbs
Eastern screech owl	*Otus asio*	Open woodlands, shade trees in towns
Eastern wood peewee	*Contoopus virens*	Roadsides, woodlots
Field sparrow	*Spizella pusilla*	Old fields, woodland edges
Great blue heron	*Ardea herodias*	Swamps, shores, rivers
Great horned owl	*Bubo virginianus*	Mixed countryside of forest and fields
Green heron	*Butorides virescens*	Streamside, lakes, ponds, marshes
Hairy woodpecker	*Picoides villosus*	Forests, woodlands, shade trees
House Finch	*Carpodacus mexicanus*	Open woods, suburban areas
House wren	*Troglodytes aedon*	Near human dwellings
Killdeer	*Charadrius vociferus*	Lawns, waste places, open meadows
Louisiana waterthrush	*Seiurus motacilla*	Brooks, rivers

TABLE 9.3
BIRDS SPECIES THAT MAY POTENTIALLY OCCUR ON OR ADJACENT TO THE SITE BASED ON HABITAT TYPES PRESENT

Rohm and Haas Chemicals LLC
Reading, Ohio

Common Name	Scientific Name	Habitat Requirements
Mallard duck	*Anas platyrhynchos*	Lakes, rivers, ponds
Northern flicker	*Colaptes auratus*	Open woodland edges, woodlots
Northern harrier	*Circus cyaneus*	Fields, farmlands
Northern junco	*Junco hyemalis*	Forest edges
Orchard oriole	*Icterus spurius*	Woodland edges, shade trees
Purple martin	*Progne subis*	Farmlands, parks, suburban yards
Red-bellied woodpecker	*Melanerpes carolinus*	Woodland, towns
Red-headed woodpecker	*Melanerpes erythrocephalus*	Farm country, shade trees
Red-tailed hawk	*Buteo jamaicensis*	Mixed woodlands interspersed with open areas
Rough-winged swallow	*Stelgidopteryx serripennis*	Suburban yards, woodland edges
Ruby-throated hummingbird	*Archilochus colubris*	Mixed woodlands, backyards
Rufous-sided towhee	*Pipilo erythropthalmus*	Woodland edges, dense brushy areas
Scarlet tanager	*Piranga olivacea*	Mixed woodlots
Tufted titmouse	*Baeolophus bicolor*	Residential areas in shade trees
Turkey vulture	*Cathartes aura*	Open fields and woodlands
Warbling vireo	*Vireo gilvuv*	Open woodlands, roadsides
White-breasted nuthatch	*Sitta carolinensis*	Mixed woodlands, orchards, villages
White-crowned sparrow	*Zonotrichia leucophrys*	Roadsides, brush, thickets
White-eyed vireo	*Vireo griseus*	Woodland edges, brush
Willow flycatcher	*Empidonax trailii*	Woodland edges, roadsides, brushy fields, hedgerows
Wood duck	*Aix sponsa*	Wooded lakes, rivers, ponds
Yellow-rumped warbler	*Dendroica coronata*	Mixed woodlands, brush
Yellow-throated vireo	*Vireo flavifrons*	Deciduous woodlands, shade trees
Yellow-throated warbler	*Dendroica dominica*	Open woodlands

Note:

Bold entries were observed by sight or song during May 29 and 30, 2001 field reconnaissance conducted by Geomatrix Cousltants, Inc.

References:

Peterson, 1980.
Fazio, 1998.

TABLE 9.4
MAMMALS SPECIES THAT MAY POTENTIALLY OCCUR ON OR ADJACENT TO THE SITE BASED ON HABITAT TYPES PRESENT

Rohm and Haas Chemicals LLC
Reading, Ohio

Common Name	Scientific Name	Habitat Requirements
Observed by Sight or Tracks		
Eastern cottontail	*Sylvilagus floridanus*	Fallow fields, open woodlots, thickets
Gray squirrel	*Sciurus carolinenis*	Mixed woodlots, shade trees
Raccoon	*Procyon lotor*	Wooded areas interrupted by open areas
Woodchuck	*Marmota monax*	Woodland edges, meadows
May Potentially Occur		
Big brown bat	*Eptesicus fuscus*	Buildings, bridges, tunnels, caves
Chipmunk	*Tamias striatus*	Forest edges, semi-open brush lands
Common rat	*Rattus norvegicus*	Buildings, dumps
Coyote	*Canis latrans*	Open brushy fields
Deer mouse	*Peromyscus leucopus*	Forest edge, field boarders
Evening bat	*Nycticeius humeralis*	Buildings and hollow trees
Hairy-tailed mole	*Parascalops brewii*	Open woods, meadows with sandy loam
House mouse	*Mus musculus*	Fields, buildings
Keen myotis	*Myotis keenii*	Hollow trees, buildings, storm sewers, forested areas
Least shrew	*Cryptotis parva*	Open grassy areas, forest edges
Little brown bat	*Myotis lucifugus*	Woodlands near roosting crevices such as barns and attics
Meadow vole	*Microtus pennsylvanicus*	Fields, pastures, orchards
Mink	*Mustela vison*	Along streams and lakes
Prairie vole	*Microtus ochrogaster*	Open fields, railroad right-of-ways
Red fox	*Vulpes fulva*	Mixture of open and wooded areas
Silver-haired bat	*Lasionycteris noctivagans*	Forested areas, buildings
Striped skunk	*Mephitis mephitis*	Semi-open country, suburban areas
Virginia opposum	*Didelphis virginiana*	Dry woodlots near human habitation
White-footed mouse	*Peromyscus maniculatus*	Forest edge, pasture
White-tailed deer	*Odocoileus virginianus*	Forest edges

Note:

Bold entries were observed by sight or tracks during May 29 and 30, 2001 field reconnaissance conducted by Geomatrix Consultants, Inc.

References:

Burt and Grossenheider, 1976.
Lewis, 1998.

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[1]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[2]	Retained as a COPEC?
Volatile Organic Compounds (mg/kg)						
1,1-Dichloroethane	0.000575	0/29	0.0048 - 0.0079	NA - NA	NA	No; not detected
1,1,1-Trichloroethane	0.213	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
1,1,1,2-Tetrachloroethane	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
1,1,2-Trichloroethane	0.518	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
1,2-Dichlorobenzene	0.294	4/29	0.36 - 1.9	0.13 - 0.2	0.68	No; HQ<1
1,3-Dichlorobenzene	1.315	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
1,4-Dichlorobenzene	0.318	0/29	0.36 - 1.9	NA - NA	NA	No; not detected
1,1-Dichloroethene	0.0194	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
1,2-Dichloroethane	0.26	0/29	0.0048 - 0.0079	NA - NA	NA	No; not detected
1,2-Dichloroethene (total)	0.654	0/1	5.5 - 5.5	NA - NA	NA	No; not detected
1,2,3-Trichloropropane	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
1,2-Dibromo-3-Chloropropane	NE	0/7	0.011 - 0.016	NA - NA	NA	No; not detected
1,2-Dibromoethane	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
1,2-Dichloropropane	0.333	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
2-Butanone	0.0424	2/7	0.022 - 22	0.0027 - 0.0035	0.08	No; HQ<1
2,2'-Oxybis(1-chloro)propane	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2-Hexanone	0.0582	0/7	0.022 - 0.031	NA - NA	NA	No; not detected
4-Methyl-2-pentanone	0.0251	0/7	0.022 - 0.031	NA - NA	NA	No; not detected
Acetone	0.0099	9/29	0.019 - 0.031	0.0029 - 0.018	**1.82**	Yes; HQ>1
Acrylonitrile	0.0012	0/7	0.11 - 0.16	NA - NA	NA	No; not detected
Benzene	0.142	1/29	0.0048 - 0.0079	0.0036 - 0.0036	0.03	No; HQ<1
bis(2-chloroethoxy) methane	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
bis(2-chloroethyl) ether	3.52	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Bromodichloromethane	NE	0/29	0.0048 - 0.0079	NA - NA	NA	No; not detected
Bromomethane	0.00137	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Carbon disulfide	0.0239	1/29	0.0048 - 0.0079	0.0072 - 0.0072	0.30	No; HQ<1
Carbon tetrachloride	1.45	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
CFC-11	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
CFC-12	NE	0/29	0.0048 - 0.0079	NA - NA	NA	No; not detected
Chlorobenzene	0.291	6/29	0.0048 - 0.0079	0.0011 - 0.018	0.06	No; HQ<1
Chloroethane	NE	0/29	0.0048 - 0.0079	NA - NA	NA	No; not detected
Chloroform	0.121	0/29	0.0048 - 0.0079	NA - NA	NA	No; not detected
Chloromethane	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
cis-1,2-Dichloroethene	0.654	0/7	0.0027 - 0.0039	NA - NA	NA	No; not detected
cis-1,3-Dichloropropene	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as a COPEC?
Dibromochloromethane	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Dibromomethane	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Ethylbenzene	0.175	1/29	0.0048 - 0.0079	0.00077 - 0.00077	0.00	No; HQ<1
Hexachloro-1,3-butadiene	0.0265	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Hexachlorobenzene	0.02	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Hexachlorocyclopentadiene	0.901	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Hexachloroethane	0.584	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Hexachloropropene	NE	0/7	3.6 - 19	NA - NA	NA	No; not detected
Iodomethane	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Isosafrole	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
Kepone	0.00331	0/7	0.072 - 2.1	NA - NA	NA	No; not detected
Methylcyclohexane	1.22	2/22	0.0097 - 0.013	0.00081 - 0.0011	0.00	No; HQ<1
Methylene chloride	0.159	3/29	0.0048 - 0.0079	0.0037 - 0.0052	0.03	No; HQ<1
Styrene	0.254	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Tetrachloroethene	0.99	0/7	0.0054 - 5.5	NA - NA	NA	No; not detected
Toluene	1.22	0/29	0.0048 - 0.0079	NA - NA	NA	No; not detected
trans-1,2-Dichloroethene	0.654	0/7	0.0027 - 0.0039	NA - NA	NA	No; not detected
trans-1,3-Dichloropropene	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
trans-1,4-Dichlorobutene	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Tribromomethane	0.492	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Trichloroethene	0.112	0/7	0.0054 - 5.7	NA - NA	NA	No; not detected
Vinyl acetate	0.013	0/7	0.011 - 0.016	NA - NA	NA	No; not detected
Vinyl chloride	0.202	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Xylenes (total)	0.433	1/29	0.0097 - 0.014	0.002 - 0.002	0.00	No; HQ<1
Semivolatile Organic Compounds (mg/kg)						
1,2,4,5-Tetrachlorobenzene	1.252	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
1,2,4-Trichlorobenzene	5.062	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
1,3,5-Trinitrobenzene	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
1,4-Dioxane	0.119	0/7	0.36 - 1.9	NA - NA	NA	No; not detected

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as a COPEC?
1,4-Naphthoquinone	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
1-Naphthylamine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2-Acetylaminofluorene	0.0153	0/7	3.6 - 19	NA - NA	NA	No; not detected
2-Aminonaphthalene	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2-Chlor-1,3-Butadiene	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
2-Chloronaphthalene	0.417	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2-Chlorophenol	0.0319	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2-Methyl-1-Propanol	NE	0/7	0.22 - 0.31	NA - NA	NA	No; not detected
2-Methylnaphthalene	0.0202	1/7	0.36 - 0.47	0.25 - 0.25	**12.38**	Yes; HQ>1
2-Methylphenol	0.0554	0/29	0.36 - 1.9	NA - NA	NA	No; not detected
2-Nitroaniline	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
2-Nitrophenol	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2-Picoline	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
2,4-Dichlorophenol	0.0817	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2,4-Dimethylphenol	0.304	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2,4-Dinitrophenol	0.00621	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
2,4-Dinitrotoluene	0.0144	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2,4,5-Trichlorophenol	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2,4,6-Trichlorophenol	0.208	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2,6-Dichlorophenol	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
2,6-Dinitrotoluene	0.0398	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
3-Methylchloranthrene	8190	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
3-Methylphenol	0.0524	1/7	0.36 - 1.9	0.24 - 0.24	**4.58**	Yes; HQ>1
3-Nitroaniline	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
3,3'-Dichlorobenzidine	0.127	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
3,3'-Dimethylbenzidine	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
3,5,5-Trimethyl-2-cyclohexene-1-one	0.432	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
4-Aminobiphenyl	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
4-Bromophenyl phenyl ether	1.55	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
4-Chloro-3-methylphenol	0.388	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
4-Chlorophenyl phenyl ether	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
4-Dimethylaminoazobenzene	0.318	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
4-Methylphenol	0.0202	1/29	0.36 - 1.9	0.24 - 0.24	**11.88**	Yes; HQ>1
4-Nitrophenol	0.0133	0/7	1.8 - 9.3	NA - NA	NA	No; not detected

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as a COPEC?
4-Nitroquinoline-N-oxide	NE	0/7	3.6 - 19	NA - NA	NA	No; not detected
4,6-Dinitro-2-methylphenol	0.104	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
5-Nitro-O-toluidine	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
7,12-Dimethylbenz(a)anthracene	66.4	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
Acenaphthene	0.00671	1/7	0.36 - 0.47	0.25 - 0.25	**37.26**	Yes; HQ>1
Acenaphthylene	0.00587	1/7	0.36 - 0.47	0.3 - 0.3	**51.11**	Yes; HQ>1
Acetonitrile	0.056	0/7	0.11 - 0.16	NA - NA	NA	No; not detected
Acetophenone	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Acrolein	0.00000152	0/7	0.11 - 0.16	NA - NA	NA	No; not detected
Acrylonitrile	0.0012	0/7	0.11 - 0.16	NA - NA	NA	No; not detected
Allyl chloride	NE	0/7	0.11 - 0.16	NA - NA	NA	No; not detected
alpha, aplha Dimethylphenethylamine	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Aniline	0.00031	0/29	0.36 - 1.9	NA - NA	NA	No; not detected
Anthracene	0.0572	5/7	0.36 - 0.39	0.033 - 1.3	**22.73**	Yes; HQ>1
Aramite	0.00000111	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
Benzaldehyde	NE	0/22	0.38 - 0.43	NA - NA	NA	No; not detected
Benzo(a)anthracene	0.108	5/7	0.36 - 0.39	0.087 - 1.4	**12.96**	Yes; HQ>1
Benzo(a)pyrene	0.15	5/7	0.36 - 0.39	0.1 - 1.2	**8.00**	Yes; HQ>1
Benzo(b)fluoranthene	10.4	7/7	NA - NA	0.027 - 1.3	0.13	No; HQ<1
Benzo(ghi)perylene	0.17	5/7	0.36 - 0.39	0.067 - 0.63	**3.71**	Yes; HQ>1
Benzo(k)fluoranthene	0.24	5/7	0.36 - 0.39	0.054 - 0.62	**2.58**	Yes; HQ>1
Benzyl alcohol	0.00104	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Benzyl butyl phthalate	1.97	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
bis(2-ethylhexyl)phthalate	0.182	5/7	0.36 - 1.9	0.03 - 0.13	0.71	No; HQ<1
Chlorophenols	0.0319	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Chrysene	0.166	5/7	0.36 - 0.39	0.16 - 1.7	**10.24**	Yes; HQ>1
Dibenz(ah)anthracene	0.033	3/7	0.36 - 0.42	0.031 - 0.19	**5.76**	Yes; HQ>1
Dibenzofuran	0.449	1/7	0.36 - 0.47	0.47 - 0.47	**1.05**	Yes; HQ>1
Diethyl phthalate	0.295	1/7	0.36 - 1.9	0.04 - 0.04	0.14	No; HQ<1
Dimethyl phthalate	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Di-n-butyl phthalate	1.114	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Di-n-octyl phthalate	40.6	1/7	0.36 - 1.9	0.022 - 0.022	0.00	No; HQ<1
Diphenylamine	0.0346	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Ethyl methacrylate	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as a COPEC?
Ethyl methanesulfonate	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Fluoranthene	0.423	7/7	NA - NA	0.027 - 4.6	**10.87**	Yes; HQ>1
Fluorene	0.0774	1/7	0.36 - 0.47	0.9 - 0.9	**11.63**	Yes; HQ>1
Indeno(123-cd)pyrene	0.2	5/7	0.36 - 0.39	0.06 - 0.58	**2.90**	Yes; HQ>1
m-Dinitrobenzene	0.00861	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Methyl-N-nitroso-methanamine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Methyl methacrylate	0.168	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Methyl methanesulfonate	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Methylpyrilene	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Methylacrylonitrile	NE	0/7	0.0054 - 0.0079	NA - NA	NA	No; not detected
Naphthalene	0.176	1/7	0.36 - 0.47	0.7 - 0.7	**3.98**	Yes; HQ>1
Nitrobenzene	0.145	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Nitrosomethylethylamine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Nitrosodiethylamine	0.0228	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Nitrosodi-N-butylamine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Nitrosodi-N-propylamine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Nitrosodiphenylamine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Nitrosomorpholine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Nitrosopiperidine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
N-Nitrosopyrrolidine	NE	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
o-Dinitrobenzene	0.00861	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
o-Toluidine	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
o,o,o-Triethyl phosphorothioate	0.189	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
o,o-Diethyl o-pyrazinyl phosphothioate	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
p-Chloroaniline	0.146	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Pentachlorobenzene	0.024	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Pentachlorophenol	23	0/7	0.36 - 1.9	NA - NA	NA	No; not detected
Phenacetin	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
Phenanthrene	0.204	5/7	0.36 - 0.39	0.2 - 4.8	**23.53**	Yes; HQ>1
Phenol	0.0491	0/8	0.36 - 1.9	NA - NA	NA	No; not detected
p-Nitroaniline	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
p-Phenylenediamide	NE	0/7	3.6 - 19	NA - NA	NA	No; not detected
Propane nitrile	NE	0/7	0.022 - 0.031	NA - NA	NA	No; not detected
Pyrene	0.195	7/8	0.4 - 0.4	0.021 - 3.1	**15.90**	Yes; HQ>1

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as a COPEC?
Pyridine	0.106	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
Safrole	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
Pesticides/PCBs (mg/kg)						
4,4'-DDD	0.00488	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
4,4'-DDE	0.00316	7/29	0.002 - 0.11	0.00091 - 0.023	**7.28**	Yes; HQ>1
4,4'-DDT	0.00416	2/29	0.002 - 0.11	0.004 - 0.0056	**1.35**	Yes; HQ>1
Aldrin	0.002	1/29	0.002 - 0.11	0.001 - 0.001	0.50	No; HQ<1
alpha-BHC	0.006	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
beta-BHC	0.005	4/29	0.002 - 0.11	0.0046 - 0.094	**18.80**	Yes; HQ>1
gamma-BHC (Lindane)	0.00237	0/7	0.0037 - 0.11	NA - NA	NA	No; not detected
Camphechlor	NE	0/7	0.15 - 4.2	NA - NA	NA	No; not detected
Chlordane	0.00324	0/7	0.037 - 1.1	NA - NA	NA	No; not detected
alpha-Chlordane	0.00324	0/22	0.002 - 0.022	NA - NA	NA	No; not detected
gamma-Chlordane	0.00324	0/1	0.021 - 0.021	NA - NA	NA	No; not detected
Chlorobenzilate	0.86	2/7	0.037 - 0.21	0.0087 - 0.024	0.03	No; HQ<1
Cygon	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected
Diallate	0.452	2/7	0.072 - 2.1	0.029 - 0.032	0.07	No; HQ<1
Dieldrin	0.0019	4/29	0.002 - 0.11	0.002 - 0.024	**12.63**	Yes; HQ>1
Disulfoton	0.324	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Endosulfan I	0.00326	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
Endosulfan II	0.00194	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
Endosulfan sulfate	0.0346	0/7	0.0037 - 0.021	NA - NA	NA	No; not detected
Endrin	0.00222	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
Endrin aldehyde	0.48	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
Endrin ketone	0.00222	1/22	0.002 - 0.022	0.0014 - 0.0014	0.63	No; HQ<1
Famphur	NE	0/7	3.6 - 19	NA - NA	NA	No; not detected
Heptachlor	0.0006	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
Heptachlor epoxide	0.00247	0/29	0.002 - 0.11	NA - NA	NA	No; not detected
Isodrin	0.0552	0/29	0.0038 - 0.21	NA - NA	NA	No; not detected
Methoxychlor	0.0136	3/8	0.0072 - 0.21	0.0034 - 0.0056	0.41	No; HQ<1
Pentachloronitrobenzene	NE	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Phorate	0.000861	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Propyzamide	NE	0/7	0.72 - 3.8	NA - NA	NA	No; not detected

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as a COPEC?
Sulfotep (TEDP)	0.56	0/7	1.8 - 9.3	NA - NA	NA	No; not detected
Aroclor-1016	0.0598	0/7	0.036 - 0.047	NA - NA	NA	No; not detected
Aroclor-1221	0.0598	0/7	0.036 - 0.047	NA - NA	NA	No; not detected
Aroclor-1232	0.0598	0/7	0.036 - 0.047	NA - NA	NA	No; not detected
Aroclor-1242	0.0598	0/7	0.036 - 0.047	NA - NA	NA	No; not detected
Aroclor-1248	0.0598	4/7	0.038 - 0.047	0.015 - 0.07	**1.17**	Yes; HQ>1
Aroclor-1254	0.0598	1/7	0.036 - 0.047	0.1 - 0.1	**1.67**	Yes; HQ>1
Aroclor-1260	0.0598	0/7	0.036 - 0.047	NA - NA	NA	No; not detected
Inorganic Compounds (mg/kg)						
Aluminum	58000	22/22	NA - NA	1690 - 9330	0.16	No; HQ<1
Antimony	NE	0/29	1.1 - 1.4	NA - NA	NA	No; not detected
Arsenic	9.79	29/29	NA - NA	2.8 - 6.3	0.64	No; HQ<1
Barium	330	29/29	NA - NA	8.9 - 76.9	0.23	No; HQ<1
Beryllium	40	29/29	NA - NA	0.069 - 0.46	0.01	No; HQ<1
Cadmium	0.99	29/29	NA - NA	0.11 - 0.54	0.55	No; HQ<1
Calcium	NE	22/22	NA - NA	18800 - 178000	-	No; essential nutrient
Chromium	43.4	29/29	NA - NA	4 - 22.9	0.53	No; HQ<1
Chromium, hexavalent	NE	0/3	0.88 - 1	NA - NA	NA	No; not detected
Cobalt	50	29/29	NA - NA	2.4 - 7.8	0.16	No; HQ<1
Copper	31.6	29/29	NA - NA	4.2 - 26	0.82	No; HQ<1
Cyanide	0.0001	0/13	0.57 - 0.66	NA - NA	NA	No; not detected
Iron	200	22/22	NA - NA	6220 - 17400	**87.00**	Yes; HQ>1
Lead	35.8	29/29	NA - NA	4 - 38.3	**1.07**	Yes; HQ>1
Magnesium	NE	22/22	NA - NA	5450 - 64400	-	No; essential nutrient
Manganese	100	22/22	NA - NA	245 - 670	**6.70**	Yes; HQ>1
Mercury	0.174	23/29	0.01 - 0.13	0.01 - 0.095	0.55	No; HQ<1
Nickel	22.7	29/29	NA - NA	4.7 - 22	0.97	No; HQ<1
Potassium	NE	22/22	NA - NA	228 - 1230	-	No; essential nutrient
Selenium	2	2/29	0.55 - 0.71	0.39 - 0.48	0.24	No; HQ<1
Silver	0.5	1/7	0.55 - 0.63	0.2 - 0.2	0.40	No; HQ<1
Sodium	NE	22/22	NA - NA	124 - 360	-	No; essential nutrient
Thallium	1	13/29	1.1 - 1.3	0.57 - 2.2	**2.20**	Yes; HQ>1
Tin	53	29/29	NA - NA	2.7 - 76.3	**1.44**	Yes; HQ>1

TABLE 10.1
COMPARISON OF SEDIMENT AND SEEP SOIL DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as a COPEC?
Vanadium	2	29/29	NA - NA	5.9 - 17	**8.50**	Yes; HQ>1
Zinc	121	29/29	NA - NA	16.4 - 101	0.83	No; HQ<1

[(1)] The following compounds did not have Region 5 ESLs; therefore the following surrogate/alternate screening benchmarks were used:

Methylcyclohexane - toluene used as a surrogate
Carbazole - diphenyl amine used as a surrogate
Dibenzofuran - Washington State NEL Sediment Screening Benchmark used as a surrogate
Diallate - Region 5 Residential Soil ESL used as a surrogate
Endrin ketone - endrin used as a surrogate
Aluminum - ARCS PEL used as a surrogate
Barium - Eco SSL for soil invertebrates used as a surrogate
Beryllium - Eco SSL for soil invertebrates used as a surrogate
Iron - Region 4 Soil Screening Benchmark used as a surrogate
Manganese - Region 4 Soil Screening Benchmark used as a surrogate
Selenium - Region 3 BTAG Screening Benchmark used as a surrogate
Thallium - Region 4 Soil Screening Benchmark used as a surrogate
Tin - Region 4 Soil Screening Benchmark used as a surrogate
Vanadium - Region 4 Soil Screening Benchmark used as a surrogate

[(2)] HQ is calculated by dividing the maximum detected concentration by the Region 5 ESL.

NE - Not Established
NA - Not Applicable

Shaded compounds were retained as COPECs for ecological receptors since they exceeded the Region 5 ESL or surrogate.
BOLD compounds were retained as compounds of concern for the fish ingestion pathway since any detection may be significant.
BOLD ITALICIZED compounds were retained as compounds of concern for uptake by sediment-dwelling benthos and aquatic plants since these are bioaccumulative compounds and any detection could be significant.

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[1]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[2]	Retained as COPEC?
Volatile Organic Compounds (ug/l)						
1,1-Dichloroethane	47	2/9	1 - 1	0.55 - 1	0.02	No; HQ<1
1,1,1-Trichloroethane	76	7/7	NA - NA	0.19 - 0.4	0.01	No; HQ<1
1,1,1,2-Tetrachloroethane	380	0/7	1 - 1	NA - NA	NA	No; not detected
1,1,2-Trichloroethane	500	0/7	1 - 1	NA - NA	NA	No; not detected
1,2-Dichlorobenzene	14	2/9	10 - 10	14 - 21	**1.50**	Yes; HQ>1
1,3-Dichlorobenzene	38	0/7	10 - 10	NA - NA	NA	No; not detected
1,4-Dichlorobenzene	9.4	2/9	10 - 10	1.7 - 2.6	0.28	No; HQ<1
1,1-Dichloroethene	65	0/7	1 - 1	NA - NA	NA	No; not detected
1,2-Dibromo-3-Chloropropane	NE	0/7	2 - 2	NA - NA	NA	No; not detected
1,2-Dibromomethane	NE	0/7	1 - 1	NA - NA	NA	No; not detected
1,2-Dichloroethane	910	0/9	1 - 1.8	NA - NA	NA	No; not detected
cis-1,2-Dichloroethene	970	1/7	0.5 - 0.5	0.26 - 0.26	0.00	No; HQ<1
1,2-Dichloropropane	360	0/7	1 - 1	NA - NA	NA	No; not detected
1,2,3-Trichloropropane	NE	0/7	1 - 1	NA - NA	NA	No; not detected
cis-1,3-Dichloropropene	1.7	0/7	1 - 1	NA - NA	NA	No; not detected
2-Butanone	2200	0/7	10 - 10	NA - NA	NA	No; not detected
2-Hexanone	99	0/7	10 - 10	NA - NA	NA	No; not detected
2,2'-Oxybis(1-chloro)propane	NE	0/7	10 - 10	NA - NA	NA	No; not detected
4-Methyl-2-pentanone	170	0/7	5 - 5	NA - NA	NA	No; not detected
Acetone	1700	7/9	10 - 10	1.2 - 6.3	0.00	No; HQ<1
Acetophenone	NE	0/7	10 - 10	NA - NA	NA	No; not detected
Benzene	114	2/9	1 - 1	0.92 - 1.1	0.01	No; HQ<1
bis(2-chloroethoxy)methane	NE	0/7	10 - 10	NA - NA	NA	No; not detected
bis(2-chloroethyl) ether	19000	0/7	10 - 10	NA - NA	NA	No; not detected
Bromodichloromethane	NE	0/9	1 - 1.8	NA - NA	NA	No; not detected
Bromoform	230	0/7	1 - 1	NA - NA	NA	No; not detected
Bromomethane	16	0/7	2 - 2	NA - NA	NA	No; not detected
Carbon disulfide	15	2/9	1 - 1	0.97 - 1.1	0.07	No; HQ<1
Carbon tetrachloride	240	0/7	1 - 1	NA - NA	NA	No; not detected
CFC-11	NE	0/7	2 - 2	NA - NA	NA	No; not detected
CFC-12	NE	0/9	1 - 2	NA - NA	NA	No; not detected
Chlorobenzene	47	2/9	1 - 1	11 - 24	0.51	No; HQ<1
Chloroethane	NE	0/9	2 - 3.6	NA - NA	NA	No; not detected

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as COPEC?
Chloroform	140	4/9	1 - 1.8	0.23 - 0.26	0.00	No; HQ<1
Chloromethane	NE	0/7	2 - 2	NA - NA	NA	No; not detected
Dibromochloromethane	9.7	2/7	1 - 1	0.82 - 0.86	0.09	No; HQ<1
Dibromomethane	NE	0/7	1 - 1	NA - NA	NA	No; not detected
Ethylbenzene	14	1/9	1 - 1.8	0.39 - 0.39	0.03	No; HQ<1
Hexachloro-1,3-butadiene	0.053	0/7	10 - 10	NA - NA	NA	No; not detected
Hexachlorobenzene	0.0003	0/7	10 - 10	NA - NA	NA	No; not detected
Hexachlorocyclopentadiene	77	0/7	50 - 50	NA - NA	NA	No; not detected
Hexachloroethane	8	0/7	10 - 10	NA - NA	NA	No; not detected
Hexachloropropene	NE	0/7	100 - 100	NA - NA	NA	No; not detected
Iodomethane	NE	0/7	1 - 1	NA - NA	NA	No; not detected
Isosafrole	NE	0/7	20 - 20	NA - NA	NA	No; not detected
Kepone	0.132	0/7	1 - 1	NA - NA	NA	No; not detected
Methylcyclohexane	253	2/2	NA - NA	0.3 - 0.49	0.00	No; HQ<1
Methylene chloride	940	0/9	1 - 1.8	NA - NA	NA	No; not detected
Styrene	32	0/7	1 - 1	NA - NA	NA	No; not detected
Tetrachloroethene	45	0/7	1 - 1	NA - NA	NA	No; not detected
Toluene	253	2/9	1 - 1	0.45 - 0.55	0.00	No; HQ<1
trans-1,2-Dichloroethene	970	0/7	0.5 - 0.5	NA - NA	NA	No; not detected
trans-1,3-Dichloropropene	1.7	0/7	1 - 1	NA - NA	NA	No; not detected
trans-1,4-Dichlorobutene	NE	0/7	1 - 1	NA - NA	NA	No; not detected
Trichloroethene	47	6/7	1 - 1	0.24 - 0.33	0.01	No; HQ<1
Vinyl acetate	248	0/7	2 - 2	NA - NA	NA	No; not detected
Vinyl chloride	930	0/7	2 - 2	NA - NA	NA	No; not detected
Xylenes (total)	27	1/9	1 - 1.8	1.7 - 1.7	0.06	No; HQ<1

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[1]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[2]	Retained as COPEC?
Semivolatile Organic Compounds (ug/l)						
1,2,4-Trichlorobenzene	30	0/7	10 - 10	NA - NA	NA	No; not detected
1,2,4,5-Tetrachlorobenzene	3	0/7	1 - 1	NA - NA	NA	No; not detected
1,3,5-Trinitrobenzene	11	0/7	50 - 50	NA - NA	NA	No; not detected
1,4-Dioxane	22000	1/9	10 - 10	1.1 - 1.1	0.00	No; HQ<1
1,4-Naphthoquinone	NE	0/7	50 - 50	NA - NA	NA	No; not detected
1-Naphthylamine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
2-Acetylaminofluorene	535	0/7	100 - 100	NA - NA	NA	No; not detected
2-Aminonaphthalene	NE	0/7	10 - 10	NA - NA	NA	No; not detected
2-Chlor-1,3-Butadiene	NE	0/7	1 - 1	NA - NA	NA	No; not detected
2-Chloronaphthalene	0.396	0/7	10 - 10	NA - NA	NA	No; not detected
2-Chlorophenol	24	0/7	10 - 10	NA - NA	NA	No; not detected
2-Methyl-1-propanol	NE	0/7	50 - 50	NA - NA	NA	No; not detected
2-Methylnaphthalene	330	0/7	10 - 10	NA - NA	NA	No; not detected
2-Methylphenol	67	0/9	10 - 10	NA - NA	NA	No; not detected
2-Nitroaniline	NE	0/7	50 - 50	NA - NA	NA	No; not detected
2-Nitrophenol	73	0/7	10 - 10	NA - NA	NA	No; not detected
2-Picoline	NE	0/7	20 - 20	NA - NA	NA	No; not detected
2,4-Dichlorophenol	11	0/7	10 - 10	NA - NA	NA	No; not detected
2,4-Dimethylphenol	100	0/7	10 - 10	NA - NA	NA	No; not detected
2,4-Dinitrophenol	19	0/7	50 - 50	NA - NA	NA	No; not detected
2,4-Dinitrotoluene	44	0/7	10 - 10	NA - NA	NA	No; not detected
2,4,5-Trichlorophenol	NE	0/7	10 - 10	NA - NA	NA	No; not detected
2,4,6-Trichlorophenol	4.9	0/7	10 - 10	NA - NA	NA	No; not detected
2,6-Dichlorophenol	NE	0/7	10 - 10	NA - NA	NA	No; not detected
2,6-Dinitrotoluene	81	0/7	10 - 10	NA - NA	NA	No; not detected
3,3'-Dichlorobenzidine	4.5	0/7	50 - 50	NA - NA	NA	No; not detected
3,3'-Dimethylbenzidine	NE	0/7	50 - 50	NA - NA	NA	No; not detected
3,5,5-Trimethyl-2-cyclohexene-1-	920	0/7	10 - 10	NA - NA	NA	No; not detected
3-Methylchloranthrene	0.0891	0/7	20 - 20	NA - NA	NA	No; not detected
3-Methylphenol	62	0/7	10 - 10	NA - NA	NA	No; not detected
3-Nitroaniline	NE	0/7	50 - 50	NA - NA	NA	No; not detected
4-Aminobiphenyl	NE	0/7	50 - 50	NA - NA	NA	No; not detected
4-Bromophenyl phenyl ether	1.5	0/7	10 - 10	NA - NA	NA	No; not detected

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as COPEC?
4-Chloro-3-methylphenol	34.8	0/7	10 - 10	NA - NA	NA	No; not detected
4-Chlorophenyl phenyl ether	NE	0/7	10 - 10	NA - NA	NA	No; not detected
4-Dimethylaminoazobenzene	1.65	0/7	20 - 20	NA - NA	NA	No; not detected
4-Methylphenol	25	0/9	10 - 10	NA - NA	NA	No; not detected
4-Nitrophenol	60	0/7	50 - 50	NA - NA	NA	No; not detected
4-Nitroquinoline-N-Oxide	NE	0/7	100 - 100	NA - NA	NA	No; not detected
4,6-Dinitro-2-Methylphenol	23	0/7	50 - 50	NA - NA	NA	No; not detected
5-Nitro-O-Toluidine	NE	0/7	20 - 20	NA - NA	NA	No; not detected
7,12-Dimethylbenz(a)anthracene	0.548	0/7	20 - 20	NA - NA	NA	No; not detected
Acenaphthene	38	0/7	10 - 10	NA - NA	NA	No; not detected
Acenaphthylene	4840	0/7	10 - 10	NA - NA	NA	No; not detected
Acetonitrile	12000	0/7	20 - 20	NA - NA	NA	No; not detected
Acrolein	0.19	0/7	20 - 20	NA - NA	NA	No; not detected
Acrylonitrile	66	0/7	20 - 20	NA - NA	NA	No; not detected
Allyl chloride	NE	0/7	2 - 2	NA - NA	NA	No; not detected
alpha, alpha Dimethylphenethyla	NE	0/7	50 - 50	NA - NA	NA	No; not detected
Aniline	4.1	0/9	10 - 10	NA - NA	NA	No; not detected
Anthracene	0.035	0/7	10 - 10	NA - NA	NA	No; not detected
Aramite	3.09	0/7	20 - 20	NA - NA	NA	No; not detected
Benzaldehyde	NE	0/2	10 - 10	NA - NA	NA	No; not detected
Benzo(a)anthracene	0.025	0/7	10 - 10	NA - NA	NA	No; not detected
Benzo(a)pyrene	0.014	0/7	10 - 10	NA - NA	NA	No; not detected
Benzo(b)fluoranthene	9.07	0/7	10 - 10	NA - NA	NA	No; not detected
Benzo(ghi)perylene	7.64	0/7	10 - 10	NA - NA	NA	No; not detected
Benzo(k)fluoranthene	NE	0/7	10 - 10	NA - NA	NA	No; not detected
Benzyl alcohol	8.6	0/7	10 - 10	NA - NA	NA	No; not detected
bis(2-ethylhexyl)phthalate	0.3	6/7	10 - 10	0.55 - 1.4	**4.67**	Yes; HQ>1
Butyl benzyl phthalate	23	0/7	10 - 10	NA - NA	NA	No; not detected
Chlorobenzilate	7.16	0/7	10 - 10	NA - NA	NA	No; not detected
Chlorophenols	24	0/7	50 - 50	NA - NA	NA	No; not detected
Chrysene	NE	0/7	10 - 10	NA - NA	NA	No; not detected
Dibenz(a,h)anthracene	NE	0/7	10 - 10	NA - NA	NA	No; not detected
Dibenzofuran	4	0/7	10 - 10	NA - NA	NA	No; not detected
Diethyl phthalate	110	0/7	10 - 10	NA - NA	NA	No; not detected

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as COPEC?
Dimethyl phthalate	1100	0/7	10 - 10	NA - NA	NA	No; not detected
Di-n-butyl phthalate	9.7	0/7	10 - 10	NA - NA	NA	No; not detected
Di-n-octyl phthalate	30	0/7	10 - 10	NA - NA	NA	No; not detected
Diphenylamine	412	0/7	10 - 10	NA - NA	NA	No; not detected
Ethyl methacrylate	NE	0/7	1 - 1	NA - NA	NA	No; not detected
Ethyl methanesulfonate	NE	0/7	10 - 10	NA - NA	NA	No; not detected
Fluoranthene	1.9	0/7	10 - 10	NA - NA	NA	No; not detected
Fluorene	19	0/7	10 - 10	NA - NA	NA	No; not detected
Indeno(1,2,3-cd)pyrene	4.31	0/7	10 - 10	NA - NA	NA	No; not detected
m-Dinitrobenzene	22	0/7	10 - 10	NA - NA	NA	No; not detected
N-Methyl-N-nitroso-methanamine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
Methapyrilene	NE	0/7	50 - 50	NA - NA	NA	No; not detected
Methylacrylonitrile	NE	0/7	1 - 1	NA - NA	NA	No; not detected
Methyl methacrylate	2800	0/7	1 - 1	NA - NA	NA	No; not detected
Methyl methanesulfonate	NE	0/7	10 - 10	NA - NA	NA	No; not detected
Naphthalene	13	0/7	10 - 10	NA - NA	NA	No; not detected
Nitrobenzene	220	0/7	10 - 10	NA - NA	NA	No; not detected
Nitrosomethylethylamine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
N-Nitrosodiethylamine	768	0/7	10 - 10	NA - NA	NA	No; not detected
N-Nitrosodi-N-butylamine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
N-Nitrosodi-N-propylamine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
N-Nitrosodiphenylamine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
N-Nitrosomorpholine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
N-Nitrosopiperidine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
N-Nitrosopyrrolidine	NE	0/7	10 - 10	NA - NA	NA	No; not detected
o-Dinitrobenzene	22	0/7	10 - 10	NA - NA	NA	No; not detected
o-Toluidine	NE	0/7	20 - 20	NA - NA	NA	No; not detected
o,o,o-Triethyl phosphorothioate	58.2	0/7	50 - 50	NA - NA	NA	No; not detected
o,o-Diethyl o-pyrazinyl phosphotl	NE	0/7	50 - 50	NA - NA	NA	No; not detected
p-Chloroaniline	232	0/7	10 - 10	NA - NA	NA	No; not detected
Pentachlorobenzene	0.019	0/7	10 - 10	NA - NA	NA	No; not detected
Pentachlorophenol	4	0/7	10 - 10	NA - NA	NA	No; not detected
Phenacetin	NE	0/7	20 - 20	NA - NA	NA	No; not detected
Phenanthrene	3.6	0/7	10 - 10	NA - NA	NA	No; not detected
Phenol	180	0/7	10 - 10	NA - NA	NA	No; not detected

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as COPEC?
p-Nitroaniline	NE	0/7	50 - 50	NA - NA	NA	No; not detected
p-Phenylenediamide	NE	0/7	100 - 100	NA - NA	NA	No; not detected
Propane nitrile	NE	0/7	4 - 4	NA - NA	NA	No; not detected
Pyrene	0.3	0/7	10 - 10	NA - NA	NA	No; not detected
Pyridine	2380	0/7	20 - 20	NA - NA	NA	No; not detected
Safrole	NE	0/7	20 - 20	NA - NA	NA	No; not detected
Pesticide/PCBs (ug/l)						
4,4'-DDD	NE	0/9	0.05 - 0.05	NA - NA	NA	No; not detected
4,4'-DDE	4.51E-09	1/9	0.05 - 0.05	0.025 - 0.025	**5543237**	Yes; HQ>1
4,4'-DDT	1.10E-05	1/9	0.05 - 0.05	0.028 - 0.028	**2545**	Yes; HQ>1
Aldrin	1.70E-02	0/9	0.05 - 0.05	NA - NA	NA	No; not detected
alpha-BHC	1.24E+01	0/9	0.05 - 0.05	NA - NA	NA	No; not detected
alpha-Chlordane	4.30E-03	1/2	0.05 - 0.05	0.02 - 0.02	**4.65**	Yes; HQ>1
beta-BHC	4.95E-01	2/9	0.05 - 0.05	0.042 - 0.056	0.11	No; HQ<1
delta-BHC	6.67E+02	0/9	0.05 - 0.05	NA - NA	NA	No; not detected
Chlordane	4.30E-03	0/7	0.5 - 0.5	NA - NA	NA	No; not detected
Cygon	NE	0/7	20 - 20	NA - NA	NA	No; not detected
Diallate	NE	0/7	1 - 1	NA - NA	NA	No; not detected
Dieldrin	7.10E-05	1/9	0.05 - 0.05	0.053 - 0.053	**746**	Yes; HQ>1
Disulfoton	4.02E-02	0/7	50 - 50	NA - NA	NA	No; not detected
Endosulfan I	5.60E-02	1/9	0.05 - 0.05	0.03 - 0.03	0.54	No; HQ<1
Endosulfan II	5.60E-02	1/9	0.05 - 0.05	0.046 - 0.046	0.82	No; HQ<1
Endosulfan sulfate	2.22E+00	0/7	0.05 - 0.05	NA - NA	NA	No; not detected
Endrin	3.60E-02	0/9	0.05 - 0.05	NA - NA	NA	No; not detected
Endrin aldehyde	1.50E-01	0/9	0.05 - 0.05	NA - NA	NA	No; not detected
Endrin ketone	NE	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
Famphur	NE	0/7	100 - 100	NA - NA	NA	No; not detected
gamma-BHC	2.60E-02	0/7	0.05 - 0.05	NA - NA	NA	No; not detected
Heptachlor	3.80E-03	0/9	0.05 - 0.05	NA - NA	NA	No; not detected
Heptachlor epoxide	3.80E-03	1/9	0.05 - 0.05	0.033 - 0.033	**8.68**	Yes; HQ>1
Isodrin	3.09E-02	1/9	0.1 - 0.1	0.005 - 0.005	0.16	No; HQ<1
Methoxychlor	0.019	0/7	0.1 - 0.1	NA - NA	NA	No; not detected
Pentachloronitrobenzene	NE	0/7	50 - 50	NA - NA	NA	No; not detected
Phorate	3.62E+00	0/7	50 - 50	NA - NA	NA	No; not detected

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[(1)]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(2)]	Retained as COPEC?
Propyzamide	NE	0/7	20 - 20	NA - NA	NA	No; not detected
Toxaphene	1.40E-04	0/7	2 - 2	NA - NA	NA	No; not detected
Aroclor-1016	1.20E-04	0/7	1 - 1	NA - NA	NA	No; not detected
Aroclor-1221	1.20E-04	0/7	1 - 1	NA - NA	NA	No; not detected
Aroclor-1232	1.20E-04	0/7	1 - 1	NA - NA	NA	No; not detected
Aroclor-1242	1.20E-04	0/7	1 - 1	NA - NA	NA	No; not detected
Aroclor-1248	1.20E-04	0/7	1 - 1	NA - NA	NA	No; not detected
Aroclor-1254	1.20E-04	0/7	1 - 1	NA - NA	NA	No; not detected
Aroclor-1260	1.20E-04	0/7	1 - 1	NA - NA	NA	No; not detected
Inorganic Compounds (ug/l)						
Aluminum	80	2/2	NA - NA	14300 - 48300	**604**	Yes; HQ>1
Antimony	80	0/9	10 - 10	NA - NA	NA	No; not detected
Arsenic	148	3/9	10 - 10	3.6 - 25.7	0.17	No; HQ<1
Barium	220	9/9	NA - NA	53 - 494	**2.25**	Yes; HQ>1
Beryllium	3.6	9/9	NA - NA	0.66 - 3.1	0.86	No; HQ<1
Cadmium	0.15	2/9	2 - 2	0.28 - 1.7	**11.33**	Yes; HQ>1
Calcium	NE	2/2	NA - NA	417000 - 430000	-	No; essential nutrient
Chromium	42	2/9	5 - 5	36.7 - 174	**4.14**	Yes; HQ>1
Chromium, hexavalent	11	0/2	20 - 20	NA - NA	NA	No; not detected
Cobalt	24	4/9	7 - 7	1.1 - 43.8	**1.83**	Yes; HQ>1
Copper	1.58	9/9	NA - NA	5.4 - 104	**65.82**	Yes; HQ>1
Cyanide	5.2	0/9	10 - 10	NA - NA	NA	No; not detected
Iron	1000	2/2	NA - NA	23800 - 90100	**90.10**	Yes; HQ>1
Lead	1.17	2/9	3 - 3	24.2 - 126	**107.69**	Yes; HQ>1
Magnesium	NE	2/2	NA - NA	67100 - 90100	-	No; essential nutrient
Manganese	120	2/2	NA - NA	2150 - 2730	**22.75**	Yes; HQ>1
Mercury	1.30E-03	6/9	0.2 - 0.2	0.04 - 0.18	**138.46**	Yes; HQ>1
Nickel	28.9	2/9	40 - 40	57.7 - 214	**7.40**	Yes; HQ>1
Potassium	NE	2/2	NA - NA	14100 - 14200	-	No; essential nutrient
Selenium	5	0/9	5 - 5	NA - NA	NA	No; not detected
Silver	0.12	0/7	5 - 5	NA - NA	NA	No; not detected
Sodium	NE	2/2	NA - NA	149000 - 375000	-	No; essential nutrient
Thallium	10	1/9	10 - 10	6.8 - 6.8	0.68	No; HQ<1
Tin	180	2/9	100 - 100	782 - 1340	**7.44**	Yes; HQ>1

TABLE 10.2
COMPARISON OF SEEP AND SURFACE WATER DATA TO ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Region 5 ESL[1]	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[2]	Retained as COPEC?
Vanadium	12	2/9	7 - 7	33.2 - 124	**10.33**	Yes; HQ>1
Zinc	65.7	9/9	NA - NA	14.5 - 411	**6.26**	Yes; HQ>1

For screening of surface water concentrations only, refer to Table 15-2.

[1] The following compounds did not have Region 5 ESLs; therefore the following surrogate/alternate screening benchmarks were used:

cis-1,3-Dichloropropene - Ohio EPA OMZA for Ohio River Basin used as a surrogate
trans-1,3-Dichloropropene - Ohio EPA OMZA for Ohio River Basin used as a surrogate
1,3,5-Trinitrobenzene - Ohio EPA OMZA for Ohio River Basin used as a surrogate
2-Nitrophenol - Ohio EPA OMZA for Ohio River Basin used as a surrogate
Dimethyl phthalate - Ohio EPA OMZA for Ohio River Basin used as a surrogate
0-Dinitrobenzene - Ohio EPA OMZA for Ohio River Basin used as a surrogate
Chromium, hexavalent - Ohio EPA OMZA for Ohio River Basin used as a surrogate
Methylcyclohexane - toluene used as a surrogate
Aluminum - Region 4 Chronic Surface Water Criteria used as a surrogate
Iron - Region 4 Chronic Surface Water Criteria used as a surrogate
Manganese - Region 6 Freshwater Criteria used as a surrogate

[2] HQ is calculated by dividing the maximum detected concentration by the Region 5 ESL.
Includes both total and dissolved metals results.
NE - Not Established
NA - Not Applicable

TABLE 10.3
COMPARISON OF NOVEMBER 2006 GROUNDWATER DATA IN THE UPPER AQUIFER TO OHIO SURFACE WATER CRITERIA AND REGION 5 ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	OMZA	Region 5 ESL	MAX Detected - All Wells	Location	OMZA Based HQ - All Wells	Retained as COPEC--All Wells?
Volatile Organic Compounds (ug/l)						
1,1-Dichloroethane	ID	47	26	UAW20-60	0.55	No; HQ<1
1,1,1-Trichloroethane	76	76	56	UAW20-60	0.74	No; HQ<1
1,1,2-Trichloroethane	740	500	5	MW-EPA-2	0.007	No; HQ<1
1,1,2-Trichloro-1,2,2-trifluoroethane	-	NE	3.9	MW-EPA-2	**-**	**Yes, screening value unavailable**
1,1-Dichloroethene	210	65	9.8	UAW20-60	0.05	No; HQ<1
1,2-Dichlorobenzene	23	14	1000	MW-EPA-1	**43.48**	**Yes; HQ>1**
1,3-Dichlorobenzene	22	38	46	MW-EPA-1	**2.09**	**Yes; HQ>1**
1,4-Dichlorobenzene	9.4	9.4	330	MW-EPA-1	**35.11**	**Yes; HQ>1**
1,2-Dichloroethane	2000	910	1600	UAW20-60	0.80	No; HQ<1
cis-1,2-Dichloroethene	970	970	63	UAW20-60	0.06	No; HQ<1
4-Methyl-2-pentanone	ID	170	44	UAW08-20	0.26	No; HQ<1
Benzene	160	114	87	UAW08-20	0.54	No; HQ<1
Bromodichloromethane	ID	NE	1.3	UAW09-20	**-**	**Yes, screening value unavailable**
Carbon disulfide	15	15	95	UAW13-20	**6**	**Yes; HQ>1**
Carbon tetrachloride	240	240	1.1	UAW15-20	0.00	No; HQ<1
Chlorobenzene	47	47	4400	MW-EPA-1	**94**	**Yes; HQ>1**
Chloroethane	-	NE	0.61	UAW10-80	**-**	**Yes, screening value unavailable**
Chloroform	140	140	82	UAW20-60	0.59	No; HQ=1
Cyclohexane	-	NE	1.9	UAW08-20	**-**	**Yes, screening value unavailable**
Ethylbenzene	61	14	30	UAW08-20	0.49	No; HQ<1
Isopropylbenzene	4.8	NE	1.1	UAW07-20	0.23	No; HQ<1
Methylcyclohexane	-	253	8	UAW08-20	0.03	No; HQ<1
Methyl ethyl ketone	22000	2200	4.6	UAW15-50	0.00	No; HQ<1
Methylene chloride	1900	940	10	UAW05-20	0.01	No; HQ<1
Tetrachloroethene	53	45	55	UAW20-60	**1.04**	**Yes; HQ>1**
Toluene	62	253	4000	UAW04-20	**64.52**	**Yes; HQ>1**
trans-1,2-Dichloroethene	970	970	2.2	UAW02-40	0.00	No; HQ<1
Trichloroethene	220	47	6	MW-EPA-2	0.03	No; HQ<1
Vinyl chloride	930	930	4.1	UAW01-80	0.00	No; HQ<1
Xylenes (total)	27	27	130	UAW08-20	**4.81**	**Yes; HQ>1**
Semivolatile Organic Compounds (ug/l)						
2-Chlorophenol	32	24	16	MW-EPA-1	0.50	No; HQ<1
2-Methylnaphthalene	-	330	5.7	UAW13-20	0.02	No; HQ<1
2-Methylphenol	67	67	12	UAW04-20	0.18	No; HQ<1
4-Methylphenol	53	25	12	UAW04-20	0.23	No; HQ<1
Acenaphthene	15	38	1.2	UAW06-20	0.08	No; HQ<1
Aniline	4.1	4.1	1700	UAW08-20	**414.63**	**Yes; HQ>1**
bis(2-ethylhexyl)phthalate	8.4	0.3	1.1	UAW27-50	0.13	No; HQ<1
Caprolactam	-	-	16	UAW11-10	**-**	**Yes, screening value unavailable**
Di-n-Butyl phthalate	-	9.7	0.62	UAW21-30	0.06	No; HQ<1
Naphthalene	21	13	11	MW-EPA-1	0.52	No; HQ<1

TABLE 10.3
COMPARISON OF NOVEMBER 2006 GROUNDWATER DATA IN THE UPPER AQUIFER TO OHIO SURFACE WATER CRITERIA AND REGION 5 ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	OMZA	Region 5 ESL	MAX Detected - All Wells	Location	OMZA Based HQ - All Wells	Retained as COPEC--All Wells?
Inorganic Compounds (ug/l)						
Aluminum	-	80	7270	UAW21-30	**90.88**	**Yes; HQ>1**
Antimony	190	80	21.4	UAW04-20	0.11	No; HQ<1
Arsenic	150	148	293	MW-EPA-1	**1.95**	**Yes; HQ>1**
Barium	220	220	528	UAW15-50	**2.40**	**Yes; HQ>1**
Beryllium	47.8	3.6	0.75	UAW21-30	0.02	No; HQ<1
Cadmium	5.1	0.15	5.3	MW-EPA-2	**1.04**	**Yes; HQ>1**
Calcium	-	NE	878000	UAW13-20	-	No; essential nutrient
Chromium	183	42	7230	UAW21-30	**39.51**	**Yes; HQ>1**
Cobalt	24	24	91.4	UAW21-30	**3.81**	**Yes; HQ>1**
Copper	20.4	1.58	157	UAW21-30	**7.70**	**Yes; HQ>1**
Iron	-	1000	56500	UAW21-30	**56.50**	**Yes; HQ>1**
Lead	20.6	1.17	22.8	UAW03-20	**1.11**	**Yes; HQ>1**
Magnesium	-	NE	143000	UAW08-20	-	No; essential nutrient
Manganese	-	120	7620	UAW22-20	**63.50**	**Yes; HQ>1**
Mercury	0.91	0.0013	0.12	UAW03-20	0.13	No; HQ<1
Nickel	113	28.9	1950	UAW21-30	**17.26**	**Yes; HQ>1**
Potassium	-	NE	23900	UAW23-20	-	No; essential nutrient
Selenium	5	5	18.5	UAW23-20	**3.70**	**Yes; HQ>1**
Silver	1.3	0.12	9.9	UAW10-50	**7.62**	**Yes; HQ>1**
Sodium	-	NE	1400000	UAW15-20	-	No; essential nutrient
Thallium	17	10	11.9	UAW22-20	0.70	No; HQ<1
Tin	180	180	4950	UAW08-20	**27.50**	**Yes; HQ>1**
Vanadium	44	12	39.3	UAW21-30	0.89	No; HQ<1
Zinc	260	65.7	244	UAW03-20	0.94	No; HQ<1

OMZA - Ohio Outside the Mixing Zone Average, from Ohio EPA, July 27, 2005.
ID - Insufficient data to develop a value.
NE- None established.
NA - Not applicable
HQ calculated by dividing the maximum detected concentration by the OMZA concentration. If OMZA concentration not available, then the HQ is calculated by dividing the maximum detected concentration by the Region 5 ESL.
Criteria for metals are for the total fraction since the groundwater analytical results are for the the total fraction.
All values based on an average hardness of 250 mg/L as measured at two locations near the site by the OEPA in 1992.
- Maximum detected concentration exceeds OMZA (or ESL if OMZA unavailable)

Table 11.1

DETERMINATION OF AQUATIC PLANT TISSUE CONCENTRATIONS

Rohm and Haas Chemicals LLC
Reading, Ohio

COPEC	Exposure Point Concentration (mg/kg)	Soil to Plant Uptake Equation[(1)]	Reference	Concentration in Plant (mg/kg)
1,2-Dichlorobenzene	0.2	Cp = 0.0821 * Cs	RAIS, 2008	1.64E-02
Acenaphthene	0.25	ln(Cp) = -0.8556 * ln(Cs) - 5.562	Eco SSLs, 2007	1.26E-02
Acenaphthylene	0.3	ln(Cp) = 0.791 * ln(Cs) - 1.144	Eco SSLs, 2007	1.23E-01
Anthracene	1.3	ln(Cp) = 0.7784 * ln(Cs) - 0.9887	Eco SSLs, 2007	4.56E-01
Benzo(a)anthracene	1.4	ln(Cp) = 0.5944 * ln(Cs) - 2.7078	Eco SSLs, 2007	8.14E-02
Benzo(a)pyrene	1.2	ln(Cp) = 0.975 * ln(Cs) - 2.0615	Eco SSLs, 2007	1.52E-01
Benzo(b)fluoranthene	1.3	Cp = 0.310*Cs	Eco SSLs, 2007	4.03E-01
Benzo(ghi)perylene	0.63	ln(Cp) = 1.1829 * ln(Cs) - 0.9313	Eco SSLs, 2007	2.28E-01
Benzo(k)fluoranthene	0.62	ln(Cp) = 0.8595 * ln(cs) - 2.1579	Eco SSLs, 2007	7.66E-02
Chrysene	1.7	ln(Cp) = 0.5944 * ln(Cs) - 2.7078	Eco SSLs, 2007	9.14E-02
Dibenz(ah)anthracene	0.19	Cp = 0.13*Cs	Eco SSLs, 2007	2.47E-02
Fluoranthene	4.6	Cp = 0.50 * Cs	Eco SSLs, 2007	2.30E+00
Fluorene	0.9	ln(Cp) = -0.8556 * ln(Cs) - 5.562	Eco SSLs, 2007	4.20E-03
Indeno(123-cd)pyrene	0.58	Cp = 0.11 * Cs	Eco SSLs, 2007	6.38E-02
Phenanthrene	4.8	ln(Cp) = 0.6203 * ln(Cs) - 0.1665	Eco SSLs, 2007	2.24E+00
Pyrene	3.1	Cp = 0.72 * Cs	Eco SSLs, 2007	2.23E+00
4,4'-DDE	0.023	ln(Cp) = 0.7524 * ln(Cs) - 2.5119	Eco SSLs, 2007	4.75E-03
4,4'-DDT	0.0056	ln(Cp) = 0.7524 * ln(Cs) - 2.5119	Eco SSLs, 2007	1.64E-03
Aldrin	0.001	Cp = 0.14 * Cs	RAIS, 2008	4.10E-04
beta-BHC	0.094	Cp = 0.0369 * Cs	RAIS, 2008	3.85E-02
Dieldrin	0.024	Cp = 0.41 * Cs	Eco SSLs, 2007	9.84E-03
Methoxychlor	0.0056	Cp = 0.0216 * Cs	RAIS, 2008	2.30E-03
Aroclor-1248	0.07	Cp = 0.00333 * Cs	RAIS, 2008	2.33E-04
Aroclor-1254	0.1	Cp = 0.00255 * Cs	RAIS, 2008	2.55E-04
Arsenic	6.3	Cp = 0.03752 *Cs	Eco SSLs, 2007	2.36E-01
Cadmium	0.54	ln(Cp) = 0.546 * ln(Cs) - 0.475	Eco SSLs, 2007	4.44E-01
Copper	26	ln(Cp) = 0.394 * ln(Cs) + 0.668	Eco SSLs, 2007	4.28E+00
Lead	38.3	ln(Cp) = 0.561 * ln(Cs) - 1.328	Eco SSLs, 2007	2.05E+00
Mercury	0.033	Cp = 0.652 * Cs	Bechtel-Jacobs, 1998	2.15E-02
Nickel	22	ln(Cp) = 0.748 * ln(Cs) - 2.223	Eco SSLs, 2007	1.09E+00
Selenium	0.48	ln(Cp) = 1.104 * ln(Cs) - 0.677	Eco SSLs, 2007	2.26E-01
Silver	0.2	Cp = 0.014 * Cs	Eco SSLs, 2007	2.80E-03
Zinc	101	ln(Cp) = 0.554 * ln(Cs) + 1.575	Eco SSLs, 2007	6.23E+01

(1) Where:
Cp = concentration in the plant (mg/kg dry weight)
Cs = concentration in soil (mg/kg)

Table 11.2

DETERMINATION OF BENTHOS TISSUE CONCENTRATIONS

Rohm and Haas Chemicals LLC
Reading, Ohio

COPECs in Sediment	Exposure Point Concentration (mg/kg)	% TOC[1]	BSAF[2] (unitless)	% Lipid[3]	Benthos Conc.[4] (mg/kg)
1,2-Dichlorobenzene[5]	0.2	3.9	4.394	4.96	1.12E+00
Acenaphthene	0.25	3.9	0.472	4.96	1.50E-01
Acenaphthylene	0.3	3.9	0.472	4.96	1.80E-01
Anthracene	1.3	3.9	0.472	4.96	7.80E-01
Benzo(a)anthracene	1.4	3.9	0.472	4.96	8.40E-01
Benzo(a)pyrene	1.2	3.9	0.472	4.96	7.20E-01
Benzo(b)fluoranthene	1.3	3.9	0.472	4.96	7.80E-01
Benzo(ghi)perylene	0.63	3.9	0.472	4.96	3.78E-01
Benzo(k)fluoranthene	0.62	3.9	0.472	4.96	3.72E-01
Chrysene	1.7	3.9	0.472	4.96	1.02E+00
Dibenz(ah)anthracene	0.19	3.9	0.472	4.96	1.14E-01
Fluoranthene	4.6	3.9	0.472	4.96	2.76E+00
Fluorene	0.9	3.9	0.472	4.96	5.40E-01
Indeno(123-cd)pyrene	0.58	3.9	0.472	4.96	3.48E-01
Phenanthrene	4.8	3.9	0.472	4.96	2.88E+00
Pyrene	3.1	3.9	0.472	4.96	1.86E+00
4,4'-DDE	0.023	3.9	4.952	4.96	1.45E-01
4,4'-DDT	0.0056	3.9	4.952	4.96	3.53E-02
Aldrin	0.001	3.9	4.952	4.96	6.30E-03
beta-BHC	0.094	3.9	4	4.96	4.78E-01
Dieldrin	0.024	3.9	3.6	4.96	1.10E-01
Methoxychlor	0.0056	3.9	2	4.96	1.42E-02
Aroclor-1248	0.07	3.9	1.203	4.96	1.07E-01
Aroclor-1254	0.1	3.9	1.7	4.96	2.16E-01
Arsenic	6.3	NA	0.69	NA	4.35E+00
Cadmium	0.54	NA	7.99	NA	4.31E+00
Copper	26	NA	5.25	NA	1.37E+02
Lead	38.3	NA	0.607	NA	2.32E+01
Mercury	0.033	NA	2.868	NA	9.46E-02
Nickel	22	NA	2.32	NA	5.10E+01
Selenium	0.48	NA	0.9	NA	4.32E-01
Silver	0.2	NA	0.9	NA	1.80E-01
Zinc	101	NA	7.527	NA	7.60E+02

(1) Percent TOC is a site-specific measured value based on sample location SS-01. This is the only site-specific value for sediment TOC.
(2) Data for organics are from USACE BSAF database, 2008. Data for individual PAHs were grouped since there were no BSAFs specifically for freshwater crustaceans. Thus, the mean value for all species for total PAHs was utilized. For 4,4'-DDE, 4,4'-DDT and dieldrin, the mean BSAF for all pesticides was used as a default value since reported values for freshwater species were unavailable. Unless otherwise noted, the average of reported values (or the maximum value if less than 3 values were reported) were utilized. If data for the freshwater crustaceans were unavailable, the average of reported values (or the maximum value if less than 3 values were reported) were utilized.
Data for inorganics from Bechtel-Jacobs, 1998 except for selenium and silver. BSAFs for these two compounds are from USEPA, 1999.
(3) Percent lipid based on mean value for freshwater crustaceans from USACE BSAF database, 2008.
(4) Organics: Benthos conc. = (Exposure Point Conc./% TOC) * BSAF * % Lipid
Inorganics: Benthos conc. = Exposure Point Conc* BSAF
(5) BSAF for 1,2-Dichlorobenzene from Washington Department of Health, 1995, Table 6.

Table 11.3

DETERMINATION OF FISH TISSUE CONCENTRATIONS

Rohm and Haas Chemicals LLC
Reading, Ohio

COPECs in Surface Water (dissolved metals)[1]	Exposure Point Concentration (mg/L)	Fish BCF[2] (L/kg)	Fish Conc.[3] (mg/kg)
Arsenic	0.0036	3.00E+02	1.08E+00
Copper	0.0067	2.00E+02	1.34E+00
Zinc	0.0231	1.00E+03	2.31E+01

(1) COPECs selected as indicated in Table 15-4.
(2) Fish BCFs from Oak Ridge National Laboratory, 2008.
(3) Fish Conc. = Exposure Point Conc. * Fish BCF

COPECs in Sediment[1]	Exposure Point Concentration (mg/kg)	% TOC[2]	BSAF[3] (unitless)	% Lipid[4]	Fish Conc.[5] (mg/kg)
1,2-Dichlorobenzene[6]	0.2	3.9	4.394	3.5	7.89E-01

(1) Selected COPECs based on being potentially site-related and bioaccumulative.
(2) Percent TOC is a site-specific measured value based on sample location SS-01. This is the only site-specific value for sediment TOC.
(3) Data from USACE BSAF database, 2008.
(4) Percent lipid based on mean value for common carp from USACE BSAF database, 2008.
(5) Fish conc. = (Exposure Point Conc./% TOC) * BSAF * % Lipid
(6) BSAF for 1,2-Dichlorobenzene from Washington Department of Health, 1995, Table 6.

TABLE 12

Intake Parameters for the Key Receptor Species

Rohm and Haas Chemicals LLC
Reading, Ohio

Receptor Species	FRsw (unitless)	NIRsw (g/g-day)	S_F (unitless)	BW (g)	FRfood (unitless)	NIRfood (g/g-day)	I_s (g/g-day)	Diet	Home Range (ha)
Mallard	1	0.057	0.03	1162	1	0.063	0.00189	100% aquatic plants	435
Muskrat	1	0.98	0	1174	1	0.3	0	100% aquatic plants	0.13
Mink	1	0.079	0	1020	1	0.16	0	100% fish	2.24(1)
Great Blue Heron	1	0.045	0	2336	1	0.18	0	100% fish	3.1(1)
Spotted Sandpiper	1	0.17	0.14	42.5	1	1.5	0.21	100% benthic macros	0.39

Where:

FRsw - Fraction of total water ingested (from the seeps or Mill Creek)

NIRsw - Normalized water ingestion rate

S_F - Fraction of soil in diet

BW - Body Weight

FRfood - Fraction of food intake that is contaminated

NIRfood - Normalized food ingestion rate

I_s - Ingestion rate of soil (S_F x NIRfood)

(1) - km of shoreline

Parameters taken from Table D-1, OEPA DERR Ecological Risk Assessment Guidance, 2008.

TABLE 13.1

Estimated Exposure Intake and Hazard Quotient Calculations for the Mallard
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Aquatic Plant Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Acetone	0.00E+00	0.00E+00	1.80E-02	3.40E-05	0.00E+00	0.00E+00	3.40E-05	4.00E+00	8.51E-06	4.00E+01	8.51E-07
Carbon disulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-	-	-	-
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	0.00E+00	2.00E+01	0.00E+00
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	0.00E+00	2.00E+01	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	2.50E-01	4.73E-04	0.00E+00	0.00E+00	4.73E-04	2.85E+01	1.66E-05	2.85E+02	1.66E-06
Acenaphthene	0.00E+00	0.00E+00	2.50E-01	4.73E-04	1.26E-02	7.94E-04	1.27E-03	2.85E+01	4.44E-05	2.85E+02	4.44E-06
Acenaphthylene	0.00E+00	0.00E+00	3.00E-01	5.67E-04	1.23E-01	7.75E-03	8.32E-03	2.85E+01	2.92E-04	2.85E+02	2.92E-05
Anthracene	0.00E+00	0.00E+00	1.30E+00	2.46E-03	4.56E-01	2.87E-02	3.12E-02	2.85E+01	1.09E-03	2.85E+02	1.09E-04
Benzo(a)anthracene	0.00E+00	0.00E+00	1.40E+00	2.65E-03	8.14E-02	5.13E-03	7.77E-03	2.85E+01	2.73E-04	2.85E+02	2.73E-05
Benzo(a)pyrene	0.00E+00	0.00E+00	1.20E+00	2.27E-03	1.52E-01	9.58E-03	1.18E-02	2.85E+01	4.16E-04	2.85E+02	4.16E-05
Benzo(b)fluoranthene	0.00E+00	0.00E+00	1.30E+00	2.46E-03	4.03E-01	2.54E-02	2.78E-02	2.85E+01	9.77E-04	2.85E+02	9.77E-05
Benzo(ghi)perylene	0.00E+00	0.00E+00	6.30E-01	1.19E-03	2.28E-01	1.44E-02	1.56E-02	2.85E+01	5.46E-04	2.85E+02	5.46E-05
Benzo(k)fluoranthene	0.00E+00	0.00E+00	6.20E-01	1.17E-03	7.66E-02	4.83E-03	6.00E-03	2.85E+01	2.10E-04	2.85E+02	2.10E-05
bis(2-ethylhexyl) phthalate	1.40E-03	7.98E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-05	1.11E+00	7.19E-05	1.10E+01	7.25E-06
Chrysene	0.00E+00	0.00E+00	1.70E+00	3.21E-03	9.14E-02	5.76E-03	8.97E-03	2.85E+01	3.15E-04	2.85E+02	3.15E-05
Dibenz(ah)anthracene	0.00E+00	0.00E+00	1.90E-01	3.59E-04	2.47E-02	1.56E-03	1.92E-03	2.85E+01	6.72E-05	2.85E+02	6.72E-06
Dibenzofuran	0.00E+00	0.00E+00	4.70E-01	8.88E-04	0.00E+00	0.00E+00	8.88E-04	2.85E+01	3.12E-05	2.85E+02	3.12E-06
1,2-Dichlorobenzene	2.10E-02	1.20E-03	2.00E-01	3.78E-04	1.64E-02	1.03E-03	2.61E-03	-	-	-	-
Fluoranthene	0.00E+00	0.00E+00	4.60E+00	8.69E-03	2.30E+00	1.45E-01	1.54E-01	2.85E+01	5.39E-03	2.85E+02	5.39E-04
Fluorene	0.00E+00	0.00E+00	9.00E-01	1.70E-03	4.20E-03	2.65E-04	1.97E-03	2.85E+01	6.90E-05	2.85E+02	6.90E-06
Indeno(123-cd)pyrene	0.00E+00	0.00E+00	5.80E-01	1.10E-03	6.38E-02	4.02E-03	5.12E-03	2.85E+01	1.79E-04	2.85E+02	1.79E-05
3-Methylphenol	0.00E+00	0.00E+00	2.40E-01	4.54E-04	0.00E+00	0.00E+00	4.54E-04	-	-	-	-
4-Methylphenol	0.00E+00	0.00E+00	2.40E-01	4.54E-04	0.00E+00	0.00E+00	4.54E-04	-	-	-	-
Naphthalene	0.00E+00	0.00E+00	7.00E-01	1.32E-03	0.00E+00	0.00E+00	1.32E-03	4.00E+02	3.31E-06	4.00E+03	3.31E-07
Phenanthrene	0.00E+00	0.00E+00	4.80E+00	9.07E-03	2.24E+00	1.41E-01	1.50E-01	4.00E+02	3.75E-04	4.00E+03	3.75E-05
Pyrene	0.00E+00	0.00E+00	3.10E+00	5.86E-03	2.23E+00	1.40E-01	1.46E-01	2.85E+01	5.14E-03	2.85E+02	5.14E-04
4,4'-DDE	2.50E-05	1.43E-06	2.30E-02	4.35E-05	4.75E-03	2.99E-04	3.44E-04	2.80E-03	1.23E-01	2.80E-02	1.23E-02
4,4'-DDT	2.80E-05	1.60E-06	5.60E-03	1.06E-05	1.64E-03	1.03E-04	1.16E-04	2.80E-03	4.13E-02	2.80E-02	4.13E-03
Aldrin	0.00E+00	0.00E+00	1.00E-03	1.89E-06	4.10E-04	2.58E-05	2.77E-05	7.70E-02	3.60E-04	7.70E-01	3.60E-05
alpha-Chlordane	2.00E-05	1.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-06	2.14E+00	5.33E-07	1.07E+01	1.07E-07
beta-BHC	0.00E+00	0.00E+00	9.40E-02	1.78E-04	3.85E-02	2.43E-03	2.60E-03	5.63E-01	4.62E-03	2.25E+00	1.16E-03
Dieldrin	5.30E-05	3.02E-06	2.40E-02	4.54E-05	9.84E-03	6.20E-04	6.68E-04	7.70E-02	8.68E-03	7.70E-01	8.68E-04
Heptachlor Epoxide	3.30E-05	1.88E-06	0.00E+00	0.00E+00	2.30E-03	1.45E-04	1.47E-04	6.50E+01	2.26E-06	6.50E+02	2.26E-07
Methoxychlor	0.00E+00	0.00E+00	5.60E-03	1.06E-05	2.30E-03	1.45E-04	1.55E-04	-	-	-	-
Aroclor-1242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-01	0.00E+00	4.10E+00	0.00E+00
Aroclor-1248	0.00E+00	0.00E+00	7.00E-02	1.32E-04	2.33E-04	1.47E-05	1.47E-04	4.10E-01	3.58E-04	4.10E+00	3.58E-05
Aroclor-1254	0.00E+00	0.00E+00	1.00E-01	1.89E-04	2.55E-04	1.61E-05	2.05E-04	4.10E-01	5.00E-04	4.10E+00	5.00E-05
Aroclor-1260	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-01	0.00E+00	4.10E+00	0.00E+00
Aluminum	4.83E+01	2.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E+00	1.10E+02	2.50E-02	1.10E+03	2.50E-03
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+00	0.00E+00	7.38E+00	0.00E+00
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-01	1.49E-02	1.49E-02	2.46E+00	6.04E-03	7.38E+00	2.01E-03
Barium	4.94E-01	2.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-02	2.08E+01	1.35E-03	4.17E+01	6.75E-04
Cadmium	1.70E-03	9.69E-05	0.00E+00	0.00E+00	4.44E-01	2.80E-02	2.81E-02	1.45E+00	1.94E-02	2.00E+01	1.40E-03

TABLE 13.1

Estimated Exposure Intake and Hazard Quotient Calculations for the Mallard
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Aquatic Plant Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Chromium	1.74E-01	9.92E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.92E-03	1.00E+00	9.92E-03	5.00E+00	1.98E-03
Cobalt	4.38E-02	2.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	7.74E+01	3.23E-05	1.07E+02	2.33E-05
Copper	1.04E-01	5.93E-03	0.00E+00	0.00E+00	4.28E+00	2.70E-01	2.76E-01	4.70E+01	5.87E-03	6.17E+01	4.47E-03
Iron	9.01E+01	5.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E+00	-	-	-	-
Lead	1.26E-01	7.18E-03	3.83E+01	7.24E-02	2.05E+00	1.29E-01	2.09E-01	3.85E+00	5.42E-02	3.85E+01	5.42E-03
Manganese	2.73E+00	1.56E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-01	9.77E+02	1.59E-04	9.77E+03	1.59E-05
Mercury	1.80E-04	1.03E-05	3.30E-02	6.24E-05	2.15E-02	1.35E-03	1.43E-03	4.50E-01	3.17E-03	9.00E-01	1.59E-03
Nickel	2.14E-01	1.22E-02	0.00E+00	0.00E+00	1.09E+00	6.87E-02	8.09E-02	7.74E+01	1.04E-03	1.07E+02	7.56E-04
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-01	1.42E-02	1.42E-02	5.00E-01	2.85E-02	1.00E+00	1.42E-02
Silver	0.00E+00	0.00E+00	2.00E-01	3.78E-04	2.80E-03	1.76E-04	5.54E-04	1.78E+02	3.11E-06	1.78E+03	3.11E-07
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-02	0.00E+00	3.50E-01	0.00E+00
Tin	1.34E+00	7.64E-02	7.63E+01	1.44E-01	0.00E+00	0.00E+00	2.21E-01	6.76E+00	3.26E-02	1.69E+01	1.31E-02
Vanadium	1.24E-01	7.07E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.07E-03	1.14E+01	6.20E-04	1.14E+02	6.20E-05
Zinc	4.11E-01	2.34E-02	0.00E+00	0.00E+00	6.23E+01	3.92E+00	3.95E+00	1.45E+01	2.72E-01	1.31E+02	3.01E-02

Note: A "0.00E+00" in the concentration term (and any subsequent calculations) means that the compound was either not detected in that medium, or was detected below the appropriate screening value.

TABLE 13.2

Estimated Exposure Intake and Hazard Quotient Calculations for the Muskrat
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Aquatic Plant Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Acetone	0.00E+00	0.00E+00	1.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.39E+00	0.00E+00	3.70E+01	0.00E+00
Carbon disulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-01	0.00E+00	2.36E+00	0.00E+00
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.18E+01	0.00E+00	7.18E+02	0.00E+00
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-01	0.00E+00	1.04E+00	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	2.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-01	0.00E+00	1.88E+00	0.00E+00
Acenaphthene	0.00E+00	0.00E+00	2.50E-01	0.00E+00	1.26E-02	3.78E-03	3.78E-03	2.31E+01	1.64E-04	2.31E+02	1.64E-05
Acenaphthylene	0.00E+00	0.00E+00	3.00E-01	0.00E+00	1.23E-01	3.69E-02	3.69E-02	4.00E-01	9.23E-02	4.00E+00	9.23E-03
Anthracene	0.00E+00	0.00E+00	1.30E+00	0.00E+00	4.56E-01	1.37E-01	1.37E-01	1.32E+02	1.04E-03	1.32E+03	1.04E-04
Benzo(a)anthracene	0.00E+00	0.00E+00	1.40E+00	0.00E+00	8.14E-02	2.44E-02	2.44E-02	3.34E+00	7.31E-03	3.34E+01	7.31E-04
Benzo(a)pyrene	0.00E+00	0.00E+00	1.20E+00	0.00E+00	1.52E-01	4.56E-02	4.56E-02	4.00E-01	1.14E-01	4.00E+00	1.14E-02
Benzo(b)fluoranthene	0.00E+00	0.00E+00	1.30E+00	0.00E+00	4.03E-01	1.21E-01	1.21E-01	4.00E-01	3.02E-01	4.00E+00	3.02E-02
Benzo(ghi)perylene	0.00E+00	0.00E+00	6.30E-01	0.00E+00	2.28E-01	6.84E-02	6.84E-02	4.00E-01	1.71E-01	4.00E+00	1.71E-02
Benzo(k)fluoranthene	0.00E+00	0.00E+00	6.20E-01	0.00E+00	7.66E-02	2.30E-02	2.30E-02	4.00E-01	5.75E-02	4.00E+00	5.75E-03
bis(2-ethylhexyl) phthalate	1.40E-03	1.37E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-03	7.33E+00	1.87E-04	7.33E+01	1.87E-05
Chrysene	0.00E+00	0.00E+00	1.70E+00	0.00E+00	9.14E-02	2.74E-02	2.74E-02	4.00E-01	6.86E-02	4.00E+00	6.86E-03
Dibenz(ah)anthracene	0.00E+00	0.00E+00	1.90E-01	0.00E+00	2.47E-02	7.41E-03	7.41E-03	4.00E-01	1.85E-02	4.00E+00	1.85E-03
Dibenzofuran	0.00E+00	0.00E+00	4.70E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-01	0.00E+00	4.00E+00	0.00E+00
1,2-Dichlorobenzene	2.10E-02	2.06E-02	2.00E-01	0.00E+00	1.64E-02	4.92E-03	2.55E-02	6.33E+01	4.03E-04	6.33E+02	4.03E-05
Fluoranthene	0.00E+00	0.00E+00	4.60E+00	0.00E+00	2.30E+00	6.90E-01	6.90E-01	1.65E+01	4.18E-02	1.65E+02	4.18E-03
Fluorene	0.00E+00	0.00E+00	9.00E-01	0.00E+00	4.20E-03	1.26E-03	1.26E-03	1.65E+01	7.64E-05	1.65E+02	7.64E-06
Indeno(123-cd)pyrene	0.00E+00	0.00E+00	5.80E-01	0.00E+00	6.38E-02	1.91E-02	1.91E-02	4.00E-01	4.79E-02	4.00E+00	4.79E-03
3-Methylphenol	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	0.00E+00	1.22E+02	0.00E+00
4-Methylphenol	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	7.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E+01	0.00E+00	1.73E+02	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	4.80E+00	0.00E+00	2.24E+00	6.72E-01	6.72E-01	4.00E-01	1.68E+00	4.00E+00	1.68E-01
Pyrene	0.00E+00	0.00E+00	3.10E+00	0.00E+00	2.23E+00	6.69E-01	6.69E-01	9.90E+00	6.76E-02	9.90E+01	6.76E-03
4,4'-DDE	2.50E-05	2.45E-05	2.30E-02	0.00E+00	4.75E-03	1.43E-03	1.45E-03	5.91E-01	2.45E-03	2.96E+00	4.90E-04
4,4'-DDT	2.80E-05	2.74E-05	5.60E-03	0.00E+00	1.64E-03	4.92E-04	5.19E-04	5.91E-01	8.79E-04	2.96E+00	1.75E-04
Aldrin	0.00E+00	0.00E+00	1.00E-03	0.00E+00	4.10E-04	1.23E-04	1.23E-04	1.48E-01	8.31E-04	7.39E-01	1.66E-04
alpha-Chlordane	2.00E-05	1.96E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-05	1.84E+00	1.07E-05	3.68E+00	5.33E-06
beta-BHC	0.00E+00	0.00E+00	9.40E-02	0.00E+00	3.85E-02	1.16E-02	1.16E-02	1.18E+00	9.79E-03	2.36E+00	4.89E-03
Dieldrin	5.30E-05	5.19E-05	2.40E-02	0.00E+00	9.84E-03	2.95E-03	3.00E-03	1.48E-02	2.03E-01	1.48E-01	2.03E-02
Heptachlor Epoxide	3.30E-05	3.23E-05	0.00E+00	0.00E+00	2.30E-03	6.90E-04	7.22E-04	9.60E-02	7.52E-03	9.60E-01	7.52E-04
Methoxychlor	0.00E+00	0.00E+00	5.60E-03	0.00E+00	2.30E-03	6.90E-04	6.90E-04	2.96E+00	2.33E-04	5.91E+00	1.17E-04
Aroclor-1242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.62E-02	0.00E+00	6.62E-01	0.00E+00
Aroclor-1248	0.00E+00	0.00E+00	7.00E-02	0.00E+00	2.33E-04	6.99E-05	6.99E-05	2.72E-02	2.57E-03	2.72E-01	2.57E-04
Aroclor-1254	0.00E+00	0.00E+00	1.00E-01	0.00E+00	2.55E-04	7.65E-05	7.65E-05	2.72E-02	2.81E-03	2.72E-01	2.81E-04
Aroclor-1260	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-02	0.00E+00	2.72E-01	0.00E+00
Aluminum	4.83E+01	4.73E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.73E+01	7.72E-01	**6.13E+01**	7.72E+00	**6.13E+00**
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-02	0.00E+00	5.00E-01	0.00E+00
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-01	7.08E-02	7.08E-02	5.04E-02	1.40E+00	5.04E-01	1.40E-01
Barium	4.94E-01	4.84E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E-01	3.74E+00	1.29E-01	3.74E+01	1.29E-02
Cadmium	1.70E-03	1.67E-03	0.00E+00	0.00E+00	4.44E-01	1.33E-01	1.35E-01	7.39E-01	1.82E-01	7.39E+00	1.82E-02

TABLE 13.2

Estimated Exposure Intake and Hazard Quotient Calculations for the Muskrat
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Aquatic Plant Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Chromium	1.74E-01	1.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	2.02E+03	8.44E-05	2.02E+04	8.44E-06
Cobalt	4.38E-02	4.29E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.29E-02	2.96E+01	1.45E-03	5.91E+01	7.26E-04
Copper	1.04E-01	1.02E-01	0.00E+00	0.00E+00	4.28E+00	1.28E+00	1.39E+00	1.12E+01	1.24E-01	1.45E+01	9.56E-02
Iron	9.01E+01	8.83E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.83E+01	-	-	-	-
Lead	1.26E-01	1.23E-01	3.83E+01	0.00E+00	2.05E+00	6.15E-01	7.38E-01	5.91E+00	1.25E-01	5.91E+01	1.25E-02
Manganese	2.73E+00	2.68E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.68E+00	6.50E+01	4.12E-02	2.10E+02	1.27E-02
Mercury	1.80E-04	1.76E-04	3.30E-02	0.00E+00	2.15E-02	6.45E-03	6.63E-03	9.60E-01	6.90E-03	9.60E+00	6.90E-04
Nickel	2.14E-01	2.10E-01	0.00E+00	0.00E+00	1.09E+00	3.27E-01	5.37E-01	2.96E+01	1.81E-02	5.91E+01	9.08E-03
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-01	6.78E-02	6.78E-02	1.48E-01	4.58E-01	2.44E-01	2.78E-01
Silver	0.00E+00	0.00E+00	2.00E-01	0.00E+00	2.80E-03	8.40E-04	8.40E-04	1.50E-01	5.60E-03	1.50E+00	5.60E-04
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	0.00E+00	5.47E-02	0.00E+00
Tin	1.34E+00	1.31E+00	7.63E+01	0.00E+00	0.00E+00	0.00E+00	1.31E+00	9.36E+00	1.40E-01	1.40E+01	9.38E-02
Vanadium	1.24E-01	1.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-01	1.55E-01	7.84E-01	1.55E+00	7.84E-02
Zinc	4.11E-01	4.03E-01	0.00E+00	0.00E+00	6.23E+01	1.87E+01	1.91E+01	1.18E+02	1.62E-01	2.36E+02	8.09E-02

Note: A "0.00E+00" in the concentration term (and any subsequent calculations) means that the compound was either not detected in that medium, or was detected below the appropriate screening value.

TABLE 13.3

Estimated Exposure Intake and Hazard Quotient Calculations for the Mink
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Acetone	0.00E+00	0.00E+00	1.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E+00	0.00E+00	3.83E+01	0.00E+00
Carbon disulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-01	0.00E+00	2.44E+00	0.00E+00
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.43E+01	0.00E+00	7.43E+02	0.00E+00
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.69E-01	0.00E+00	1.08E+00	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	2.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-01	0.00E+00	1.95E+00	0.00E+00
Acenaphthene	0.00E+00	0.00E+00	2.50E-01	0.00E+00	1.06E-01	1.70E-02	1.70E-02	2.39E+01	7.10E-04	2.39E+02	7.10E-05
Acenaphthylene	0.00E+00	0.00E+00	3.00E-01	0.00E+00	1.27E-01	2.03E-02	2.03E-02	4.14E-01	4.91E-02	4.14E+00	4.91E-03
Anthracene	0.00E+00	0.00E+00	1.30E+00	0.00E+00	5.51E-01	8.82E-02	8.82E-02	1.37E+02	6.44E-04	1.37E+03	6.44E-05
Benzo(a)anthracene	0.00E+00	0.00E+00	1.40E+00	0.00E+00	5.93E-01	9.49E-02	9.49E-02	3.46E+00	2.74E-02	3.46E+01	2.74E-03
Benzo(a)pyrene	0.00E+00	0.00E+00	1.20E+00	0.00E+00	5.08E-01	8.13E-02	8.13E-02	4.14E-01	1.96E-01	4.14E+00	1.96E-02
Benzo(b)fluoranthene	0.00E+00	0.00E+00	1.30E+00	0.00E+00	5.51E-01	8.82E-02	8.82E-02	4.14E-01	2.13E-01	4.14E+00	2.13E-02
Benzo(ghi)perylene	0.00E+00	0.00E+00	6.30E-01	0.00E+00	2.67E-01	4.27E-02	4.27E-02	4.14E-01	1.03E-01	4.14E+00	1.03E-02
Benzo(k)fluoranthene	0.00E+00	0.00E+00	6.20E-01	0.00E+00	2.63E-01	4.21E-02	4.21E-02	4.14E-01	1.02E-01	4.14E+00	1.02E-02
bis(2-ethylhexyl) phthalate	1.40E-03	1.11E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-04	7.59E+00	1.46E-05	7.59E+01	1.46E-06
Chrysene	0.00E+00	0.00E+00	1.70E+00	0.00E+00	7.20E-01	1.15E-01	1.15E-01	4.14E-01	2.78E-01	4.14E+00	2.78E-02
Dibenz(ah)anthracene	0.00E+00	0.00E+00	1.90E-01	0.00E+00	8.05E-02	1.29E-02	1.29E-02	4.14E-01	3.11E-02	4.14E+00	3.11E-03
Dibenzofuran	0.00E+00	0.00E+00	4.70E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-01	0.00E+00	4.14E+00	0.00E+00
1,2-Dichlorobenzene	2.10E-02	1.66E-03	2.00E-01	0.00E+00	7.89E-01	1.26E-01	1.28E-01	6.56E+01	1.95E-03	6.56E+02	1.95E-04
Fluoranthene	0.00E+00	0.00E+00	4.60E+00	0.00E+00	1.95E+00	3.12E-01	3.12E-01	1.71E+01	1.82E-02	1.71E+02	1.82E-03
Fluorene	0.00E+00	0.00E+00	9.00E-01	0.00E+00	3.81E-01	6.10E-02	6.10E-02	1.71E+01	3.56E-03	1.71E+02	3.56E-04
Indeno(123-cd)pyrene	0.00E+00	0.00E+00	5.80E-01	0.00E+00	2.46E-01	3.94E-02	3.94E-02	4.14E-01	9.51E-02	4.14E+00	9.51E-03
3-Methylphenol	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+01	0.00E+00	1.26E+02	0.00E+00
4-Methylphenol	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-01	0.00E+00	1.58E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	7.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+01	0.00E+00	1.79E+02	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	4.80E+00	0.00E+00	2.03E+00	3.25E-01	3.25E-01	4.14E-01	7.85E-01	4.14E+00	7.85E-02
Pyrene	0.00E+00	0.00E+00	3.10E+00	0.00E+00	1.31E+00	2.10E-01	2.10E-01	1.02E+01	2.05E-02	1.02E+02	2.05E-03
4,4'-DDE	2.50E-05	1.98E-06	2.30E-02	0.00E+00	1.55E-01	2.48E-02	2.48E-02	6.12E-01	4.05E-02	3.06E+00	8.11E-03
4,4'-DDT	2.80E-05	2.21E-06	5.60E-03	0.00E+00	6.86E-03	1.10E-03	1.10E-03	6.12E-01	1.80E-03	3.06E+00	3.59E-04
Aldrin	0.00E+00	0.00E+00	1.00E-03	0.00E+00	3.77E-04	6.03E-05	6.03E-05	1.53E-01	3.94E-04	7.65E-01	7.88E-05
alpha-Chlordane	2.00E-05	1.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-06	1.90E+00	8.32E-07	3.81E+00	4.15E-07
beta-BHC	0.00E+00	0.00E+00	9.40E-02	0.00E+00	3.37E-01	5.39E-02	5.39E-02	1.22E+00	4.42E-02	2.45E+00	2.20E-02
Dieldrin	5.30E-05	4.19E-06	2.40E-02	0.00E+00	7.75E-02	1.24E-02	1.24E-02	1.53E-02	8.11E-01	1.53E-01	8.11E-02
Heptachlor Epoxide	3.30E-05	2.61E-06	0.00E+00	0.00E+00	1.01E-02	1.62E-03	1.62E-03	9.95E-02	1.63E-02	9.95E-01	1.63E-03
Methoxychlor	0.00E+00	0.00E+00	5.60E-03	0.00E+00	1.01E-02	1.62E-03	1.62E-03	3.06E+00	5.28E-04	6.12E+00	2.64E-04
Aroclor-1242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.87E-02	0.00E+00	6.87E-01	0.00E+00
Aroclor-1248	0.00E+00	0.00E+00	7.00E-02	0.00E+00	5.46E-01	8.74E-02	8.74E-02	2.82E-02	3.10E+00	2.82E-01	3.10E-01
Aroclor-1254	0.00E+00	0.00E+00	1.00E-01	0.00E+00	7.80E-01	1.25E-01	1.25E-01	2.82E-02	**4.43E+00**	2.82E-01	4.43E-01
Aroclor-1260	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-02	0.00E+00	2.82E-01	0.00E+00
Aluminum	4.83E+01	3.82E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.82E+00	7.99E-01	4.78E+00	7.99E+00	4.78E-01
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.18E-02	0.00E+00	5.18E-01	0.00E+00
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E+00	1.73E-01	1.73E-01	5.22E-02	**3.31E+00**	5.22E-01	3.31E-01
Barium	4.94E-01	3.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E-02	3.87E+00	1.01E-02	3.87E+01	1.01E-03
Cadmium	1.70E-03	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-04	7.65E-01	1.76E-04	7.65E+00	1.76E-05

TABLE 13.3

Estimated Exposure Intake and Hazard Quotient Calculations for the Mink
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Chromium	1.74E-01	1.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-02	2.09E+03	6.58E-06	2.09E+04	6.58E-07
Cobalt	4.38E-02	3.46E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-03	3.06E+01	1.13E-04	6.12E+01	5.65E-05
Copper	1.04E-01	8.22E-03	0.00E+00	0.00E+00	1.34E+00	2.14E-01	2.23E-01	1.17E+01	1.90E-02	1.51E+01	1.47E-02
Iron	9.01E+01	7.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.12E+00	-	-	-	-
Lead	1.26E-01	9.95E-03	3.83E+01	0.00E+00	0.00E+00	0.00E+00	9.95E-03	6.12E+00	1.63E-03	6.12E+01	1.63E-04
Manganese	2.73E+00	2.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-01	6.73E+01	3.20E-03	2.17E+02	9.94E-04
Mercury	1.80E-04	1.42E-05	3.30E-02	0.00E+00	9.40E-02	1.50E-02	1.51E-02	9.95E-01	1.51E-02	9.95E+00	1.51E-03
Nickel	2.14E-01	1.69E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-02	3.06E+01	5.52E-04	6.12E+01	2.76E-04
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	2.52E-01	0.00E+00
Silver	0.00E+00	0.00E+00	2.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-01	0.00E+00	1.55E+00	0.00E+00
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.66E-03	0.00E+00	5.66E-02	0.00E+00
Tin	1.34E+00	1.06E-01	7.63E+01	0.00E+00	0.00E+00	0.00E+00	1.06E-01	9.69E+00	1.09E-02	1.45E+01	7.30E-03
Vanadium	1.24E-01	9.80E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.80E-03	1.61E-01	6.08E-02	1.61E+00	6.08E-03
Zinc	4.11E-01	3.25E-02	0.00E+00	0.00E+00	2.31E+01	3.70E+00	3.73E+00	1.22E+02	3.06E-02	2.45E+02	1.52E-02

Note: A "0.00E+00" in the concentration term (and any subsequent calculations) means that the compound was either not detected in that medium, or was detected below the appropriate screening value.

TABLE 13.4

Estimated Exposure Intake and Hazard Calculations for the Great Blue Heron
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Acetone	0.00E+00	0.00E+00	1.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E+00	0.00E+00	4.00E+01	0.00E+00
Carbon disulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-	-	-	-
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	0.00E+00	2.00E+01	0.00E+00
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	0.00E+00	2.00E+01	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	2.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E+01	0.00E+00	2.85E+02	0.00E+00
Acenaphthene	0.00E+00	0.00E+00	2.50E-01	0.00E+00	1.06E-01	1.91E-02	1.91E-02	2.85E+01	6.69E-04	2.85E+02	6.69E-05
Acenaphthylene	0.00E+00	0.00E+00	3.00E-01	0.00E+00	1.27E-01	2.29E-02	2.29E-02	2.85E+01	8.02E-04	2.85E+02	8.02E-05
Anthracene	0.00E+00	0.00E+00	1.30E+00	0.00E+00	5.51E-01	9.92E-02	9.92E-02	2.85E+01	3.48E-03	2.85E+02	3.48E-04
Benzo(a)anthracene	0.00E+00	0.00E+00	1.40E+00	0.00E+00	5.93E-01	1.07E-01	1.07E-01	2.85E+01	3.75E-03	2.85E+02	3.75E-04
Benzo(a)pyrene	0.00E+00	0.00E+00	1.20E+00	0.00E+00	5.08E-01	9.14E-02	9.14E-02	2.85E+01	3.21E-03	2.85E+02	3.21E-04
Benzo(b)fluoranthene	0.00E+00	0.00E+00	1.30E+00	0.00E+00	5.51E-01	9.92E-02	9.92E-02	2.85E+01	3.48E-03	2.85E+02	3.48E-04
Benzo(ghi)perylene	0.00E+00	0.00E+00	6.30E-01	0.00E+00	2.67E-01	4.81E-02	4.81E-02	2.85E+01	1.69E-03	2.85E+02	1.69E-04
Benzo(k)fluoranthene	0.00E+00	0.00E+00	6.20E-01	0.00E+00	2.63E-01	4.73E-02	4.73E-02	2.85E+01	1.66E-03	2.85E+02	1.66E-04
bis(2-ethylhexyl) phthalate	1.40E-03	6.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-05	1.11E+00	5.68E-05	1.10E+01	5.73E-06
Chrysene	0.00E+00	0.00E+00	1.70E+00	0.00E+00	7.20E-01	1.30E-01	1.30E-01	2.85E+01	4.55E-03	2.85E+02	4.55E-04
Dibenz(ah)anthracene	0.00E+00	0.00E+00	1.90E-01	0.00E+00	8.05E-02	1.45E-02	1.45E-02	2.85E+01	5.08E-04	2.85E+02	5.08E-05
Dibenzofuran	0.00E+00	0.00E+00	4.70E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E+01	0.00E+00	2.85E+02	0.00E+00
1,2-Dichlorobenzene	2.10E-02	9.45E-04	2.00E-01	0.00E+00	7.89E-01	1.42E-01	1.43E-01	-	-	-	-
Fluoranthene	0.00E+00	0.00E+00	4.60E+00	0.00E+00	1.95E+00	3.51E-01	3.51E-01	2.85E+01	1.23E-02	2.85E+02	1.23E-03
Fluorene	0.00E+00	0.00E+00	9.00E-01	0.00E+00	3.81E-01	6.86E-02	6.86E-02	2.85E+01	2.41E-03	2.85E+02	2.41E-04
Indeno(123-cd)pyrene	0.00E+00	0.00E+00	5.80E-01	0.00E+00	2.46E-01	4.43E-02	4.43E-02	2.85E+01	1.55E-03	2.85E+02	1.55E-04
3-Methylphenol	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-	-	-	-
4-Methylphenol	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-	-	-	-
Naphthalene	0.00E+00	0.00E+00	7.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E+02	0.00E+00	4.00E+03	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	4.80E+00	0.00E+00	2.03E+00	3.65E-01	3.65E-01	4.00E+02	9.14E-04	4.00E+03	9.14E-05
Pyrene	0.00E+00	0.00E+00	3.10E+00	0.00E+00	1.31E+00	2.36E-01	2.36E-01	2.85E+01	8.27E-03	2.85E+02	8.27E-04
4,4'-DDE	2.50E-05	1.13E-06	2.30E-02	0.00E+00	1.55E-01	2.79E-02	2.79E-02	2.80E-03	**9.96E+00**	2.80E-02	9.96E-01
4,4'-DDT	2.80E-05	1.26E-06	5.60E-03	0.00E+00	6.86E-03	1.23E-03	1.24E-03	2.80E-03	4.41E-01	2.80E-02	4.41E-02
Aldrin	0.00E+00	0.00E+00	1.00E-03	0.00E+00	3.77E-04	6.79E-05	6.79E-05	7.70E-02	8.81E-04	7.70E-01	8.81E-05
alpha-Chlordane	2.00E-05	9.00E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-07	2.14E+00	4.21E-07	1.07E+01	8.41E-08
beta-BHC	0.00E+00	0.00E+00	9.40E-02	0.00E+00	3.37E-01	6.07E-02	6.07E-02	5.63E-01	1.08E-01	2.25E+00	2.70E-02
Dieldrin	5.30E-05	2.39E-06	2.40E-02	0.00E+00	7.75E-02	1.40E-02	1.40E-02	7.70E-02	1.81E-01	7.70E-01	1.81E-02
Heptachlor Epoxide	3.30E-05	1.49E-06	0.00E+00	0.00E+00	1.01E-02	1.82E-03	1.82E-03	6.50E+01	2.80E-05	6.50E+02	2.80E-06
Methoxychlor	0.00E+00	0.00E+00	5.60E-03	0.00E+00	1.01E-02	1.82E-03	1.82E-03	-	-	-	-
Aroclor-1242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-01	0.00E+00	4.10E+00	0.00E+00
Aroclor-1248	0.00E+00	0.00E+00	7.00E-02	0.00E+00	5.46E-01	9.83E-02	9.83E-02	4.10E-01	2.40E-01	4.10E+00	2.40E-02
Aroclor-1254	0.00E+00	0.00E+00	1.00E-01	0.00E+00	7.80E-01	1.40E-01	1.40E-01	4.10E-01	3.42E-01	4.10E+00	3.42E-02
Aroclor-1260	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-01	0.00E+00	4.10E+00	0.00E+00
Aluminum	4.83E+01	2.17E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E+00	1.10E+02	1.98E-02	1.10E+03	1.98E-03
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+00	0.00E+00	7.38E+00	0.00E+00
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E+00	1.94E-01	1.94E-01	2.46E+00	7.90E-02	7.38E+00	2.63E-02
Barium	4.94E-01	2.22E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-02	2.08E+01	1.07E-03	4.17E+01	5.33E-04
Cadmium	1.70E-03	7.65E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-05	1.45E+00	5.28E-05	2.00E+01	3.83E-06
Chromium	1.74E-01	7.83E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.83E-03	1.00E+00	7.83E-03	5.00E+00	1.57E-03
Cobalt	4.38E-02	1.97E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-03	7.74E+01	2.55E-05	1.07E+02	1.84E-05
Copper	1.04E-01	4.68E-03	0.00E+00	0.00E+00	1.34E+00	2.41E-01	2.46E-01	4.70E+01	5.23E-03	6.17E+01	3.99E-03

TABLE 13.4

Estimated Exposure Intake and Hazard Calculations for the Great Blue Heron
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Iron	9.01E+01	4.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	-	-	-	-
Lead	1.26E-01	5.67E-03	3.83E+01	0.00E+00	0.00E+00	0.00E+00	5.67E-03	3.85E+00	1.47E-03	3.85E+01	1.47E-04
Manganese	2.73E+00	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-01	9.77E+02	1.26E-04	9.77E+03	1.26E-05
Mercury	1.80E-04	8.10E-06	3.30E-02	0.00E+00	9.40E-02	1.69E-02	1.69E-02	4.50E-01	3.76E-02	9.00E-01	1.88E-02
Nickel	2.14E-01	9.63E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.63E-03	7.74E+01	1.24E-04	1.07E+02	9.00E-05
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-01	0.00E+00	1.00E+00	0.00E+00
Silver	0.00E+00	0.00E+00	2.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E+02	0.00E+00	1.78E+03	0.00E+00
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-02	0.00E+00	3.50E-01	0.00E+00
Tin	1.34E+00	6.03E-02	7.63E+01	0.00E+00	0.00E+00	0.00E+00	6.03E-02	6.76E+00	8.92E-03	1.69E+01	3.57E-03
Vanadium	1.24E-01	5.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.58E-03	1.14E+01	4.89E-04	1.14E+02	4.89E-05
Zinc	4.11E-01	1.85E-02	0.00E+00	0.00E+00	2.31E+01	4.16E+00	4.18E+00	1.45E+01	2.88E-01	1.31E+02	3.19E-02

Note: A "0.00E+00" in the concentration term (and any subsequent calculations) means that the compound was either not detected in that medium, or was detected below the appropriate screening value.

TABLE 13.5

Estimated Exposure Intake and Hazard Quotient Calculations for the Spotted Sandpiper
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Benthos Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Acetone	0.00E+00	0.00E+00	1.80E-02	3.78E-03	0.00E+00	0.00E+00	3.78E-03	4.00E+00	9.45E-04	4.00E+01	9.45E-05
Carbon disulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-	-	-	-
Ethylbenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	0.00E+00	2.00E+01	0.00E+00
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	0.00E+00	2.00E+01	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	2.50E-01	5.25E-02	0.00E+00	0.00E+00	5.25E-02	2.85E+01	1.84E-03	2.85E+02	1.84E-04
Acenaphthene	0.00E+00	0.00E+00	2.50E-01	5.25E-02	1.50E-01	2.25E-01	2.78E-01	2.85E+01	9.74E-03	2.85E+02	9.74E-04
Acenaphthylene	0.00E+00	0.00E+00	3.00E-01	6.30E-02	1.80E-01	2.70E-01	3.33E-01	2.85E+01	1.17E-02	2.85E+02	1.17E-03
Anthracene	0.00E+00	0.00E+00	1.30E+00	2.73E-01	7.80E-01	1.17E+00	1.44E+00	2.85E+01	5.06E-02	2.85E+02	5.06E-03
Benzo(a)anthracene	0.00E+00	0.00E+00	1.40E+00	2.94E-01	8.40E-01	1.26E+00	1.55E+00	2.85E+01	5.45E-02	2.85E+02	5.45E-03
Benzo(a)pyrene	0.00E+00	0.00E+00	1.20E+00	2.52E-01	7.20E-01	1.08E+00	1.33E+00	2.85E+01	4.67E-02	2.85E+02	4.67E-03
Benzo(b)fluoranthene	0.00E+00	0.00E+00	1.30E+00	2.73E-01	7.80E-01	1.17E+00	1.44E+00	2.85E+01	5.06E-02	2.85E+02	5.06E-03
Benzo(ghi)perylene	0.00E+00	0.00E+00	6.30E-01	1.32E-01	3.78E-01	5.67E-01	6.99E-01	2.85E+01	2.45E-02	2.85E+02	2.45E-03
Benzo(k)fluoranthene	0.00E+00	0.00E+00	6.20E-01	1.30E-01	3.72E-01	5.58E-01	6.88E-01	2.85E+01	2.41E-02	2.85E+02	2.41E-03
bis(2-ethylhexyl) phthalate	1.40E-03	2.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-04	1.11E+00	2.14E-04	1.10E+01	2.16E-05
Chrysene	0.00E+00	0.00E+00	1.70E+00	3.57E-01	1.02E+00	1.53E+00	1.89E+00	2.85E+01	6.62E-02	2.85E+02	6.62E-03
Dibenz(ah)anthracene	0.00E+00	0.00E+00	1.90E-01	3.99E-02	1.14E-01	1.71E-01	2.11E-01	2.85E+01	7.40E-03	2.85E+02	7.40E-04
Dibenzofuran	0.00E+00	0.00E+00	4.70E-01	9.87E-02	0.00E+00	0.00E+00	9.87E-02	2.85E+01	3.46E-03	2.85E+02	3.46E-04
1,2-Dichlorobenzene	2.10E-02	3.57E-03	2.00E-01	4.20E-02	1.12E+00	1.68E+00	1.73E+00	-	-	-	-
Fluoranthene	0.00E+00	0.00E+00	4.60E+00	9.66E-01	2.76E+00	4.14E+00	5.11E+00	2.85E+01	1.79E-01	2.85E+02	1.79E-02
Fluorene	0.00E+00	0.00E+00	9.00E-01	1.89E-01	5.40E-01	8.10E-01	9.99E-01	2.85E+01	3.51E-02	2.85E+02	3.51E-03
Indeno(123-cd)pyrene	0.00E+00	0.00E+00	5.80E-01	1.22E-01	3.48E-01	5.22E-01	6.44E-01	2.85E+01	2.26E-02	2.85E+02	2.26E-03
3-Methylphenol	0.00E+00	0.00E+00	2.40E-01	5.04E-02	0.00E+00	0.00E+00	5.04E-02	-	-	-	-
4-Methylphenol	0.00E+00	0.00E+00	2.40E-01	5.04E-02	0.00E+00	0.00E+00	5.04E-02	-	-	-	-
Naphthalene	0.00E+00	0.00E+00	7.00E-01	1.47E-01	0.00E+00	0.00E+00	1.47E-01	4.00E+02	3.68E-04	4.00E+03	3.68E-05
Phenanthrene	0.00E+00	0.00E+00	4.80E+00	1.01E+00	2.88E+00	4.32E+00	5.33E+00	4.00E+02	1.33E-02	4.00E+03	1.33E-03
Pyrene	0.00E+00	0.00E+00	3.10E+00	6.51E-01	1.86E+00	2.79E+00	3.44E+00	2.85E+01	1.21E-01	2.85E+02	1.21E-02
4,4'-DDE	2.50E-05	4.25E-06	2.30E-02	4.83E-03	1.45E-01	2.18E-01	2.22E-01	2.80E-03	**7.94E+01**	2.80E-02	**7.94E+00**
4,4'-DDT	2.80E-05	4.76E-06	5.60E-03	1.18E-03	3.53E-02	5.30E-02	5.41E-02	2.80E-03	**1.93E+01**	2.80E-02	**1.93E+00**
Aldrin	0.00E+00	0.00E+00	1.00E-03	2.10E-04	6.30E-03	9.45E-03	9.66E-03	7.70E-02	1.25E-01	7.70E-01	1.25E-02
alpha-Chlordane	2.00E-05	3.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-06	2.14E+00	1.59E-06	1.07E+01	3.18E-07
beta-BHC	0.00E+00	0.00E+00	9.40E-02	1.97E-02	4.78E-01	7.17E-01	7.37E-01	5.63E-01	1.31E+00	2.25E+00	3.27E-01
Dieldrin	5.30E-05	9.01E-06	2.40E-02	5.04E-03	1.10E-01	1.65E-01	1.70E-01	7.70E-02	**2.21E+00**	7.70E-01	2.21E-01
Heptachlor Epoxide	3.30E-05	5.61E-06	0.00E+00	0.00E+00	1.42E-02	2.13E-02	2.13E-02	6.50E+01	3.28E-04	6.50E+02	3.28E-05
Methoxychlor	0.00E+00	0.00E+00	5.60E-03	1.18E-03	1.42E-02	2.13E-02	2.25E-02	-	-	-	-
Aroclor-1242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-01	0.00E+00	4.10E+00	0.00E+00
Aroclor-1248	0.00E+00	0.00E+00	7.00E-02	1.47E-02	1.07E-01	1.61E-01	1.75E-01	4.10E-01	4.27E-01	4.10E+00	4.27E-02
Aroclor-1254	0.00E+00	0.00E+00	1.00E-01	2.10E-02	2.16E-01	3.24E-01	3.45E-01	4.10E-01	8.41E-01	4.10E+00	8.41E-02
Aroclor-1260	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-01	0.00E+00	4.10E+00	0.00E+00
Aluminum	4.83E+01	8.21E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.21E+00	1.10E+02	7.46E-02	1.10E+03	7.46E-03
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E+00	0.00E+00	7.38E+00	0.00E+00
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.35E+00	6.53E+00	6.53E+00	2.46E+00	**2.65E+00**	7.38E+00	8.84E-01
Barium	4.94E-01	8.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-02	2.08E+01	4.04E-03	4.17E+01	2.01E-03
Cadmium	1.70E-03	2.89E-04	0.00E+00	0.00E+00	4.31E+00	6.47E+00	6.47E+00	1.45E+00	**4.46E+00**	2.00E+01	3.23E-01
Chromium	1.74E-01	2.96E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-02	1.00E+00	2.96E-02	5.00E+00	5.92E-03
Cobalt	4.38E-02	7.45E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.45E-03	7.74E+01	9.62E-05	1.07E+02	6.96E-05
Copper	1.04E-01	1.77E-02	0.00E+00	0.00E+00	1.37E+02	2.06E+02	2.06E+02	4.70E+01	**4.38E+00**	6.17E+01	**3.33E+00**

TABLE 13.5

Estimated Exposure Intake and Hazard Quotient Calculations for the Spotted Sandpiper
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Surface Water Conc. (mg/L)	Est. Intake via SW (mg/kg-day)	Sediment Conc. (mg/kg)	Est. Intake via Sediment (mg/kg-day)	Benthos Food Conc. (mg/kg)	Est. Intake via Food (mg/kg-day)	Total Estimated Intake (mg/kg-day)	Ecological NOAEL TRV (mg/kg-day)	Calculated HQ (unitless)	Ecological LOAEL TRV (mg/kg-day)	Calculated HQ (unitless)
Iron	9.01E+01	1.53E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E+01	-	-	-	-
Lead	1.26E-01	2.14E-02	3.83E+01	8.04E+00	2.32E+01	3.48E+01	4.29E+01	3.85E+00	**1.11E+01**	3.85E+01	1.11E+00
Manganese	2.73E+00	4.64E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-01	9.77E+02	4.75E-04	9.77E+03	4.75E-05
Mercury	1.80E-04	3.06E-05	3.30E-02	6.93E-03	9.46E-02	1.42E-01	1.49E-01	4.50E-01	3.31E-01	9.00E-01	1.65E-01
Nickel	2.14E-01	3.64E-02	0.00E+00	0.00E+00	5.10E+01	7.65E+01	7.65E+01	7.74E+01	9.89E-01	1.07E+02	7.15E-01
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-01	6.48E-01	6.48E-01	5.00E-01	1.30E+00	1.00E+00	6.48E-01
Silver	0.00E+00	0.00E+00	2.00E-01	4.20E-02	1.80E-01	2.70E-01	3.12E-01	1.78E+02	1.75E-03	1.78E+03	1.75E-04
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-02	0.00E+00	3.50E-01	0.00E+00
Tin	1.34E+00	2.28E-01	7.63E+01	1.60E+01	0.00E+00	0.00E+00	1.63E+01	6.76E+00	**2.40E+00**	1.69E+01	9.62E-01
Vanadium	1.24E-01	2.11E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-02	1.14E+01	1.85E-03	1.14E+02	1.85E-04
Zinc	4.11E-01	6.99E-02	0.00E+00	0.00E+00	7.60E+02	1.14E+03	1.14E+03	1.45E+01	**7.87E+01**	1.31E+02	**8.70E+00**

Note: A "0.00E+00" in the concentration term (and any subsequent calculations) means that the compound was either not detected in that medium, or was detected below the appropriate screening value.

TABLE 14

TOXICITY REFERENCE VALUES (TRVs)
Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
INORGANICS/OTHER							
Aluminum	Muskrat	19.3	Chronic LOAEL to mouse over 3 generations	0.33	0.4	2.55	Sample, 1996
	Mink	19.3	Chronic LOAEL to mouse over 3 generations	0.33	0.418	2.66	Sample, 1996
	Mallard	109.7	Chronic NOAEL to ringed dove over 4 months	1	1	109.70	Sample, 1996
	Heron	109.7	Chronic NOAEL to ringed dove over 4 months	1	1	109.70	Sample, 1996
	Sandpiper	109.7	Chronic NOAEL to ringed dove over 4 months	1	1	109.70	Sample, 1996
Antimony	Muskrat	1.25	Chronic LOAEL to mouse over lifetime	0.33	0.4	0.17	Sample, 1996
	Mink	1.25	Chronic LOAEL to mouse over lifetime	0.33	0.418	0.17	Sample, 1996
	Mallard	2.46	Chronic NOAEL for arsenic to cowbird over 7 months	1	1	2.46	Sample, 1996
	Heron	2.46	Chronic NOAEL for arsenic to cowbird over 7 months	1	1	2.46	Sample, 1996
	Sandpiper	2.46	Chronic NOAEL for arsenic to cowbird over 7 months	1	1	2.46	Sample, 1996
Arsenic	Muskrat	1.26	Chronic LOAEL to mouse over 3 generations	0.33	0.4	0.17	Sample, 1996
	Mink	1.26	Chronic LOAEL to mouse over 3 generations	0.33	0.418	0.17	Sample, 1996
	Mallard	2.46	Chronic NOAEL to cowbird over 7 months	1	1	2.46	Sample, 1996
	Heron	2.46	Chronic NOAEL to cowbird over 7 months	1	1	2.46	Sample, 1996
	Sandpiper	2.46	Chronic NOAEL to cowbird over 7 months	1	1	2.46	Sample, 1996
Barium	Muskrat	5.06	Chronic NOAEL to rat over 16 months	1	0.734	3.71	Sample, 1996
	Mink	5.06	Chronic NOAEL to rat over 16 months	1	0.733	3.71	Sample, 1996
	Mallard	208.26	Subchronic NOAEL to day-old chicks for 4 weeks	0.33	1	68.73	Sample, 1996
	Heron	208.26	Subchronic NOAEL to day-old chicks for 4 weeks	0.33	1	68.73	Sample, 1996
	Sandpiper	208.26	Subchronic NOAEL to day-old chicks for 4 weeks	0.33	1	68.73	Sample, 1996
Cadmium	Muskrat	1	Chronic NOAEL to rat over critical lifestage	1	0.734	0.73	Sample, 1996
	Mink	1	Chronic NOAEL to rat over critical lifestage	1	0.733	0.73	Sample, 1996
	Mallard	1.45	Chronic NOAEL to mallards over critical lifestage	1	1	1.45	Sample, 1996
	Heron	1.45	Chronic NOAEL to mallards over critical lifestage	1	1	1.45	Sample, 1996
	Sandpiper	1.45	Chronic NOAEL to mallards over critical lifestage	1	1	1.45	Sample, 1996
Chromium	Muskrat	2737	Chronic NOAEL to rat over critical lifestage	1	0.734	2008.96	Sample, 1996
	Mink	2737	Chronic NOAEL to rat over critical lifestage	1	0.733	2006.22	Sample, 1996
	Mallard	1	Chronic NOAEL to black duck over critical lifestage	1	1	1.00	Sample, 1996
	Heron	1	Chronic NOAEL to black duck over critical lifestage	1	1	1.00	Sample, 1996
	Sandpiper	1	Chronic NOAEL to black duck over critical lifestage	1	1	1.00	Sample, 1996

TABLE 14

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Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
Cobalt	Muskrat	40	Chronic NOAEL for nickel to rat over critical lifestage	1	0.734	29.36	Sample, 1996
	Mink	40	Chronic NOAEL for nickel to rat over critical lifestage	1	0.733	29.32	Sample, 1996
	Mallard	77.4	Chronic NOAEL for nickel to mallard ducking	1	1	77.40	Sample, 1996
	Heron	77.4	Chronic NOAEL for nickel to mallard ducking	1	1	77.40	Sample, 1996
	Sandpiper	77.4	Chronic NOAEL for nickel to mallard ducking	1	1	77.40	Sample, 1996
Copper	Muskrat	11.71	Chronic NOAEL to minkover critical lifestage	1	0.96	11.24	Sample, 1996
	Mink	11.71	Chronic NOAEL to minkover critical lifestage	1	0.955	11.18	Sample, 1996
	Mallard	46.97	Chronic NOAEL to 1-day old chicks for 10 weeks	1	1	46.97	Sample, 1996
	Heron	46.97	Chronic NOAEL to 1-day old chicks for 10 weeks	1	1	46.97	Sample, 1996
	Sandpiper	46.97	Chronic NOAEL to 1-day old chicks for 10 weeks	1	1	46.97	Sample, 1996
Iron	Muskrat					-	
	Mink					-	
	Mallard					-	
	Heron					-	
	Sandpiper					-	
Lead	Muskrat	8	Chronic NOAEL to rat over critical lifestage	1	0.734	5.87	Sample, 1996
	Mink	8	Chronic NOAEL to rat over critical lifestage	1	0.733	5.86	Sample, 1996
	Mallard	3.85	Chronic NOAEL to kestrels over 7 months	1	1	3.85	Sample, 1996
	Heron	3.85	Chronic NOAEL to kestrels over 7 months	1	1	3.85	Sample, 1996
	Sandpiper	3.85	Chronic NOAEL to kestrels over 7 months	1	1	3.85	Sample, 1996
Manganese	Muskrat	88	Chronic NOAEL to rat over critical lifestage	1	0.734	64.59	Sample, 1996
	Mink	88	Chronic NOAEL to rat over critical lifestage	1	0.733	64.50	Sample, 1996
	Mallard	977	Chronic NOAEL to japanese quail	1	1	977.00	Sample, 1996
	Heron	977	Chronic NOAEL to japanese quail	1	1	977.00	Sample, 1996
	Sandpiper	977	Chronic NOAEL to japanese quail	1	1	977.00	Sample, 1996
Mercury	Muskrat	1	Chronic NOAEL to rat over critical lifestage	1	0.96	0.96	Sample, 1996
	Mink	1	Chronic NOAEL to rat over critical lifestage	1	0.955	0.96	Sample, 1996
	Mallard	0.45	Chronic NOAEL to japanese quail for 1 year	1	1	0.45	Sample, 1996
	Heron	0.45	Chronic NOAEL to japanese quail for 1 year	1	1	0.45	Sample, 1996
	Sandpiper	0.45	Chronic NOAEL to japanese quail for 1 year	1	1	0.45	Sample, 1996
Nickel	Muskrat	40	Chronic NOAEL to rat over critical lifestage	1	0.734	29.36	Sample, 1996
	Mink	40	Chronic NOAEL to rat over critical lifestage	1	0.733	29.32	Sample, 1996
	Mallard	77.4	Chronic NOAEL to mallard ducking	1	1	77.40	Sample, 1996
	Heron	77.4	Chronic NOAEL to mallard ducking	1	1	77.40	Sample, 1996
	Sandpiper	77.4	Chronic NOAEL to mallard ducking	1	1	77.40	Sample, 1996

TABLE 14

TOXICITY REFERENCE VALUES (TRVs)
Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
Selenium	Muskrat	0.2	Chronic NOAEL to rat over critical lifestage	1	0.734	0.15	Sample, 1996
	Mink	0.2	Chronic NOAEL to rat over critical lifestage	1	0.733	0.15	Sample, 1996
	Mallard	0.5	Chronic NOAEL to mallard during critical lifestage	1	1	0.50	Sample, 1996
	Heron	0.5	Chronic NOAEL to mallard during critical lifestage	1	1	0.50	Sample, 1996
	Sandpiper	0.5	Chronic NOAEL to mallard during critical lifestage	1	1	0.50	Sample, 1996
Thallium	Muskrat	0.74	Subchronic LOAEL to rat	0.05	0.734	0.03	Sample, 1996
	Mink	0.74	Subchronic LOAEL to rat	0.05	0.733	0.03	Sample, 1996
	Mallard	35	Acute LD50 to starling	0.001	1	0.04	USEPA, 1999
	Heron	35	Acute LD50 to starling	0.001	1	0.04	USEPA, 1999
	Sandpiper	35	Acute LD50 to starling	0.001	1	0.04	USEPA, 1999
Tin	Muskrat	23.4	Chronic NOAEL to rat over critical lifestage	1	0.4	9.36	Sample, 1996
	Mink	23.4	Chronic NOAEL to rat over critical lifestage	1	0.418	9.78	Sample, 1996
	Mallard	6.76	Chronic NOAEL to japanese quail	1	1	6.76	Sample, 1996
	Heron	6.76	Chronic NOAEL to japanese quail	1	1	6.76	Sample, 1996
	Sandpiper	6.76	Chronic NOAEL to japanese quail	1	1	6.76	Sample, 1996
Vanadium	Muskrat	2.1	Chronic LOAEL to rat over critical lifestage	0.1	0.734	0.15	Sample, 1996
	Mink	2.1	Chronic LOAEL to rat over critical lifestage	0.1	0.733	0.15	Sample, 1996
	Mallard	11.4	Chronic NOAEL to mallard	1	1	11.40	Sample, 1996
	Heron	11.4	Chronic NOAEL to mallard	1	1	11.40	Sample, 1996
	Sandpiper	11.4	Chronic NOAEL to mallard	1	1	11.40	Sample, 1996
Zinc	Muskrat	160	Chronic NOAEL to rat over critical lifestage	1	0.734	117.44	Sample, 1996
	Mink	160	Chronic NOAEL to rat over critical lifestage	1	0.733	117.28	Sample, 1996
	Mallard	14.49	Chronic NOAEL to hens over critical lifestage	1	1	14.49	Sample, 1996
	Heron	14.49	Chronic NOAEL to hens over critical lifestage	1	1	14.49	Sample, 1996
	Sandpiper	14.49	Chronic NOAEL to hens over critical lifestage	1	1	14.49	Sample, 1996
VOCs							
Acetone	Muskrat	100	Subchronic NOAEL to rat	0.33	0.734	24.22	Sample, 1996
	Mink	100	Subchronic NOAEL to rat	0.33	0.733	24.19	Sample, 1996
	Mallard	40,000	LC50 to Japanese Quail	0.0001	1	4.00	HSDB, 2005
	Heron	40,000	LC50 to Japanese Quail	0.0001	1	4.00	HSDB, 2005
	Sandpiper	40,000	LC50 to Japanese Quail	0.0001	1	4.00	HSDB, 2005

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Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
Carbon disulfide	Muskrat	3188	LD50 to rat	0.0001	0.734	0.23	HSDB, 2005
	Mink	3188	LD50 to rat	0.0001	0.733	0.23	HSDB, 2005
	Mallard					-	
	Heron					-	
	Sandpiper					-	
Chlorobenzene	Muskrat	2290	LD50 to rat	0.0001	0.734	0.17	HSDB, 2005
	Mink	2290	LD50 to rat	0.0001	0.733	0.17	
	Mallard					-	
	Heron					-	
	Sandpiper					-	
Ethylbenzene	Muskrat	97.1	Chronic NOEL to rat for liver and kidney toxicity	1	0.734	71.27	IRIS, 1991
	Mink	97.1	Chronic NOEL to rat for liver and kidney toxicity	1	0.733	71.17	IRIS, 1991
	Mallard	20000	LD50 for xylenes to Japanese Quail	0.0001	1	2.00	Hill & Camardese, 1986
	Heron	20000	LD50 for xylenes to Japanese Quail	0.0001	1	2.00	Hill & Camardese, 1986
	Sandpiper	20000	LD50 for xylenes to Japanese Quail	0.0001	1	2.00	Hill & Camardese, 1986
Xylenes	Muskrat	2.1	Chronic NOAEL to mouse	1	0.4	0.84	Sample, 1996
	Mink	2.1	Chronic NOAEL to mouse	1	0.418	0.88	Sample, 1996
	Mallard	20000	LD50 to Japanese Quail	0.0001	1	2.00	Hill & Camardese, 1986
	Heron	20000	LD50 to Japanese Quail	0.0001	1	2.00	Hill & Camardese, 1986
	Sandpiper	20000	LD50 to Japanese Quail	0.0001	1	2.00	Hill & Camardese, 1986
SVOCs							
2-Methylnaphthalene	Muskrat	4.7	Chronic LOAEL to mice	0.1	0.4	0.19	IRIS, 2003
	Mink	4.7	Chronic LOAEL to mice	0.1	0.418	0.20	IRIS, 2003
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Acenaphthene	Muskrat	175	Subchronic NOAEL to mouse	0.33	0.4	23.10	IRIS, 1990
	Mink	175	Subchronic NOAEL to mouse	0.33	0.418	24.14	IRIS, 1990
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987

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TOXICITY REFERENCE VALUES (TRVs)
Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
Acenaphthylene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Anthracene	Muskrat	1000	Subchronic NOEL to mice	0.33	0.4	132.00	IRIS, 1991
	Mink	1000	Subchronic NOEL to mice	0.33	0.418	137.94	IRIS, 1991
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Benzo(a)anthracene	Muskrat	167	Subchronic LOAEL to mouse	0.05	0.4	3.34	USEPA, 1999
	Mink	167	Subchronic LOAEL to mouse	0.05	0.418	3.49	USEPA, 1999
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Benzo(a)pyrene	Muskrat	10	Chronic LOAEL to mouse	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Benzo(b)fluoranthene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Benzo(ghi)perylene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Benzo(k)fluoranthene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987

TABLE 14

TOXICITY REFERENCE VALUES (TRVs)
Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
bis(2-ethylhexyl) phthalate	Muskrat	18.33	Chronic LOAEL to mouse during critical lifestage	1	0.4	7.33	Sample, 1996
	Mink	18.33	Chronic LOAEL to mouse during critical lifestage	1	0.418	7.66	Sample, 1996
	Mallard	1.11	Chronic NOAEL to ringed dove	1	1	1.11	Sample, 1996
	Heron	1.11	Chronic NOAEL to ringed dove	1	1	1.11	Sample, 1996
	Sandpiper	1.11	Chronic NOAEL to ringed dove	1	1	1.11	Sample, 1996
Chrysene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Dibenz(ah)anthracene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Dibenzofuran	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
1,2-Dichlorobenzene	Muskrat	85.7	Chronic NOAEL to rat over 2 years	0.1	0.734	6.29	IRIS, 2005
	Mink	85.7	Chronic NOAEL to rat over 2 years	0.1	0.733	6.28	IRIS, 2005
	Mallard					-	
	Heron					-	
	Sandpiper					-	
Fluoranthene	Muskrat	125	Subchronic NOAEL to mouse	0.33	0.4	16.50	IRIS, 1990
	Mink	125	Subchronic NOAEL to mouse	0.33	0.418	17.24	IRIS, 1990
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987

TABLE 14

TOXICITY REFERENCE VALUES (TRVs)
Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
Fluorene	Muskrat	125	Subchronic NOAEL to mouse	0.33	0.4	16.50	IRIS, 1990
	Mink	125	Subchronic NOAEL to mouse	0.33	0.418	17.24	IRIS, 1990
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
Indeno(123-cd)pyrene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
3-Methylphenol	Muskrat	50	Subchronic NOAEL to rat over 90 days	0.33	0.734	12.11	IRIS, 2005
	Mink	50	Subchronic NOAEL to rat over 90 days	0.33	0.733	12.09	IRIS, 2005
	Mallard					-	
	Heron					-	
	Sandpiper					-	
4-Methylphenol	Muskrat	207	LD50 to rat	0.001	0.734	0.15	HSDB, 2005
	Mink	207	LD50 to rat	0.001	0.733	0.15	HSDB, 2005
	Mallard					-	
	Heron					-	
	Sandpiper					-	
Naphthalene	Muskrat	71	Subchronic NOAEL to rat	0.33	0.734	17.20	IRIS, 1998
	Mink	71	Subchronic NOAEL to rat	0.33	0.733	17.17	IRIS, 1998
	Mallard	4000	Chronic LOAEL to mallards	0.1	1	400.00	Eisler, 1987
	Heron	4000	Chronic LOAEL to mallards	0.1	1	400.00	Eisler, 1987
	Sandpiper	4000	Chronic LOAEL to mallards	0.1	1	400.00	Eisler, 1987
Phenanthrene	Muskrat	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.4	0.40	Sample, 1996
	Mink	10	Chronic LOAEL to mouse for benzo(a)pyrene	0.1	0.418	0.42	Sample, 1996
	Mallard	4000	Chronic LOAEL to mallards	0.1	1	400.00	Eisler, 1987
	Heron	4000	Chronic LOAEL to mallards	0.1	1	400.00	Eisler, 1987
	Sandpiper	4000	Chronic LOAEL to mallards	0.1	1	400.00	Eisler, 1987
Pyrene	Muskrat	75	Subchronic NOAEL to mouse	0.33	0.4	9.90	IRIS, 1991
	Mink	75	Subchronic NOAEL to mouse	0.33	0.418	10.35	IRIS, 1991
	Mallard	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Heron	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987
	Sandpiper	285	Chronic LOAEL to mallard for mixed PAHs	0.1	1	28.50	Eisler, 1987

TABLE 14

TOXICITY REFERENCE VALUES (TRVs)
Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
Pesticides/PCBs							
4,4'-DDE	Muskrat	0.8	Chronic NOAEL for DDT to rat over 2 years	1	0.734	0.59	Sample, 1996
	Mink	0.8	Chronic NOAEL for DDT to rat over 2 years	1	0.733	0.59	Sample, 1996
	Mallard	0.028	Chronic LOAEL for DDT to pelican for 5 years	0.1	1	0.003	Sample, 1996
	Heron	0.028	Chronic LOAEL for DDT to pelican for 5 years	0.1	1	0.003	Sample, 1996
	Sandpiper	0.028	Chronic LOAEL for DDT to pelican for 5 years	0.1	1	0.003	Sample, 1996
4,4'-DDT	Muskrat	0.8	Chronic NOAEL to rat over 2 years	1	0.734	0.59	Sample, 1996
	Mink	0.8	Chronic NOAEL to rat over 2 years	1	0.733	0.59	Sample, 1996
	Mallard	0.028	Chronic LOAEL to pelican for 5 years	0.1	1	0.003	Sample, 1996
	Heron	0.028	Chronic LOAEL to pelican for 5 years	0.1	1	0.003	Sample, 1996
	Sandpiper	0.028	Chronic LOAEL to pelican for 5 years	0.1	1	0.003	Sample, 1996
beta-BHC	Muskrat	1.6	Chronic NOAEL to rat over 4 generations	1	0.734	1.17	Sample, 1996
	Mink	1.6	Chronic NOAEL to rat over 4 generations	1	0.733	1.17	Sample, 1996
	Mallard	0.563	Chronic NOAEL to japanese quail during critical	1	1	0.56	Sample, 1996
	Heron	0.563	Chronic NOAEL to japanese quail during critical	1	1	0.56	Sample, 1996
	Sandpiper	0.563	Chronic NOAEL to japanese quail during critical	1	1	0.56	Sample, 1996
alpha-Chlordane	Muskrat	4.6	Chronic NOAEL to mouse over 6 generations	1	0.4	1.84	Sample, 1996
	Mink	4.6	Chronic NOAEL to mouse over 6 generations	1	0.418	1.92	Sample, 1996
	Mallard	2.14	Chronic NOAEL to blackbird over 10 weeks	1	1	2.14	Sample, 1996
	Heron	2.14	Chronic NOAEL to blackbird over 10 weeks	1	1	2.14	Sample, 1996
	Sandpiper	2.14	Chronic NOAEL to blackbird over 10 weeks	1	1	2.14	Sample, 1996
Dieldrin	Muskrat	0.2	Chronic LOAEL to rat over 3 generations	0.33	0.734	0.05	Sample, 1996
	Mink	0.2	Chronic LOAEL to rat over 3 generations	0.33	0.733	0.05	Sample, 1996
	Mallard	0.077	Chronic NOAEL to barn owl over 2 years	1	1	0.08	Sample, 1996
	Heron	0.077	Chronic NOAEL to barn owl over 2 years	1	1	0.08	Sample, 1996
	Sandpiper	0.077	Chronic NOAEL to barn owl over 2 years	1	1	0.08	Sample, 1996
Heptachlor epoxide	Muskrat	1	Chronic LOAEL to mink during critical lifestage	0.33	0.96	0.32	Sample, 1996
	Mink	1	Chronic LOAEL to mink during critical lifestage	0.33	0.955	0.32	Sample, 1996
	Mallard	65	Chronic NOAEL to japanese quail	1	1	65.00	USEPA, 1999
	Heron	65	Chronic NOAEL to japanese quail	1	1	65.00	USEPA, 1999
	Sandpiper	65	Chronic NOAEL to japanese quail	1	1	65.00	USEPA, 1999

TABLE 14

TOXICITY REFERENCE VALUES (TRVs)
Rohm and Haas Chemicals LLC
Reading, Ohio

CONSTITUENT	RECEPTOR SPECIES	TRV (mg/kg-day)	STUDY BASIS	NOAEL CONVERSION FACTOR[1]	SCALING FACTOR[2]	FINAL NOAEL[3] (mg/kg-day)	REFERENCE
Aroclor-1242	Muskrat	0.685	Chronic LOAEL to mink during critical lifestage	0.33	0.96	0.22	Sample, 1996
	Mink	0.685	Chronic LOAEL to mink during critical lifestage	0.33	0.955	0.22	Sample, 1996
	Mallard	0.41	Chronic NOAEL to screech owl over 2 generations	1	1	0.41	Sample, 1996
	Heron	0.41	Chronic NOAEL to screech owl over 2 generations	1	1	0.41	Sample, 1996
	Sandpiper	0.41	Chronic NOAEL to screech owl over 2 generations	1	1	0.41	Sample, 1996
Aroclor-1248	Muskrat	0.68	Chronic LOAEL to mouse over 3 generations	0.33	0.4	0.09	Sample, 1996
	Mink	0.68	Chronic LOAEL to mouse over 3 generations	0.33	0.418	0.09	Sample, 1996
	Mallard	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
	Heron	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
	Sandpiper	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
Aroclor-1254	Muskrat	0.68	Chronic LOAEL to mouse over 1 year	0.33	0.4	0.09	Sample, 1996
	Mink	0.68	Chronic LOAEL to mouse over 1 year	0.33	0.418	0.09	Sample, 1996
	Mallard	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
	Heron	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
	Sandpiper	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
Aroclor-1260	Muskrat	0.68	Chronic LOAEL for Aroclor-1254 to mouse over 1	0.33	0.4	0.09	Sample, 1996
	Mink	0.68	Chronic LOAEL for Aroclor-1254 to mouse over 1	0.33	0.418	0.09	Sample, 1996
	Mallard	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
	Heron	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996
	Sandpiper	0.41	Chronic NOAEL for Aroclor-1242 to screech owl over	1	1	0.41	Sample, 1996

(1) NOAEL conversion factor from the text.
(2) Scaling factor is based on weight for mammals and taxonomy for birds.
(3) Final NOAEL is calculated by multiplying the TRV x NOAEL Conversion Factor x Scaling Factor

TABLE 15.1

TOXICITY ASSESSMENT FOR SEDIMENT INVERTEBRATES LIVING IN MILL CREEK
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Maximum Creek Bed Sediment Conc. (mg/kg)	Sediment Invertebrate Benchmark (mg/kg)	Reference	HQ (unitless)
1,2-Dichlorobenzene	0.16	0.34	OSWER	5.E-01
2-Butanone	0.0035	0.04	USEPA, Region 5	9.E-02
2-Methylnaphthalene	0.25	0.07	NOAA ERL	**4.E+00**
3-Methylphenol	0.24	0.05	USEPA, Region 5	**5.E+00**
4,4'-DDE	0.0018	0.00316	Consensus TEC	6.E-01
4,4'-DDT	0.0056	0.00416	Consensus TEC	1.E+00
4-Methylphenol	0.24	0.02	USEPA, Region 5	**1.E+01**
Acenaphthene	0.25	0.01	NOAA ERL	**3.E+01**
Acenaphthylene	0.3	0.04	NOAA ERL	**8.E+00**
Acetone	0.012	0.0099	USEPA, Region 5	1.E+00
Aldrin	0.001	0.002	USEPA, Region 5	5.E-01
Aluminum	2720	58000	ARCS, PEC	5.E-02
Anthracene	1.3	0.05	Consensus TEC	**3.E+01**
Aroclor-1248	0.07	0.05	Consensus TEC	1.E+00
Aroclor-1254	0.1	0.05	Consensus TEC	**2.E+00**
Arsenic	6	9.79	Consensus TEC	6.E-01
Barium*	42.6	170	Ohio SRV	3.E-01
Benzo(a)anthracene	1.4	0.1	Consensus TEC	**1.E+01**
Benzo(a)pyrene	1.2	0.15	Consensus TEC	**8.E+00**
Benzo(b)fluoranthene	1.3	10.4	USEPA, Region 5	1.E-01
Benzo(ghi)perylene	0.63	0.17	USEPA, Region 5	**4.E+00**
Benzo(k)fluoranthene	0.62	0.24	USEPA, Region 5	**3.E+00**
Beryllium*	0.25	0.8	Ohio SRV	3.E-01
beta-BHC	0.01	0.005	USEPA, Region 5	**2.E+00**
bis(2-ethylhexyl)phthalate	0.13	0.18	USEPA, Region 5	7.E-01
Cadmium	0.41	0.99	Consensus TEC	4.E-01
Chlorobenzene	0.0046	0.29	USEPA, Region 5	2.E-02
Chlorobenzilate	0.024	0.86	USEPA, Region 5	3.E-02
Chromium	14.2	43.4	Consensus TEC	3.E-01
Chrysene	1.7	0.16	Consensus TEC	**1.E+01**
Cobalt	5.5	50	USEPA, Region 5	1.E-01
Copper	10.8	31.6	Consensus TEC	3.E-01
Diallate	0.032			-
Dibenz(ah)anthracene	0.19	0.03	Consensus TEC	**6.E+00**
Dibenzofuran	0.47	2	OSWER	2.E-01
Dichloromethane	0.0052	0.15	USEPA, Region 5	3.E-02
Dieldrin	0.024	0.0019	Consensus TEC	**1.E+01**
Diethyl phthalate	0.04	0.63	OSWER	6.E-02
Di-n-octyl phthalate	0.022	0.58	WA NEL	4.E-02
Endrin ketone	0.0014	0.00222	Consensus TEC	6.E-01
Fluoranthene	4.6	0.42	Consensus TEC	**1.E+01**
Fluorene	0.9	0.07	Consensus TEC	**1.E+01**
Indeno(123-cd)pyrene	0.58	0.2	USEPA, Region 5	**3.E+00**
Iron*	10800	31000	Ohio SRV	3.E-01
Lead	22.8	35.8	Consensus TEC	6.E-01
Manganese*	670	1400	Ohio SRV	5.E-01
Mercury	0.033	0.18	Consensus TEC	2.E-01
Methoxychlor	0.0056	0.01	USEPA, Region 5	6.E-01
Naphthalene	0.7	0.17	Consensus TEC	**4.E+00**
Nickel	12.1	22.7	Consensus TEC	5.E-01
Phenanthrene	4.8	0.2	Consensus TEC	**2.E+01**
Pyrene	3.1	0.19	Consensus TEC	**2.E+01**
Silver	0.2	1	NOAA ERL	2.E-01
Thallium*	2.2	4.7	Ohio SRV	5.E-01
Tin**	9.8	7.62	USEPA, Region 5	1.E+00
Vanadium*	10.7	40	Ohio SRV	3.E-01
Zinc	50.6	121	Consensus TEC	4.E-01

Sediment benchmark values obtained from the Risk Assessment Information System (RAIS), an on-line database maintained by the U.S. Department of Energy, Oak Ridge National Laboratory and the University of Tennessee unless otherwise specified. Available at http://risk.lsd.ornl.gov/.

OSWER - Office of Solid Waste and Emergency Response, Ecotox Thresholds, 1996
USEPA Region 5 - Region 5 ESLs for sediment, 2003
NOAA ERL - NOAA's National Status and Trends Program. Sediment Quality Guidelines, Effects Range Low,
Consensus TEC - Consensus-based Sediment Quality Guidelines, Threshold Effects Concentration, 2000
ARCS PEC - U.S. EPA Assessment and Remediation of Contaminated Sediments Program, Probably Effects Concentration, 1996
Ohio SRV - Ohio Sediment Reference Value, 2008
WA NEL -Washington Department of Ecology, Sediment Quality Criteria, No Effects Level, 2001

* The sediment invertebrate benchmark is based on the Ohio Sediment Reference Values (OEPA, 2008).
** The Region 5 soil ESL was used as a surrogate screening value for tin.

BOLD compounds were retained as compounds of concern for the fish ingestion pathway in Table 11-3

TABLE 15.2

TOXICITY ASSESSMENT FOR AQUATIC LIFE LIVING IN MILL CREEK
Rohm and Haas Chemicals LLC
Reading, Ohio

Compound	Maximum Surface Water Conc. (Mill Creek) (ug/L)	Aquatic Life Benchmark (ug/L)	Reference	HQ (unitless)
1,1,1-Trichloroethane	0.4	76	OEPA, 2008	5.E-03
1,4-Dioxane	1.1	22000	USEPA, 2003	5.E-05
Acetone	6.3	1700	USEPA, 2003	4.E-03
Arsenic (dissolved)	3.6	150	OEPA, 2008	2.E-02
Barium (total)	61.8	220	OEPA, 2008	3.E-01
Beryllium (dissolved)	0.78	11	OEPA, 2008	7.E-02
bis(2-ethylhexyl)phthalate	1.4	8.4	OEPA, 2008	2.E-01
Chlorodibromomethane	0.86	9.7	USEPA, 2003	9.E-02
Chloroform	0.26	140	OEPA, 2008	2.E-03
cis-1,2-Dichloroethylene	0.26	970	OEPA, 2008	3.E-04
Cobalt (dissolved)	1.2	24	OEPA, 2008	5.E-02
Copper (dissolved)	6.7	9.3	OEPA, 2008	7.E-01
Mercury (total)	0.094	0.77	OEPA, 2008	1.E-01
Thallium (dissolved)	6.8	17	OEPA, 2008	4.E-01
Trichloroethylene	0.33	220	OEPA, 2008	2.E-03
Zinc (dissolved)	23.1	120	OEPA, 2008	2.E-01

(1) OEPA, 2008 - Aquatic life OMZA values, Division of Surface Water.
USEPA, 2003 - Region 5 ESLs
(2) Beryllium, copper and zinc benchmarks assume a hardness of 100 mg/L $CaCO_3$.

Note: The maximum surface water concentrations are for detections within Mill Creek only. It does not include any seep data or groundwater input to surface water.
The metals data include both total and dissolved analytical results.

BOLD compounds were retained as compounds of concern for the fish ingestion pathway in Table 11-3 since they are potentially site-related and bioaccumulative.

TABLE 16
COMPARISON OF SEEP DATA TO OHIO OMZA AND REGION 5 ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

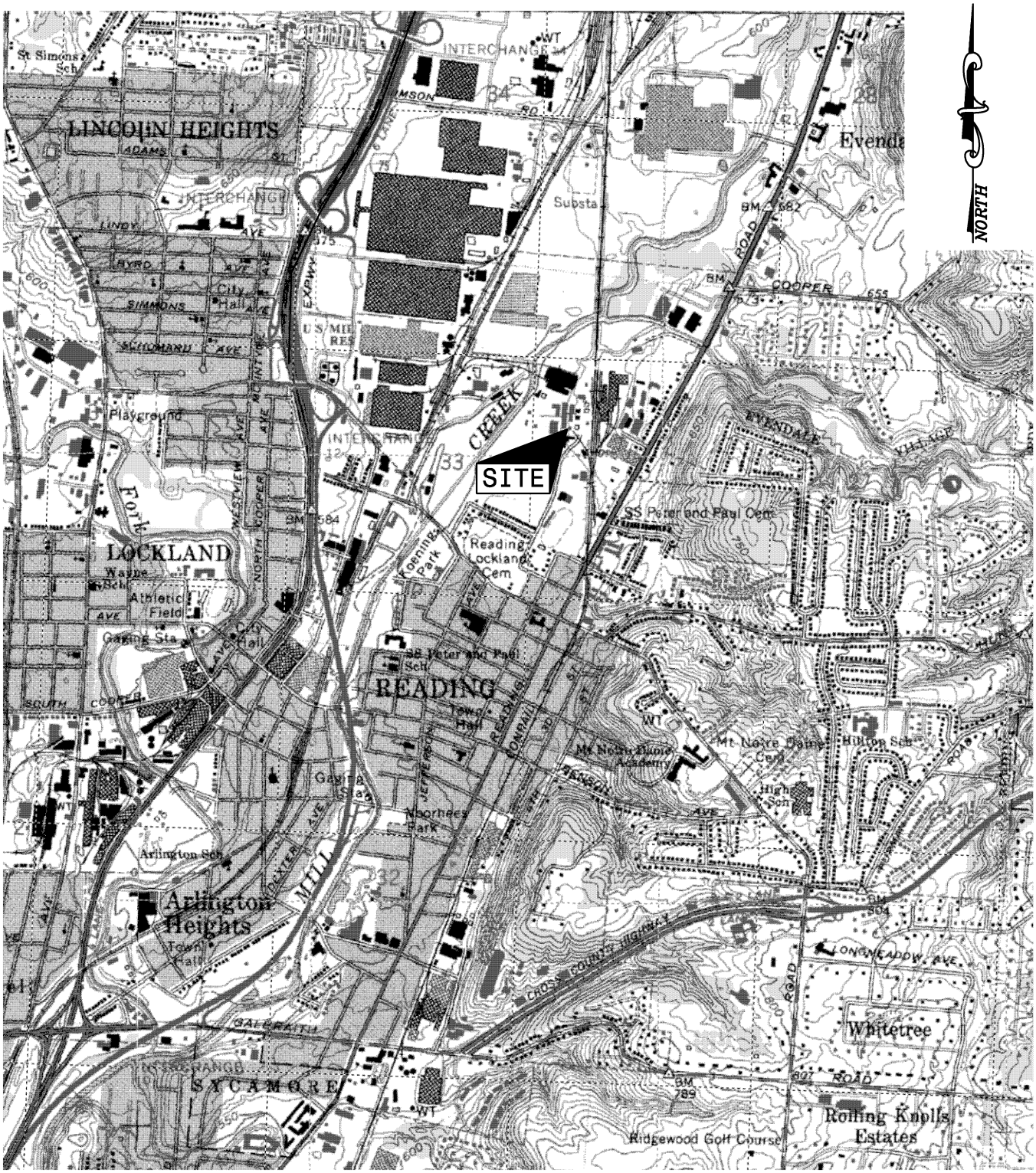
	Ohio OMZA	Region 5 ESL	Ohio IMZM	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(1)]	Retained as COPEC?
Volatile Organic Compounds (ug/l)								
1,1-Dichloroethane	ID	47	ID	2/2	NA - NA	0.55 - 1	0.02	No; HQ<1
1,2-Dichloroethane	2000	910	19000	0/2	1 - 1.8	NA - NA	NA	No; not detected
Acetone	-	1700	-	2/2	10 - 18	2.1 - 3.1	0.00	No; HQ<1
Benzene	160	114	1400	2/2	1 - 1.8	0.92 - 1.1	0.01	No; HQ<1
Bromodichloromethane	ID	NE	ID	0/2	1 - 1.8	NA - NA	NA	No; not detected
Carbon disulfide	15	15	260	2/2	1 - 1.8	0.97 - 1.1	0.07	No; HQ<1
CFC-12	-	NE	-	0/2	1 - 1.8	NA - NA	NA	No; not detected
Chlorobenzene	47	47	850	2/2	1 - 1.8	11 - 24	0.51	No; HQ<1
Chloroethane	-	NE	-	0/2	2 - 3.6	NA - NA	NA	No; not detected
Chloroform	140	140	2600	0/2	1 - 1.8	0.23 - 0.26	0.00	No; HQ<1
Ethylbenzene	61	14	1100	1/2	1 - 1.8	0.39 - 0.39	0.01	No; HQ<1
Methylcyclohexane	-	253	-	2/2	NA - NA	0.3 - 0.49	0.00	No; HQ<1
Methylene chloride	1900	940	22000	0/2	1 - 1.8	NA - NA	NA	No; not detected
Toluene	62	253	1100	2/2	1 - 1	0.45 - 0.55	0.01	No; HQ<1
Xylenes (total)	27	27	480	1/2	1 - 1.8	1.7 - 1.7	0.06	No; HQ<1
Semivolatile Organic Compounds (ug/l)								
1,2-Dichlorobenzene	23	14	190	2/2	10 - 10	14 - 21	0.91	No; HQ<1
1,4-Dichlorobenzene	9.4	9.4	110	2/2	10 - 10	1.7 - 2.6	0.28	No; HQ<1
2-Methylphenol	67	67	1200	0/2	10 - 10	NA - NA	NA	No; not detected
4-Methylphenol	53	25	960	0/2	10 - 10	NA - NA	NA	No; not detected
Aniline	4.1	4.1	59	0/2	10 - 10	NA - NA	NA	No; not detected
Benzaldehyde	-	NE	-	0/2	10 - 10	NA - NA	NA	No; not detected
Pesticide/PCBs (ug/l)								
4,4'-DDD	-	0.00488	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
4,4'-DDE	-	0.00316	-	1/2	0.05 - 0.05	0.025 - 0.025	**7.91**	Yes; HQ>1
4,4'-DDT	-	0.00416	-	1/2	0.05 - 0.05	0.028 - 0.028	**6.73**	Yes; HQ>1
Aldrin	-	1.70E-02	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
alpha-BHC	-	1.24E+01	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
alpha-Chlordane	-	4.30E-03	-	1/2	0.05 - 0.05	0.02 - 0.02	**4.65**	Yes; HQ>1
beta-BHC	-	4.95E-01	-	2/2	0.05 - 0.05	0.042 - 0.056	0.11	No; HQ<1
delta-BHC	-	6.67E+02	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
Dieldrin	0.056	7.10E-05	4.70E-01	1/2	0.05 - 0.05	0.053 - 0.053	0.9	No; HQ<1
Endosulfan I	-	5.60E-02	-	1/2	0.05 - 0.05	0.03 - 0.03	0.54	No; HQ<1
Endosulfan II	-	5.60E-02	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
Endrin	0.036	3.60E-02	1.70E-01	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
Endrin aldehyde	-	1.50E-01	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
Endrin ketone	-	NE	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected
Heptachlor	-	3.80E-03	-	0/2	0.05 - 0.05	NA - NA	NA	No; not detected

TABLE 16
COMPARISON OF SEEP DATA TO OHIO OMZA AND REGION 5 ESLs
Rohm and Haas Chemicals LLC
Reading, Ohio

	Ohio OMZA	Region 5 ESL	Ohio IMZM	Frequency of Detection	Range of Detection Limits	Range of Detected Concentrations	HQ[(1)]	Retained as COPEC?
Heptachlor epoxide	-	3.80E-03	-	1/2	0.05 - 0.05	0.033 - 0.033	**8.68**	Yes; HQ>1
Isodrin	-	3.09E-02	-	1/2	0.1 - 0.1	0.005 - 0.005	0.16	No; HQ<1
Inorganic Compounds (ug/l)								
Aluminum	-	80	-	2/2	NA - NA	14300 - 48300	**604**	Yes; HQ>1
Antimony	190	80	1800	0/2	10 - 10	NA - NA	NA	No; not detected
Arsenic	150	148	680	2/2	10 - 10	6.1 - 25.7	0.17	No; HQ<1
Barium	220	220	4000	2/2	200 - 200	233 - 494	**2.25**	Yes; HQ>1
Beryllium	11	3.6	190	2/2	NA - NA	1.2 - 3.1	0.28	No; HQ<1
Cadmium	2.5	0.15	9	2/2	2 - 2	0.28 - 1.7	0.68	No; HQ<1
Calcium	-	NE	-	2/2	NA - NA	417000 - 430000	-	No; essential nutrient
Chromium	86	42	3600	2/2	5 - 5	36.7 - 174	**2.02**	Yes; HQ>1
Cobalt	24	24	440	2/2	7 - 7	12.4 - 43.8	**1.83**	Yes; HQ>1
Copper	9.3	1.58	27	2/2	25 - 25	31.9 - 104	**11.18**	Yes; HQ>1
Cyanide	12	5.2	92	0/2	10 - 10	NA - NA	NA	No; not detected
Iron	-	1000	-	2/2	NA - NA	23800 - 90100	**90.10**	Yes; HQ>1
Lead	6.4	1.17	240	2/2	3 - 3	24.2 - 126	**19.69**	Yes; HQ>1
Magnesium	-	NE	-	2/2	NA - NA	67100 - 90100	-	No; essential nutrient
Manganese	-	120	-	2/2	NA - NA	2150 - 2730	**22.75**	Yes; HQ>1
Mercury	0.91	0.0013	3.40	1/2	0.2 - 0.2	0.18 - 0.18	0.20	No; HQ<1
Nickel	52	28.9	940	2/2	40 - 40	85.9 - 214	**4.12**	Yes; HQ>1
Potassium	-	NE	-	2/2	NA - NA	14100 - 14200	-	No; essential nutrient
Selenium	5	5	-	0/2	5 - 5	NA - NA	NA	No; not detected
Silver	1.3	0.12	3.2	0/3	5 - 5	NA - NA	NA	No; not detected
Sodium	-	NE	-	2/2	NA - NA	361000 - 375000	-	No; essential nutrient
Thallium	17	10	160	0/2	10 - 10	NA - NA	NA	No; not detected
Tin	180	180	3200	2/2	100 - 100	782 - 1340	**7.44**	Yes; HQ>1
Vanadium	44	12	300	2/2	7 - 7	33.2 - 124	**2.82**	Yes; HQ>1
Zinc	120	65.7	240	2/2	20 - 20	219 - 411	**3.43**	Yes; HQ>1

OMZA - Ohio Outside the Mixing Zone Average, from Ohio EPA, July 27, 2005.
IMZM - Ohio Inside the Mixing Zone Maximum, from Ohio EPA, July 27, 2005.
(1) HQ is calculated by dividing the maximum detected concentration by the Ohio OMZA (if available) or the Region 5 ESL.
Criteria for certain metals (beryllium, cadmium, chromium, copper, lead, nickel, silver and zinc assume a total hardness of 100 mg/L.
NE - Not Established
NA - Not Applicable
- Maximum detected concentration exceeds IMZM
- Maximum detected concentration exceeds OMZA or ESL

FIGURES



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ROHM AND HAAS CHEMICALS LLC
READING, OHIO PLANT

FIGURE 1
SITE LOCATION MAP

PARSONS
2443 CROWNE POINT DRIVE, CINCINNATI, OHIO 45241

Base Map Source: Abercrombie & Associates, Inc., May 2001 and by GEOMATRIX, 2004

0 60 120
APPROXIMATE SCALE (FEET)

-N-

LEGEND

- UAW11–10 — UPPER AQUIFER MONITORING WELL LOCATION COMPLETED IN SHALLOW SAND
- UAW11–40 — UPPER AQUIFER MONITORING WELL LOCATION COMPLETED IN LOWER SAND
- LAW12–60 — LOWER AQUIFER MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- STR09 — SOIL BORING LOCATION AND IDENTIFICATION NUMBER
- T–3 — TRENCH LOCATION
- MW–EPA–1 — UPPER AQUIFER MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (PRC, 1993)
- SW — FRENCH DRAIN AND SLURRY WALL LOCATION SOIL BORING SERIES
- MORTON FACILITY PROPERTY BOUNDARY
- SS–2 — STREAM STATION LOCATION
- B–05 — BACKGROUND SAMPLE LOCATION
- GW58 — PRISTINE SHALLOW AQUIFER MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- MW70 — PRISTINE LOWER AQUIFER MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- IMPOUNDMENT – (FROM 1960 AERIAL PHOTO)
- LOCATION OF REPORTED WASTE BURIAL
- AREA OF SURFACE GEOPHYSICAL SURVEY

ROHM AND HAAS CHEMICAL LLC

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READING, OH

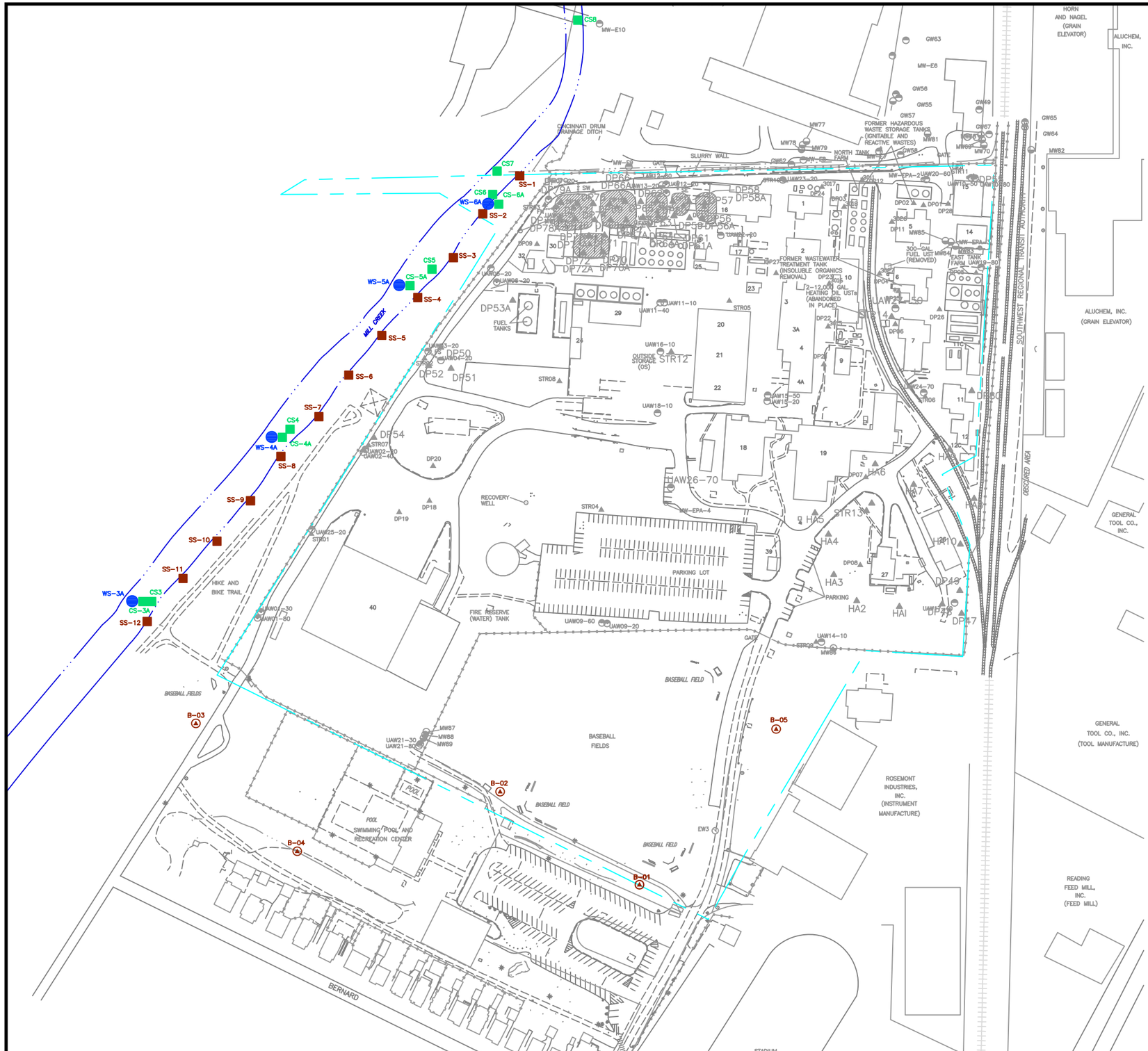
FIGURE 2

ON-SITE MONITORING WELL AND SOIL SAMPLE LOCATION MAP

PARSONS
2443 CROWNE POINT DRIVE, CINCINNATI, OHIO 45241, PHONE: 513-326-3040

441807.01000
\\CINFS01\PROJECTS\441-\441807 READING\CAD\441807_SAMPLE LOCATION MAP.dwg

Base Map Source: Abercrombie & Associates, Inc., May 2001
and by GEOMATRIX, 2004



200’ 100’ 0 200’

Approximate Scale in Feet

LEGEND

- B-06 ▲ BACKGROUND SAMPLE LOCATION
- WS-1A ● SURFACE WATER SAMPLE LOCATION
- CS-1A ■ CREEK BED SEDIMENT SAMPLE LOCATION
- SS-1 ■ STREAM STATION (CREEK BANK SEDIMENT/ OR SEEP SAMPLE LOCATION)
- MORTON FACILITY PROPERTY BOUNDARY

ROHM AND HAAS CHEMICAL LLC

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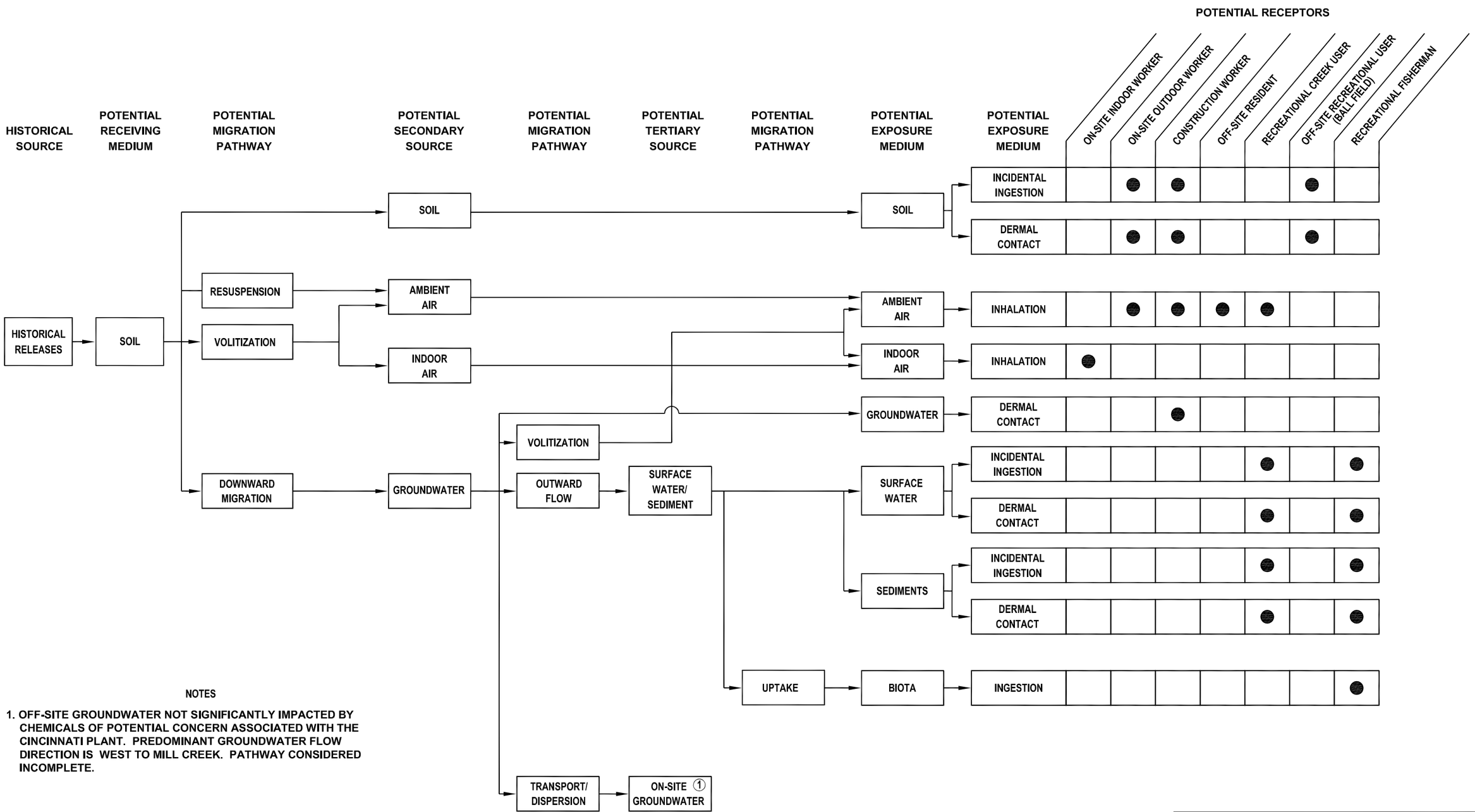
READING, OH

FIGURE 3

MILL CREEK
SAMPLE LOCATION MAP

PARSONS
2443 CROWNE POINT DRIVE, CINCINNATI, OHIO 45241, PHONE: 513-326-3040

441807.01000
\\CINFS01\PROJECTS\441-\441807 READING\CAD\441807_MW LOCATION MAP.dwg



NOTES

1. OFF-SITE GROUNDWATER NOT SIGNIFICANTLY IMPACTED BY CHEMICALS OF POTENTIAL CONCERN ASSOCIATED WITH THE CINCINNATI PLANT. PREDOMINANT GROUNDWATER FLOW DIRECTION IS WEST TO MILL CREEK. PATHWAY CONSIDERED INCOMPLETE.

ROHM AND HAAS CHEMICAL LLC

ROHM AND HAAS.
READING, OH

FIGURE 4

SITE CONCEPTUAL MODEL

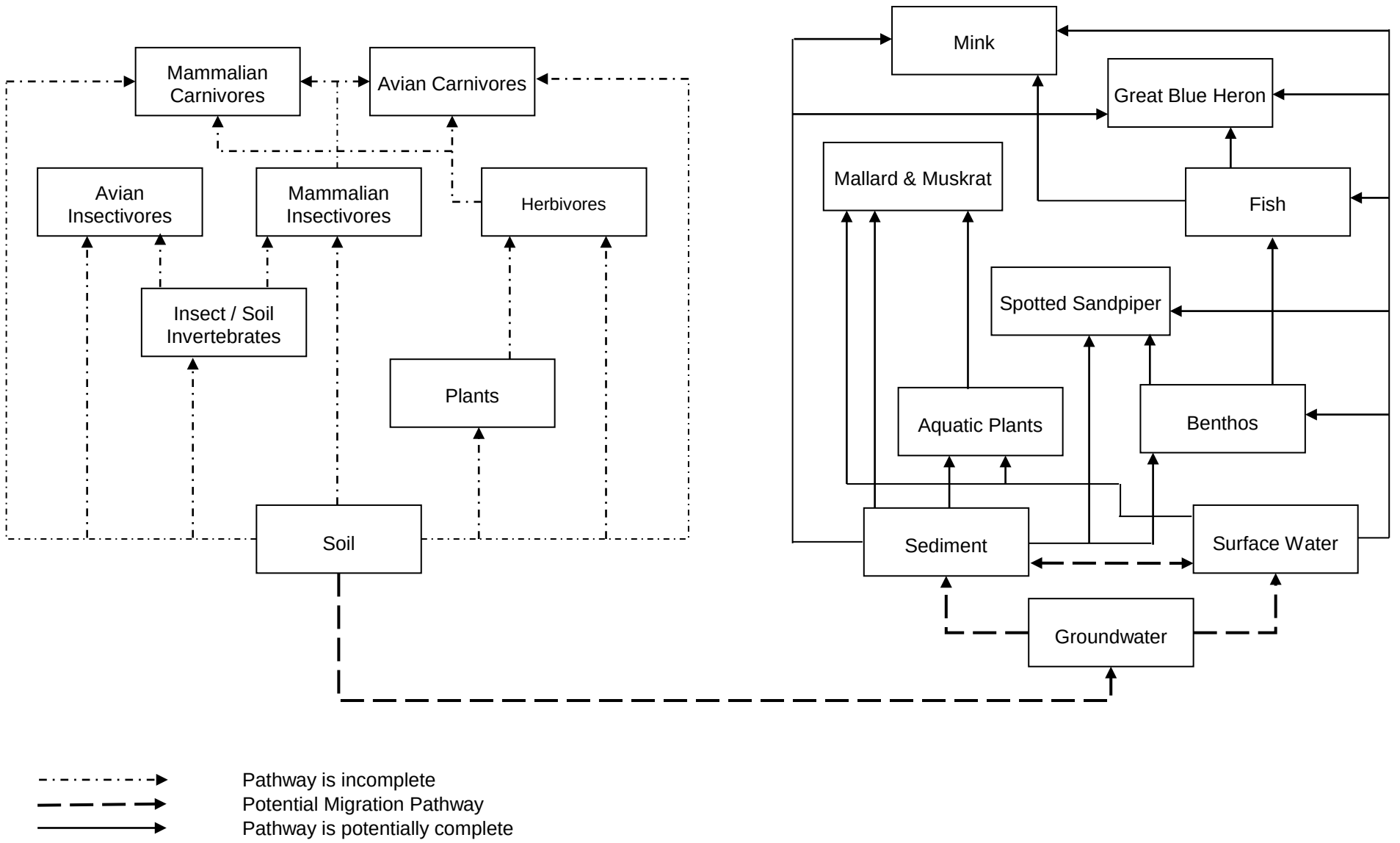
PARSONS
2443 CROWNE POINT DRIVE, CINCINNATI, OHIO 45241, PHONE: 513-326-3040

441969.01000
P:\441-\441969 R & H Cincinnati BRA & GW Goals\2009 Revised BRA\Figures\441969_SITE CONCEPTUAL MODEL_011409.dwg

FIGURE 5

Rohm and Haas Chemicals LLC
Cincinnati Plant
Reading, Hamilton County, Ohio

Conceptual Ecological Site Model



APPENDIX A

DATA SUMMARY FOR CHEMICALS DETECTED

IN SOIL AND SEDIMENT SAMPLES

APPENDIX A
Table A-1
Summary of Volatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	Acetone	Acrylonitrile	Benzene	Bromodichloromethane	Carbon disulfide	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Cyclohexane	Dichlorodifluoromethane	Ethylbenzene	Iodomethane	Isopropylbenzene	Methyl acetate	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (total)
On-Site Soil																											
DP01-2'	7/24/2001	<1.4	<1.4	<1.4	0.64 J	15	NA	<1.4	<1.4	<1.4	<1.4	<1.4	<2.8	<0.71	<2.8	<1.4	5.7	NA	0.24 J	<2.8	1.3 J	<1.4	<1.4	<1.4	<1.4	<2.8	50
DP01-9.5'	7/24/2001	<0.26	<0.26	<0.26	<1	<1	NA	<0.26	<0.26	<0.26	<0.26	<0.26	<0.52	<0.13	<0.52	<0.26	0.16 J	NA	<0.26	<0.52	<0.52	0.086JB	<0.26	<0.26	<0.26	<0.52	1.4
DP02-2'	7/24/2001	<0.0044	<0.0044	<0.0044	<0.018	0.015 J	NA	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0088	<0.0022	<0.0088	<0.0044	<0.0044	NA	<0.0044	<0.0088	<0.0088	<0.0044	<0.0044	<0.0044	<0.0044	<0.0088	<0.0088
DP02-9.5'	7/24/2001	<0.0055	<0.0055	<0.0055	<0.022	0.0093 J	NA	<0.0055	<0.0055	<0.0055	0.013	<0.0055	<0.011	<0.0028	<0.011	<0.0055	<0.0055	NA	<0.0055	<0.011	<0.011	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.011
DP03-2'	7/24/2001	<0.0047	<0.0047	<0.0047	<0.019	<0.019	NA	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0093	<0.0023	<0.0093	<0.0047	<0.0047	NA	<0.0047	<0.0093	<0.0093	<0.0047	<0.0047	<0.0047	<0.0047	<0.0093	<0.0093
DP03-8.5'	7/24/2001	<0.0045	<0.0045	<0.0045	<0.018	<0.018	NA	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.009	<0.0022	<0.009	<0.0045	<0.0045	NA	<0.0045	<0.009	<0.009	<0.0045	<0.0045	<0.0045	<0.0045	<0.009	<0.009
DP05-1'	7/25/2001	<0.0046	<0.0046	<0.0046	<0.018	<0.018	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0091	<0.0023	<0.0091	<0.0046	<0.0046	NA	<0.0046	<0.0091	<0.0091	<0.0046	<0.0046	<0.0046	<0.0046	<0.0091	<0.0091
DP05-8.5'	7/25/2001	<0.0044	<0.0044	<0.0044	<0.017	<0.017	NA	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0087	<0.0022	<0.0087	<0.0044	<0.0044	NA	<0.0044	<0.0087	<0.0087	<0.0044	<0.0044	<0.0044	<0.0044	<0.0087	<0.0087
DP07-9'	7/26/2001	<0.0046	<0.0046	<0.0046	<0.018	<0.018	NA	<0.0046	0.0015 J	<0.0046	<0.0046	0.0036 J	<0.0091	<0.0023	<0.0091	<0.0046	<0.0046	NA	<0.0046	<0.0091	<0.0091	<0.0046	<0.0046	<0.0046	<0.0046	<0.0091	<0.0091
DP08-6'	7/26/2001	<0.0057	<0.0057	<0.0057	<0.023	0.007 J	NA	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.011	<0.0028	<0.011	<0.0057	<0.0057	NA	<0.0057	<0.011	<0.011	<0.0057	<0.0057	<0.0057	<0.0057	<0.011	<0.011
DP08-11'	7/26/2001	<0.0049	<0.0049	<0.0049	<0.02	<0.02	NA	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0025	<0.0098	<0.0049	<0.0049	NA	<0.0049	<0.0098	<0.0098	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0098
DP09-12'	7/27/2001	<0.0048	<0.0048	<0.0048	<0.019	4.1	NA	<0.0048	<0.0048	0.2	<0.0048	<0.0048	<0.0095	<0.0024	<0.0095	<0.0048	<0.0048	NA	<0.0048	0.07	<0.0095	<0.0048	<0.0048	<0.0048	<0.0048	<0.0095	<0.0095
DP10-2'	7/27/2001	<0.0048	<0.0048	<0.0048	0.0037 J	0.0091 J	<0.095	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0024	NA	<0.0048	<0.0048	<0.0048	NA	NA	NA	<0.0048	<0.0048	0.00056 J	<0.0048	<0.0048	<0.0095
DP10-10'	7/27/2001	<0.27	<0.27	<0.27	0.17 J B	<1.1	<5.3	<0.27	<0.27	0.18 J	<0.27	<0.27	<0.27	<0.13	NA	<0.27	0.13 J	<0.27	NA	NA	NA	<0.27	<0.27	2.4	<0.27	<0.27	0.32J
DP10-10' (Dup)	7/27/2001	<0.27	<0.27	<0.27	0.17 J B	<1.1	<5.3	<0.27	<0.27	0.095 J	<0.27	<0.27	<0.27	<0.13	NA	<0.27	0.084 J	<0.27	NA	NA	NA	<0.27	<0.27	3.8	<0.27	<0.27	0.2 J
DP12-1.5'	7/28/2001	<0.004	<0.004	<0.004	<0.016	0.0019 J	NA	<0.004	<0.004	<0.004	<0.004	<0.004	<0.008	<0.002	<0.008	<0.004	<0.004	NA	<0.004	<0.008	<0.008	<0.004	<0.004	<0.004	<0.004	<0.008	<0.008
DP12-9'	7/28/2001	<0.0052	<0.0052	<0.0052	<0.021	<0.021	NA	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.0026	<0.01	<0.0052	<0.0052	NA	<0.0052	<0.01	<0.01	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.01
DP13-3'	7/29/2001	<0.0053	<0.0053	<0.0053	0.0031 J	0.0085 J	<0.11	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0027	NA	<0.0053	<0.0053	<0.0053	NA	NA	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011
DP13-11'	7/29/2001	<5.3	<5.3	<5.3	<21	<21	<110	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<2.7	NA	<5.3	<5.3	<5.3	NA	NA	NA	5.7 B	<5.3	16	<5.3	<5.3	<11
DP14-3'	7/29/2001	<0.22	<0.22	<0.22	<0.89	<0.89	<4.5	<0.22	<0.22	1.5	<0.22	<0.22	<0.22	<0.11	NA	<0.22	<0.22	<0.22	NA	NA	NA	0.18 J B	<0.22	0.076 J	<0.22	<0.22	<0.45
DP14-9'	7/29/2001	<0.26	<0.26	<0.26	<1	<1	<5.2	<0.26	<0.26	0.89	<0.26	<0.26	<0.26	<0.13	NA	<0.26	<0.26	<0.26	NA	NA	NA	0.23 J B	<0.26	0.76	<0.26	<0.26	<0.52
DP15-2'	7/29/2001	<0.0048	<0.0048	<0.0048	0.0051 J	0.01 J	<0.097	0.0017 J	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0024	NA	<0.0048	<0.0048	<0.0048	NA	NA	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097
DP15-9'	7/29/2001	<0.31	<0.31	<0.31	<1.2	<1.2	<6.2	<0.31	<0.31	0.22 J	<0.31	<0.31	<0.31	<0.16	NA	<0.31	<0.31	<0.31	NA	NA	NA	0.7 B	<0.31	0.44	<0.31	<0.31	<0.62
DP16-2.8'	7/30/2001	<0.0055	<0.0055	<0.0055	<0.022	<0.022	<0.11	<0.0055	<0.0055	<0.0055	0.0043 J	<0.0055	<0.0055	<0.0027	NA	<0.0055	<0.0055	<0.0055	NA	NA	NA	0.0014 J B	<0.0055	<0.0055	<0.0055	<0.0055	<0.011
DP16-12.5'	7/30/2001	<12	<12	<12	<49	<49	<250	<12	<12	<12	1.5 J	<12	<12	<6.1	NA	<12	6.2 J	<12	NA	NA	NA	11 J B	<12	150	<12	<12	24 J
DP17-3'	7/30/2001	<0.26	<0.26	<0.26	<1	<1	<5.2	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.13	NA	<0.26	<0.26	<0.26	NA	NA	NA	0.27 B	<0.26	0.063 J	<0.26	<0.26	0.045 J
DP17-13'	7/30/2001	<1.5	<1.5	<1.5	<6.1	0.52 J	1.1 J	0.67 J	<1.5	0.95 J	0.81 J	<1.5	<1.5	<0.76	NA	<1.5	1.7	<1.5	NA	NA	NA	0.41 J B	<1.5	35	<1.5	<1.5	9.1
DP18-2'	7/30/2001	<0.005	<0.005	<0.005	<0.02	<0.02	NA	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0025	<0.0099	<0.005	<0.005	NA	<0.005	<0.0099	<0.0099	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0099
DP18-14.5'	7/30/2001	<0.0049	<0.0049	<0.0049	<0.019	<0.019	NA	<0.0049	<0.0049	<0.0049	0.00053 J	<0.0049	<0.0049	<0.0024	<0.0097	<0.0049	<0.0049	NA	<0.0049	<0.0097	<0.0097	0.0015 J B	<0.0049	<0.0049	<0.0049	<0.0049	<0.0097
DP19-2'	7/30/2001	<0.0059	<0.0059	<0.0059	0.0082 J	0.02 J	NA	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0029	<0.012	0.0032 J	<0.0059	NA	<0.0059	0.0024 J	<0.012	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.012
DP19-13'	7/30/2001	<0.0057	<0.0057	<0.0057	<0.023	<0.023	NA	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0029	<0.011	<0.0057	<0.0057	NA	<0.0057	<0.011	<0.011	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.011
DP20-2'	7/30/2001	<0.005	<0.005	<0.005	<0.02	<0.02	NA	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0025	<0.0099	<0.005	<0.005	NA	<0.005	0.0019 J	<0.0099	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0099
DP20-14.5'	7/30/2001	<0.26	<0.26	<0.26	<1	<1	NA	<0.26	<0.26	<0.26	0.079 J	<0.26	<0.26	<0.13	<0.52	<0.26	<0.26	NA	<0.26	<0.52	<0.52	0.25 J B	<0.26	<0.26	<0.26	<0.26	<0.52
DP23-2.5'	8/1/2001	<0.0062	<0.0062	<0.0062	<0.025	<0.025	NA	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.012	<0.0031	<0.012	<0.0062	<0.0062	NA	<0.0062	<0.012	<0.012	<0.0062	<0.0062	<0.0062	<0.0062	<0.012	<0.012
DP23-9'	8/1/2001	<0.0053	<0.0053	<0.0053	<0.021	<0.021	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0027	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
DP25-2.5'	8/7/2001	<0.0053	<0.0053	<0.0053	<0.021	0.0045 J	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0027	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
DP25-2.5' (Dup)	8/7/2001	<0.0047	<0.0047	<0.0047	<0.019	0.0032 J	NA	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094	<0.0024	<0.0094	<0.0047	<0.0047	NA	<0.0047	<0.0094	<0.0094	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094	<0.0094
DP25-7.5'	8/7/2001	<0.0044	<0.0044	<0.0044	<0.018	0.0025 J	NA	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0089	<0.0022	<0.0089	<0.0044	<0.0044	NA	<0.0044	<0.0089	<0.0089	<0.0044	<0.0044	<0.0044	<0.0044	<0.0089	<0.0089
DP29-5'	11/9/2001	<0.0056	<0.0056	<0.0056	<0.022	0.0036 J B	NA	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.011	<0.0028	<0.011	<0.0056	<0.0056	NA	<0.0056	<0.011	<0.011	0.0032 J	<0.0056	0.00065J	<0.0056	<0.011	<0.011
DP31-15	12/5/2001	<0.28	0.015 J	<0.28	<1.1	<1.1	<5.6	<0.28	<0.28	0.045 J	0.1 J	<0.28	<0.28	<0.14	NA	<0.28	0.026 J	<0.28	NA	NA	NA	<0.28	<0.28	0.19JB	<0.28	<0.28	0.17JB
DP36-19	12/5/2001	<0.0052	<0.0052	<0.0052	<0.021	0.012 J	<0.1	<0.0052	<0.0052	0.00089 J	0.0014 J	<0.0052	<0.0052	<0.0026	NA	<0.0052	<0.0052	<0.0052	NA	NA	NA	<0.0052	<0.0052	0.00067J	<0.0052	<0.0052	<0.01
DP37-19	12/5/2001	<0.005	<0.005	<0.005	<0.02	<0.02	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0025	NA	<0.005	<0.005	<0.005	NA	NA	NA	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01
DP37-19 (Dup)	12/5/2001	<0.0051	<0.0051	<0.0051	<0.02	<0.02	<0.1	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0025	NA	<0.0051	<0.0051	<0.0051	NA	NA	NA	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.01
DP38-14.5	12/5/2001	<7.1	<7.1	<7.1	<28	<28	<140	<7.1	<7.1	<7.1	42	<7.1	<7.1	<3.6	NA	<7.1	<7.1	<7.1	NA	NA	NA	<7.1	<7.1	<7.1	<7.1	<7.1	<14
DP50-10'	3/10/2004	NA	NA	NA	NA	NA	NA	<0.0052	NA	NA	0.016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0025JB	<0.0052	NA	NA
DP51-10'	3/10/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0018JB	NA	NA	NA
DP52-5'	3/10/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0018JB	NA	NA	NA
DP56A-9.5-10.5'	3/15/2004	<14	<14	NA	<55	<55 *	NA	0.93 J	<14	<14	<14	<14	<14	<6.9	<27	<14	<14	NA	<14	<27	19 J	<14	<14	240	<14	<14	<27
DP58A-8.5-9.5'	3/15/2004	<0.31	<0.31	NA	<1.2	<1.2 *	NA	<0.31	<0.31	0.48	0.023 J	<0.31	<0.31	<0.15	<0.61	<0.31	<0.31	NA	<0.31	0.15 J	<0.61	<0.31	<0.31	0.3 J	<0.31	<0.31	<0.61

APPENDIX A
Table A-1
Summary of Volatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	Acetone	Acrylonitrile	Benzene	Bromodichloromethane	Carbon disulfide	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Cyclohexane	Dichlorodifluoromethane	Ethylbenzene	Iodomethane	Isopropylbenzene	Methyl acetate	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (total)
DP60A-6.6-7.4'	3/15/2004	<0.35	<0.35	NA	<1.4	<1.4 *	NA	<0.35	<0.35	0.27 J	<0.35	<0.35	<0.35	<0.18	<0.71	<0.35	<0.35	NA	<0.35	<0.71	<0.71	<0.35	<0.35	4.2	<0.35	<0.35	0.063 J
DP61A-5-6'	3/15/2004	<0.82	<0.82	NA	<3.3	1 J B	NA	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	<0.41	<1.6	<0.82	<0.82	NA	<0.82	<1.6	<1.6	<0.82	<0.82	<0.82	<0.82	<0.82	<1.6
DP61A-5-6' (Dup)	3/15/2004	<0.93	<0.93	NA	<3.7	<3.7 *	NA	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.47	<1.9	<0.93	<0.93	NA	<0.93	<1.9	<1.9	<0.93	<0.93	<0.93	<0.93	<0.93	<1.9
DP64A-8.5-9.5'	3/15/2004	<0.61	<0.61	NA	<2.4	0.73 J B	NA	<0.61	<0.61	<0.61	0.35 J	<0.61	<0.61	<0.3	<1.2	<0.61	0.32 J	NA	0.05 J	<1.2	0.1 J	<0.61	<0.61	3.9	<0.61	<0.61	1.4
DP66A-9.5-10.5'	3/15/2004	<0.25	<0.25	NA	<1	<1 *	NA	0.015 J	<0.25	0.48	0.049 J	<0.25	<0.25	<0.13	<0.51	<0.25	0.023 J	NA	<0.25	<0.51	<0.51	<0.25	<0.25	0.27	<0.25	<0.25	<0.51
DP67A-12.5-13.5'	3/15/2004	<3.5	<3.5	NA	<14	4.1 J B	NA	<3.5	<3.5	<3.5	9.7	<3.5	<3.5	<1.8	2.4 J	<3.5	2.4 J	NA	<3.5	<7	21	<3.5	<3.5	100	<3.5	<3.5	11
DP70A-9-11'	3/14/2004	<0.3	<0.3	NA	<1.2	<1.2 *	NA	<0.3	<0.3	0.073 J	<0.3	<0.3	<0.3	<0.15	<0.59	<0.3	<0.3	NA	0.029 J	<0.59	1.1	<0.3	<0.3	0.036J	<0.3	<0.3	<0.59
DP72A-12-13'	3/14/2004	<0.26	<0.26	NA	<1	<1 *	NA	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.13	<0.51	<0.26	0.026 J	NA	<0.26	<0.51	4.7	<0.26	<0.26	1.6	<0.26	<0.26	0.044 J
DP73A-12-13'	3/14/2004	<1.7	<1.7	NA	<6.9	<6.9 *	NA	<1.7	<1.7	<1.7	0.25 J	<1.7	<1.7	<0.86	<3.4	<1.7	<1.7	NA	<1.7	<3.4	0.42J	<1.7	<1.7	4.9	<1.7	<1.7	0.31J
DP78A-9-10'	3/14/2004	<47	<47	NA	<190	<190 *	NA	<47	<47	<47	7.2 J	<47	<47	<24	<94	<47	4.8 J	NA	<47	<94	5.8J	<47	<47	92	<47	<47	18 J
DP79A-12-13'	3/14/2004	<0.26	<0.26	NA	<1.1	<1.1 *	NA	0.14 J	<0.26	0.2 J	4.4	<0.26	<0.26	<0.13	<0.53	<0.26	0.48	NA	0.05 J	0.26J	0.22J	<0.26	<0.26	0.47	<0.26	<0.26	1.6
STR01-3'	3/8/2001	<0.0045	<0.0045	<0.0045	<0.018	<0.018	NA	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0091	<0.0023	<0.0091	<0.0045	<0.0045	NA	<0.0045	<0.0091	<0.0091	<0.0045	<0.0045	<0.0045	<0.0045	<0.0091	<0.0091
STR01-21'	3/8/2001	<0.0052	<0.0052	<0.0052	<0.021	0.015 J	NA	<0.0052	<0.0052	<0.0052	0.013	<0.0052	<0.01	<0.0026	<0.01	<0.0052	<0.0052	NA	<0.0052	<0.01	<0.01	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.01
STR01-73'	3/9/2001	<0.0055	<0.0055	<0.0055	<0.022	<0.022	NA	0.0057	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.0027	0.026	<0.0055	0.005 J	NA	<0.0055	<0.58	0.029	<0.0055	<0.0055	0.012	<0.0055	<0.011	0.0092J
STR01-88'	3/9/2001	<0.0071	<0.0071	<0.0071	<0.028	<0.028	NA	0.0087	<0.0071	0.0076	<0.0071	<0.0071	<0.014	<0.0035	0.022	<0.0071	0.0064 J	NA	<0.0071	<0.47	0.023	<0.0071	<0.0071	0.019	<0.0071	<0.014	0.012J
STR02-1'	3/13/2001	<0.0052	<0.0052	<0.0052	<0.021	<0.021	NA	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.0026	<0.01	<0.0052	<0.0052	NA	<0.0052	<0.01	<0.01	0.0018 J	<0.0052	<0.0052	<0.0052	<0.01	<0.01
STR02-12.5'	3/13/2001	<0.0051	<0.0051	<0.0051	<0.02	0.0071 J	NA	<0.0051	<0.0051	0.0039 J	0.026	<0.0051	<0.01	<0.0026	<0.01	<0.0051	<0.0051	NA	<0.0051	<0.01	<0.01	0.0024 J	<0.0051	<0.0051	<0.0051	<0.01	<0.01
STR03-4'	3/14/2001	<0.25	<0.25	<0.25	<1	<1	<5	<0.25	<0.25	<0.25	0.31	<0.25	<0.25	<0.13	NA	<0.25	<0.25	<0.25	NA	NA	NA	<0.25	<0.25	<0.25	<0.25	<0.25	<0.5
STR03-12.5'	3/14/2001	<0.0048	<0.0048	<0.0048	<0.019	0.019	<0.095	<0.0048	<0.0048	0.0026 J	0.029	<0.0048	<0.0048	<0.0024	NA	<0.0048	0.01	<0.0048	NA	NA	NA	<0.0048	<0.0048	0.0057	<0.0048	<0.0048	0.02
STR04-1.5'	3/19/2001	<0.0051	<0.0051	<0.0051	<0.02	<0.02	NA	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.01	<0.0026	<0.01	<0.0051	<0.0051	NA	<0.0051	<0.01	<0.01	<0.0051	<0.0051	<0.0051	<0.0051	<0.01	<0.01
STR04-17.5'	3/19/2001	<0.0052	<0.0052	<0.0052	<0.021	0.0076 J	NA	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.0026	<0.01	<0.0052	<0.0052	NA	<0.0052	<0.01	<0.01	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.01
STR04-17.5' (Dup)	3/19/2001	<0.0046	<0.0046	<0.0046	<0.019	<0.019	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0023	<0.0093	<0.0046	<0.0046	NA	<0.0046	<0.0093	<0.0093	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0093
STR05-1.5'	3/10/2001	<0.0048	<0.0048	<0.0048	<0.019	0.011 J	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0024	<0.0096	<0.0048	<0.0048	NA	<0.0048	<0.0096	<0.0096	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0096
STR05-9'	3/10/2001	<0.0046	<0.0046	<0.0046	<0.019	<0.019	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0023	<0.0093	<0.0046	<0.0046	NA	<0.0046	<0.0093	<0.0093	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0093
STR05-11.3'	3/10/2001	<0.0044	<0.0044	<0.0044	<0.017	0.0072 J	NA	<0.0044	<0.0044	0.0029 J	0.0068	<0.0044	<0.0087	<0.0022	<0.0087	<0.0044	<0.0044	NA	<0.0044	<0.0087	<0.0087	<0.0044	<0.0044	0.004 J	<0.0044	<0.0087	<0.0087
STR06-1'	3/11/2001	<0.0048	<0.0048	<0.0048	<0.019	0.013 J	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.0024	<0.0097	<0.0048	<0.0048	NA	<0.0048	<0.0097	<0.0097	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.0097
STR06-15'	3/11/2001	<0.0045	<0.0045	<0.0045	<0.018	<0.018	NA	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.009	<0.0023	<0.009	<0.0045	<0.0045	NA	<0.0045	<0.009	<0.009	<0.0045	<0.0045	<0.0045	<0.0045	<0.009	<0.009
STR07-1.5'	3/21/2001	<0.0053	<0.0053	<0.0053	0.0091 J	0.03	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0027	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
STR07-18'	3/21/2001	<0.26	<0.26	<0.26	<1.1	<1.1	NA	<0.26	<0.26	<0.26	1.1	<0.26	<0.53	<0.13	<0.53	<0.26	<0.26	NA	<0.26	<0.53	<0.53	<0.26	<0.26	<0.26	<0.26	<0.53	<0.53
STR08-1.5'	3/26/2001	<0.0053	<0.0053	<0.0053	<0.021	<0.021	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0026	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
STR08-13'	3/26/2001	<0.24	<0.24	<0.24	<0.96	3.2	NA	<0.24	<0.24	0.38	<0.24	<0.24	<0.48	<0.12	<0.48	<0.24	<0.24	NA	<0.24	<0.48	<0.48	<0.24	<0.24	<0.24	<0.24	<0.48	<0.48
STR08-13' (Dup)	3/26/2001	<0.23	<0.23	<0.23	<0.94	5.9	NA	<0.23	<0.23	0.29	0.079 J	<0.23	<0.47	<0.12	<0.47	<0.23	<0.23	NA	<0.23	<0.47	<0.47	<0.23	<0.23	<0.23	<0.23	<0.47	<0.47
STR09-7.5'	4/4/2001	<0.0054	<0.0054	<0.0054	<0.022	<0.022	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.0027	<0.011	<0.0054	<0.0054	NA	<0.0054	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.011
STR10-1.5'	4/7/2001	<0.0044	<0.0044	<0.0044	<0.018	<0.018	<0.088	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0022	NA	<0.0044	<0.0044	<0.0044	NA	NA	NA	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0088
STR10-11'	4/7/2001	0.022	0.0026 J	0.0051 J	<0.023	0.0081 J	<0.11	0.0022 J	<0.0056	<0.0056	0.0038 J	<0.0056	<0.0056	0.0051	NA	<0.0056	<0.0056	<0.0056	NA	NA	NA	<0.0056	0.0047J	<0.0056	0.0025J	0.0084	<0.011
STR11-2'	8/20/2001	<0.0048	<0.0048	<0.0048	<0.019	<0.019	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0024	<0.0096	<0.0048	<0.0048	NA	<0.0048	<0.0096	<0.0096	<0.0048	0.0026J	<0.0048	<0.0048	<0.0096	<0.0096
STR11-9'	8/20/2001	<0.0045	<0.0045	<0.0045	<0.018	<0.018	NA	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0089	<0.0022	<0.0089	<0.0045	<0.0045	NA	<0.0045	<0.0089	<0.0089	<0.0045	<0.0045	<0.0045	<0.0045	<0.0089	<0.0089
STR11-9' (Dup)	8/20/2001	<0.0047	<0.0047	<0.0047	<0.019	<0.019	NA	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0093	<0.0023	<0.0093	<0.0047	<0.0047	NA	<0.0047	<0.0093	<0.0093	<0.0047	0.0016J	<0.0047	<0.0047	<0.0093	<0.0093
T-1B2-8'	3/16/2004	<0.0062	<0.0062	NA	<0.025	<0.025	NA	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0031	<0.012	<0.0062	<0.0062	NA	<0.0062	<0.012	<0.012	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.012
T-1E-2-6'	3/16/2004	<0.006	<0.006	NA	<0.024	<0.024	NA	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.003	<0.012	<0.006	<0.006	NA	<0.006	<0.012	<0.012	<0.006	<0.006	<0.006	<0.006	<0.006	<0.012
T-1N-6'	3/16/2004	<0.0067	<0.0067	NA	<0.027	<0.027	NA	<0.0067	<0.0067	<0.0067	<0.0067	<0.0067	<0.0067	<0.0033	<0.013	<0.0067	<0.0067	NA	<0.0067	<0.013	<0.013	<0.0067	<0.0067	<0.0067	<0.0067	<0.0067	<0.013
T-1NE-4'	3/16/2004	<0.0062	<0.0062	NA	<0.025	<0.025	NA	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0031	<0.012	<0.0062	<0.0062	NA	<0.0062	<0.012	<0.012	<0.0062	<0.0062	0.00069J	<0.0062	<0.0062	<0.012
T-1W2-6'	3/16/2004	<0.0063	<0.0063	NA	<0.025	<0.025	NA	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0032	<0.013	<0.0063	<0.0063	NA	<0.0063	<0.013	<0.013	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.013
T-2-3'	11/8/2001	<0.0054	<0.0054	<0.0054	<0.022	0.0028 J B	<0.11	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0027	NA	<0.0054	<0.0054	<0.0054	NA	NA	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011
T-2-9'	11/8/2001	<0.25	<0.25	<0.25	0.13 J B	0.54 J B	<5.1	<0.25	<0.25	<0.25	0.98	<0.25	<0.25	<0.13	NA	<0.25	<0.25	<0.25	NA	NA	NA	0.28	<0.25	0.027JB	<0.25	<0.25	0.11JB
T-3-3'	11/8/2001	<0.25	<0.25	<0.25	<1	0.58 J B	<5	0.037 J	<0.25	<0.25	<0.25	<0.25	<0.25	<0.13	NA	<0.25	0.13 J B	<0.25	NA	NA	NA	0.29	<0.25	0.47 B	<0.25	<0.25	0.96 B
T-3-11'	11/8/2001	<0.0047	<0.0047	<0.0047	<0.019	0.0027 J B	<0.094	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0023	NA	<0.0047	<0.0047	<0.0047	NA	NA	NA	<0.0047	<0.0047	0.00052 J	<0.0047	<0.0047	<0.0094
T-4-3'	11/9/2001	<0.0045	<0.0045	<0.0045	<0.018	0.007 J B	<0.091	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0023	NA	<0.0045	<0.0045	<0.0045	NA	NA	NA	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0091
T-4-9'	11/9/2001	<0.0055	<0.0055	<0.0055	<0.022	0.0033 J B	<0.11	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.0027	NA	<0.0055	<0.0055	<0.0055	NA	NA	NA	0.0017J	<0.0055	<0.0055	<0.0055	<0.0055	<0.011
T-5-3'	11/9/2001	<0.0064	<0.0064	<0.0064	<0.026	0.0035 J B	<0.13	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0032	NA	<0.0064	<0.0064	<0.0064	NA	NA	NA	0.0029J	<0.0064	<0.0064	<0.0064	<0.0064	<0.013

APPENDIX A
Table A-1
Summary of Volatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	Acetone	Acrylonitrile	Benzene	Bromodichloromethane	Carbon disulfide	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Cyclohexane	Dichlorodifluoromethane	Ethylbenzene	Iodomethane	Isopropylbenzene	Methyl acetate	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (total)
T-5-9'	11/9/2001	<0.0053	<0.0053	<0.0053	0.0087 J	0.028 B	<0.11	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.0026	NA	<0.0053	<0.0053	<0.0053	NA	NA	NA	0.0028J	<0.0053	0.00064 J	<0.0053	<0.0053	<0.011
T-6-3'	11/10/2001	<0.0057	<0.0057	<0.0057	0.0045 J	0.027 B	<0.11	<0.0057	<0.0057	<0.0057	0.017	<0.0057	<0.0057	<0.0028	NA	<0.0057	<0.0057	<0.0057	NA	NA	NA	0.0019J	<0.0057	<0.0057	<0.0057	<0.0057	<0.011
T-6-7.5'	11/11/2001	<0.68	<0.68	<0.68	<2.7	23 B	<14	<0.68	<0.68	0.27 J	<0.68	<0.68	<0.68	<0.34	NA	<0.68	0.24 J B	0.6 J B	NA	NA	NA	<0.68	0.067 J B	0.35 J	<0.68	<0.68	2.1B
T-6-10'	11/10/2001	<0.24	<0.24	<0.24	<0.95	0.42 J B	<4.8	<0.24	<0.24	<0.24	2.5	<0.24	<0.24	<0.12	NA	<0.24	<0.24	<0.24	NA	NA	NA	0.096JB	0.031 J B	<0.24	<0.24	<0.24	0.088JB
T-8-3'	11/11/2001	<0.0055	<0.0055	<0.0055	<0.022	0.0032 J B	<0.11	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.0027	NA	<0.0055	<0.0055	<0.0055	NA	NA	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.011
T-8-9'	11/11/2001	<0.0054	<0.0054	<0.0054	<0.022	0.0032 J B	<0.11	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0027	NA	<0.0054	<0.0054	<0.0054	NA	NA	NA	0.0014JB	<0.0054	<0.0054	<0.0054	<0.0054	<0.011
UAW01-30-1.5'	4/2/2001	<0.0054	<0.0054	<0.0054	<0.021	<0.021	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.0027	<0.011	<0.0054	<0.0054	NA	<0.0054	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.011
UAW01-30-15'	4/2/2001	<0.0056	<0.0056	<0.0056	<0.022	<0.022	NA	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.011	<0.0028	<0.011	<0.0056	<0.0056	NA	<0.0056	<0.011	<0.011	0.002J	<0.0056	<0.0056	<0.0056	<0.011	<0.011
UAW04-20-10'	3/23/2001	<7.1	<7.1	<7.1	<28	<28	NA	<7.1	<7.1	<7.1	<7.1	<7.1	<14	<3.5	<14	<7.1	<7.1	NA	<7.1	<14	<14	5.6JB	<7.1	160	<7.1	<14	<14
UAW05-20-13'	3/23/2001	<0.22	<0.22	<0.22	<0.9	<0.9	NA	<0.22	<0.22	<0.22	1.6	<0.22	<0.45	<0.11	<0.45	<0.22	<0.22	NA	<0.22	<0.45	0.22 J	<0.22	<0.22	<0.22	<0.22	<0.45	<0.45
UAW06-20-1.5'	3/26/2001	<0.0053	<0.0053	<0.0053	0.0072 J	0.029	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0026	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
UAW06-20-11.5'	3/26/2001	<0.005	<0.005	<0.005	<0.02	0.59 J	NA	<0.005	<0.005	0.036	0.043	<0.005	<0.0099	<0.0025	<0.0099	<0.005	<0.005	NA	<0.005	<0.0099	<0.0099	<0.005	<0.005	0.0017J	<0.005	<0.0099	0.0025 J
UAW08-20-13'	3/24/2001	<0.46	<0.46	<0.46	<1.8	<1.8	<9.2	0.19 J	<0.46	0.28 J	0.26 J	<0.46	<0.92	<0.23	NA	<0.46	0.32J	<0.46	NA	NA	NA	<0.46	<0.46	2	<0.46	<0.92	1.5
UAW09-20-1.5'	3/27/2001	<0.0049	<0.0049	<0.0049	<0.02	<0.02	NA	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0025	<0.0098	<0.0049	<0.0049	NA	<0.0049	<0.0098	<0.0098	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0098
UAW09-20-15'	3/27/2001	<0.0054	<0.0054	<0.0054	<0.021	<0.021	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.0027	<0.011	<0.0054	<0.0054	NA	<0.0054	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.011
UAW11-40-2'	4/17/2001	<0.0048	<0.0048	<0.0048	<0.019	0.013 J	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.0024	<0.0097	<0.0048	<0.0048	NA	<0.0048	<0.0097	<0.0097	<0.0048	<0.0048	<0.0048	<0.0048	<0.0097	<0.0097
UAW11-40-10'	4/17/2001	<0.28	<0.28	<0.28	<1.1	2.3	NA	<0.28	<0.28	<0.28	<0.28	<0.28	<0.56	<0.14	<0.56	<0.28	<0.28	NA	<0.28	<0.56	<0.56	0.099J	<0.28	<0.28	<0.28	<0.56	<0.56
UAW12-20-12'	3/24/2001	<0.3	<0.3	<0.3	<1.2	<1.2	<6	<0.3	<0.3	<0.3	0.86	<0.3	<0.6	<0.15	NA	<0.3	<0.3	<0.3	NA	NA	NA	<0.3	<0.3	<0.3	<0.3	<0.6	<0.6
UAW13-20-1.5'	3/24/2001	<0.0047	<0.0047	<0.0047	<0.019	0.025	<0.093	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0093	<0.0023	NA	<0.0047	<0.0047	<0.0047	NA	NA	NA	<0.0047	<0.0047	<0.0047	<0.0047	<0.0093	<0.0093
UAW13-20-11.5'	3/24/2001	<0.28	<0.28	<0.28	<1.1	<1.1	<5.7	<0.28	<0.28	<0.28	<0.28	<0.28	<0.57	<0.14	NA	<0.28	<0.28	<0.28	NA	NA	NA	0.26JB	<0.28	0.15 J	<0.28	<0.57	<0.57
UAW14-10-1.5'	4/4/2001	<0.0049	<0.0049	<0.0049	<0.02	<0.02	NA	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049	<0.0099	<0.0025	<0.0099	<0.0049	<0.0049	NA	<0.0049	<0.0099	<0.0099	<0.0049	<0.0049	<0.0049	<0.0049	<0.0099	<0.0099
UAW15-20-2'	4/9/2001	<0.0043	<0.0043	<0.0043	0.008 J	0.028	NA	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	<0.0086	<0.0022	<0.0086	<0.0043	<0.0043	NA	<0.0043	<0.0086	<0.0086	<0.0043	<0.0043	<0.0043	<0.0043	<0.0086	<0.0086
UAW15-20-2' (Dup)	4/9/2001	<0.0046	<0.0046	<0.0046	0.019	0.075	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0023	<0.0093	<0.0046	<0.0046	NA	<0.0046	<0.0093	<0.0093	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0093
UAW15-20-8.5'	4/9/2001	<0.0049	<0.0049	<0.0049	<0.02	<0.02	NA	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0025	<0.0098	<0.0049	<0.0049	NA	<0.0049	<0.0098	<0.0098	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0098
UAW16-10-2'	8/22/2001	<0.0057	<0.0057	<0.0057	0.0039 J	0.013 J	NA	<0.0057	<0.0057	<0.0057	0.0092	<0.0057	<0.011	<0.0029	<0.011	<0.0057	<0.0057	NA	<0.0057	<0.011	0.00082J	<0.0057	<0.0057	<0.0057	<0.0057	<0.011	<0.011
UAW16-10-5.5'	8/22/2001	<0.0061	<0.0061	<0.0061	0.0035 J	0.013 J	NA	<0.0061	<0.0061	<0.0061	0.032	<0.0061	<0.012	<0.003	<0.012	<0.0061	<0.0061	NA	<0.0061	<0.012	0.0028J	<0.0061	<0.0061	<0.0061	<0.0061	<0.012	<0.012
UAW17-40-1.5'	4/5/2001	<0.0046	<0.0046	<0.0046	<0.018	<0.018	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0091	<0.0023	<0.0091	<0.0046	<0.0046	NA	<0.0046	<0.0091	<0.0091	<0.0046	<0.0046	<0.0046	<0.0046	<0.0091	<0.0091
UAW17-40-5'	4/5/2001	<0.24	<0.24	<0.24	<0.96	0.69 J	NA	<0.24	<0.24	<0.24	<0.24	<0.24	<0.48	<0.12	<0.48	<0.24	<0.24	NA	<0.24	6	<0.48	<0.24	<0.24	<0.24	<0.24	<0.48	<0.48
UAW18-20-1'	8/23/2001	<0.26	<0.26	<0.26	<1	1.3	NA	<0.26	<0.26	<0.26	<0.26	<0.26	<0.52	<0.13	<0.52	<0.26	<0.26	NA	<0.26	<0.52	<0.52	<0.26	<0.26	<0.26	<0.26	<0.52	<0.52
UAW18-20-15'	8/23/2001	<0.0047	<0.0047	<0.0047	<0.019	0.0029 J	NA	<0.0047	<0.0047	0.0018 J	0.014	<0.0047	<0.0095	<0.0024	<0.0095	<0.0047	<0.0047	NA	<0.0047	<0.0095	<0.0095	<0.0047	<0.0047	0.0015J	<0.0047	<0.0095	<0.0095
UAW19-80-1.5'	4/6/2001	<0.005	<0.005	<0.005	<0.02	<0.02	NA	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0099	<0.0025	<0.0099	<0.005	<0.005	NA	<0.005	<0.0099	<0.0099	<0.005	<0.005	<0.005	<0.005	<0.0099	<0.0099
UAW19-80-15'	4/6/2001	<0.0046	<0.0046	<0.0046	<0.018	<0.018	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0091	<0.0023	<0.0091	<0.0046	<0.0046	NA	<0.0046	<0.0091	<0.0091	<0.0046	<0.0046	<0.0046	<0.0046	<0.0091	<0.0091
UAW20-60-1.5'	4/9/2001	<0.0047	<0.0047	<0.0047	<0.019	<0.019	NA	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0093	<0.0023	<0.0093	<0.0047	<0.0047	NA	<0.0047	<0.0093	<0.0093	<0.0047	0.0092	<0.0047	<0.0047	<0.0093	<0.0093
UAW20-60-9.5'	4/9/2001	<0.0053	<0.0053	<0.0053	<0.021	<0.021	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0026	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
UAW21-30-1.5'	4/11/2001	<0.005	<0.005	<0.005	<0.02	<0.02	NA	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.0025	<0.01	<0.005	<0.005	NA	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01
UAW21-30-10'	4/11/2001	<0.0046	<0.0046	<0.0046	<0.018	<0.018	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0023	<0.0092	<0.0046	<0.0046	NA	<0.0046	<0.0092	<0.0092	<0.0046	<0.0046	0.0034 J	<0.0046	<0.0092	0.002 J
UAW22-20-2'	9/5/2001	<0.0044	<0.0044	<0.0044	0.0036 J	0.01 J	NA	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0088	<0.0022	<0.0088	<0.0044	<0.0044	NA	<0.0044	<0.0088	0.00076 J	<0.0044	<0.0044	<0.0044	<0.0044	<0.0088	<0.0088
UAW22-20-11'	9/5/2001	<0.0063	<0.0063	<0.0063	<0.025	0.0043 J	NA	<0.0063	<0.0063	0.0064	0.037	<0.0063	<0.013	<0.0031	<0.013	<0.0063	<0.0063	NA	<0.0063	<0.013	<0.013	<0.0063	<0.0063	<0.0063	<0.0063	<0.013	<0.013

APPENDIX A
Table A-1
Summary of Volatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	Acetone	Acrylonitrile	Benzene	Bromodichloromethane	Carbon disulfide	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Cyclohexane	Dichlorodifluoromethane	Ethylbenzene	Iodomethane	Isopropylbenzene	Methyl acetate	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (total)
Background Soil																											
B01-1.5'	10/9/2001	<0.0046	<0.0046	<0.0046	<0.018	0.0044 J B	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0023	<0.0092	<0.0046	<0.0046	NA	<0.0046	<0.0092	<0.0092	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0092
B01-11.5'	10/9/2001	<0.0057	<0.0057	<0.0057		0.0061 J B	NA	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.011	<0.0029	<0.011	<0.0057	<0.0057	NA	<0.0057	<0.011	<0.011	<0.0057	<0.0057	<0.0057	<0.0057	<0.011	<0.011
B02-1.5'	10/9/2001	<0.0046	<0.0046	<0.0046	<0.018	0.0044 J B	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0023	<0.0092	<0.0046	<0.0046	NA	<0.0046	<0.0092	<0.0092	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0092
B02-11.5'	10/9/2001	<0.0058	<0.0058	<0.0058	0.004 J B	0.0055 J B	NA	<0.0058	<0.0058	<0.0058	<0.0058	<0.0058	<0.012	<0.0029	<0.012	<0.0058	<0.0058	NA	<0.0058	<0.012	<0.012	<0.0058	<0.0058	<0.0058	<0.0058	<0.012	<0.012
B03-1.5'	10/9/2001	<0.0048	<0.0048	<0.0048	<0.019	0.004 J B	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0024	<0.0096	<0.0048	<0.0048	NA	<0.0048	<0.0096	<0.0096	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0096
B03-11.5'	10/9/2001	<0.0054	<0.0054	<0.0054	<0.022	0.0051 J B	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.0027	<0.011	<0.0054	<0.0054	NA	<0.0054	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.011
B04-1.5'	10/9/2001	<0.0054	<0.0054	<0.0054	<0.022	0.0044 J B	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.0027	<0.011	<0.0054	<0.0054	NA	<0.0054	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.011
B04-1.5' (Dup)	10/9/2001	<0.0055	<0.0055	<0.0055	<0.022	0.005 J B	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.0027	<0.011	<0.0055	<0.0055	NA	<0.0055	<0.011	<0.011	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.011
B04-11.5'	10/9/2001	<0.0052	<0.0052	<0.0052	0.0037 J B	0.0053 J B	NA	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.0026	<0.01	<0.0052	<0.0052	NA	<0.0052	<0.01	<0.01	<0.0052	<0.0052	0.0006 J	<0.0052	<0.01	<0.01
B05-1.5'	10/9/2001	<0.0046	<0.0046	<0.0046	<0.018	0.0039 J B	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0023	<0.0092	<0.0046	<0.0046	NA	<0.0046	<0.0092	<0.0092	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0092
B05-11.5'	10/9/2001	<0.0059	<0.0059	<0.0059	<0.024	0.006 J B	NA	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.012	<0.003	<0.012	<0.0059	<0.0059	NA	<0.0059	<0.012	<0.012	<0.0059	<0.0059	<0.0059	<0.0059	<0.012	<0.012
B06-1.5'	10/9/2001	<0.0049	<0.0049	<0.0049	0.0033 J B	0.0047 J B	NA	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0024	<0.0098	<0.0049	<0.0049	NA	<0.0049	<0.0098	<0.0098	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0098
B06-11'	10/9/2001	<0.0053	<0.0053	<0.0053	<0.021	0.0047 J B	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0026	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	0.002 J	<0.0053	<0.0053	<0.011	<0.011
B07-1'	10/9/2001	<0.0058	<0.0058	<0.0058	<0.023	0.0051 J B	NA	<0.0058	<0.0058	<0.0058	<0.0058	<0.0058	<0.012	<0.0029	<0.012	<0.0058	<0.0058	NA	<0.0058	<0.012	<0.012	<0.0058	<0.0058	<0.0058	<0.0058	<0.012	<0.012
B07-9'	10/9/2001	<0.0051	<0.0051	<0.0051	<0.02	0.0046 J B	NA	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.01	<0.0026	<0.01	<0.0051	<0.0051	NA	<0.0051	<0.01	<0.01	<0.0051	<0.0051	<0.0051	<0.0051	<0.01	<0.01
B08-2'	10/9/2001	<0.0053	<0.0053	<0.0053	<0.021	0.0045 J B	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0026	<0.011	<0.0053	<0.0053	NA	<0.0053	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
B08-9'	10/9/2001	<0.0048	<0.0048	<0.0048	0.0041 J B	0.0088 J B	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0024	<0.0096	<0.0048	<0.0048	NA	<0.0048	<0.0096	0.00071 J	<0.0048	<0.0048	0.00066 J	<0.0048	<0.0096	<0.0096
B09-2'	10/9/2001	<0.0093	<0.0093	<0.0093	<0.037	0.012 J B	NA	<0.0093	<0.0093	<0.0093	<0.0093	<0.0093	<0.019	<0.0046	<0.019	<0.0093	<0.0093	NA	<0.0093	<0.019	<0.019	<0.0093	0.0059J	<0.0093	<0.0093	<0.019	<0.019
B09-10'	10/9/2001	0.0083	0.0052 J	0.027	<0.023	0.0064 J B	NA	0.00078 J	<0.0058	<0.0058	<0.0058	<0.0058	<0.012	0.027	<0.012	<0.0058	<0.0058	NA	<0.0058	<0.012	<0.012	<0.0058	0.0022J	<0.0058	0.0013 J	0.0091J	<0.012
B10-2'	10/9/2001	<0.011	<0.011	<0.011	<0.043	<0.043	NA	<0.011	<0.011	<0.011	<0.011	<0.011	<0.021	<0.0054	<0.021	<0.011	<0.011	NA	<0.011	0.0031J	<0.021	<0.011	0.0028J	<0.011	<0.011	<0.021	<0.021
B10-11'	10/9/2001	<0.005	<0.005	<0.005	<0.02	0.0047 J B	NA	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.0025	<0.01	<0.005	<0.005	NA	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01
Creek Bed Sediment																											
CS1	3/6/2002	<0.0065	<0.0065	NA	NA	<0.026	NA	<0.0065	<0.0065	<0.0065	<0.0065	<0.0065	NA	NA	NA	<0.0065	<0.0065	NA	NA	NA	<0.013	<0.0065	NA	<0.0065	NA	NA	<0.013
CS-1A	3/25/2004	<0.0054	<0.0054	NA	<0.022	<0.022	<0.11	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0027	NA	<0.0054	<0.0054	<0.0054	NA	NA	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011
CS2	3/6/2002	<0.0055	<0.0055	NA	NA	<0.022	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	NA	NA	NA	<0.0055	<0.0055	<0.0055	NA	NA	<0.011	<0.0055	NA	<0.0055	NA	NA	<0.011
CS-2A	3/26/2004	<0.0057	<0.0057	NA	<0.023	<0.023	<0.11	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0028	NA	<0.0057	<0.0057	<0.0057	NA	NA	NA	0.0041JB	<0.0057	<0.0057	<0.0057	<0.0057	<0.011
CS3	3/6/2002	<0.0055	<0.0055	NA	NA	0.0091 J B	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	NA	NA	NA	<0.0055	<0.0055	NA	NA	NA	<0.011	<0.0055	NA	<0.0055	NA	NA	<0.011
CS-3A	3/26/2004	<0.0055	<0.0055	NA	0.0035 J	0.011 J	<0.11	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.0027	NA	<0.0055	<0.0055	<0.0055	NA	NA	NA	0.0037JB	<0.0055	<0.0055	<0.0055	<0.0055	<0.011
CS4	3/6/2002	<0.0057	<0.0057	NA	NA	<0.023	NA	<0.0057	<0.0057	<0.0057	0.0046 J	<0.0057	NA	NA	NA	<0.0057	<0.0057	NA	NA	NA	<0.011	<0.0057	NA	<0.0057	<5.7	NA	<0.011
CS-4A	3/26/2004	<0.0072	<0.0072	NA	0.0027 J	0.012 J	<0.14	<0.0072	<0.0072	<0.0072	0.0035 J	<0.0072	<0.0072	<0.0036	NA	<0.0072	<0.0072	<0.0072	NA	NA	NA	0.0052JB	<0.0072	<0.0072	<0.0072	<0.0072	<0.014
CS5	3/6/2002	<0.0054	<0.0054	NA	NA	<0.021	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	NA	NA	NA	<0.0054	<0.0054	NA	NA	NA	<0.011	<0.0054	NA	<0.0054	NA	NA	<0.011
CS-5A	3/25/2004	<0.0057	<0.0057	NA	<0.023	<0.023	<0.11	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.0028	NA	<0.0057	<0.0057	<0.0057	NA	NA	NA	<0.0057	<0.0057	<0.0057	<0.0057	<0.0057	<0.011
CS6	3/6/2002	<0.006	<0.006	NA	NA	<0.024	NA	<0.006	<0.006	<0.006	0.0011 J	<0.006	NA	NA	NA	<0.006	<0.006	NA	NA	NA	<0.012	<0.006	NA	<0.006	NA	NA	<0.012
CS-6A	3/25/2004	<0.0079	<0.0079	NA	<0.031	<0.031	<0.16	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0039	NA	<0.0079	<0.0079	<0.0079	NA	NA	NA	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.016
CS-6A (Dup)	3/25/2004	<0.0066	<0.0066	NA	<0.026	<0.026	<0.13	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.0033	NA	<0.0066	<0.0066	<0.0066	NA	NA	NA	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.013
CS7 (Dup)	3/6/2002	<0.0059	<0.0059	NA	NA	<0.024	NA	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	NA	NA	NA	<0.0059	<0.0059	NA	NA	NA	<0.012	<0.0059	NA	<0.0059	NA	NA	<0.012
CS7	3/6/2002	<0.0055	<0.0055	NA	NA	<0.022	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	NA	NA	NA	<0.0055	<0.0055	NA	NA	NA	<0.011	<0.0055	NA	<0.0055	NA	NA	<0.011
CS8	3/6/2002	<0.0058	<0.0058	NA	NA	<0.023	NA	<0.0058	<0.0058	<0.0058	<0.0058	<0.0058	NA	NA	NA	<0.0058	<0.0058	NA	NA	NA	<0.012	<0.0058	NA	<0.0058	NA	NA	<0.012

APPENDIX A
Table A-1
Summary of Volatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	Acetone	Acrylonitrile	Benzene	Bromodichloromethane	Carbon disulfide	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Cyclohexane	Dichlorodifluoromethane	Ethylbenzene	Iodomethane	Isopropylbenzene	Methyl acetate	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (total)
Creek Bank Sediment																											
SS-1	10/11/2001	<0.0049	<0.0049	NA	NA	0.0047 J	NA	0.0036 J	<0.0049	<0.0049	0.018	<0.0049	NA	NA	NA	<0.0049	0.00077J	NA	NA	NA	0.00081J	<0.0049	NA	<0.0049	NA	NA	0.002J
SS-2	10/11/2001	<0.0048	<0.0048	NA	NA	<0.019	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	NA	NA	NA	<0.0048	<0.0048	NA	NA	NA	<0.0097	<0.0048	NA	<0.0048	NA	NA	<0.0097
SS-3	10/11/2001	<0.0061	<0.0061	NA	NA	<0.024	NA	<0.0061	<0.0061	<0.0061	<0.0061	<0.0061	NA	NA	NA	<0.0061	<0.0061	NA	NA	NA	<0.012	<0.0061	NA	<0.0061	NA	NA	<0.012
SS-4	10/11/2001	<0.0054	<0.0054	NA	NA	0.018 J	NA	<0.0054	<0.0054	0.0072	<0.0054	<0.0054	NA	NA	NA	<0.0054	<0.0054	NA	NA	NA	<0.011	<0.0054	NA	<0.0054	NA	NA	<0.011
SS-5 ~25' South	10/11/2001	<0.0057	<0.0057	NA	NA	0.0083 J	NA	<0.0057	<0.0057	<0.0057	0.0043 J	<0.0057	NA	NA	NA	<0.0057	<0.0057	NA	NA	NA	<0.011	<0.0057	NA	<0.0057	NA	NA	<0.011
SS-5 (Dup)	10/11/2001	<0.0059	<0.0059	NA	NA	0.0067 J	NA	<0.0059	<0.0059	<0.0059	0.0037 J	<0.0059	NA	NA	NA	<0.0059	<0.0059	NA	NA	NA	0.0011J	<0.0059	NA	<0.0059	NA	NA	<0.012
SS-6	10/11/2001	<0.0054	<0.0054	NA	NA	<0.022	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	NA	NA	NA	<0.0054	<0.0054	NA	NA	NA	<0.011	<0.0054	NA	<0.0054	NA	NA	<0.011
SS-7	10/11/2001	<0.0051	<0.0051	NA	NA	<0.02	NA	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	NA	NA	NA	<0.0051	<0.0051	NA	NA	NA	<0.01	<0.0051	NA	<0.0051	NA	NA	<0.01
SS-8	10/11/2001	<0.0066	<0.0066	NA	NA	0.0029 J	NA	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	NA	NA	NA	<0.0066	<0.0066	NA	NA	NA	<0.013	<0.0066	NA	<0.0066	NA	NA	<0.013
SS-9	10/11/2001	<0.0059	<0.0059	NA	NA	0.0029 J	NA	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	NA	NA	NA	<0.0059	<0.0059	NA	NA	NA	<0.012	<0.0059	NA	<0.0059	NA	NA	<0.012
SS-10	10/11/2001	<0.005	<0.005	NA	NA	<0.02	NA	<0.005	<0.005	<0.005	<0.005	<0.005	NA	NA	NA	<0.005	<0.005	NA	NA	NA	<0.01	<0.005	NA	<0.005	NA	NA	<0.01
SS-11	10/11/2001	<0.0059	<0.0059	NA	NA	<0.023	NA	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	NA	NA	NA	<0.0059	<0.0059	NA	NA	NA	<0.012	<0.0059	NA	<0.0059	NA	NA	<0.012
SS-12	10/11/2001	<0.0055	<0.0055	<5.5	<22	<0.022	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<5.5	<2.8	NA	<0.0055	<0.0055	NA	NA	NA	<0.011	<0.0055	<5.5	<0.0055	<5.5	<5.5	<0.011

Notes:
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.

* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level.
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds. Please refer to Appendix D of the Supplemental RI for excerpts from the Quality Assurance Review (Envionmental Standards, 2004) and to review data qualification of "non-detect" results.

E = Detection exceeded laboratory calibration range.

APPENDIX A
Table A-2
Summary of Semivolatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1'-Biphenyl	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dimethylphenol	2-Methylnaphthalene	2-Methylphenol	3-Methylphenol	4-Methylphenol	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl) phthalat	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
On-Site Soil																																			
DP01-2'	7/24/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP01-9.5'	7/24/2001	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	NA	<1.5	<1.5	<1.5	<1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
DP02-2'	7/24/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	0.07 J	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP02-9.5'	7/24/2001	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
DP03-2'	7/24/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
DP03-8.5'	7/24/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
DP05-1'	7/25/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
DP05-8.5'	7/25/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP07-9'	7/26/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
DP08-6'	7/26/2001	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
DP08-11'	7/26/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
DP09-12'	7/27/2001	<0.38	0.13 J	<0.38	0.073 J	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	0.072 J	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP10-2'	7/27/2001	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	0.16 J	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
DP10-10'	7/27/2001	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
DP10-10' (Dup)	7/27/2001	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	0.89 J	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
DP12-1.5'	7/28/2001	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	NA	<0.34	<0.34	<0.34	<0.34	NA	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
DP12-9'	7/28/2001	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
DP13-3'	7/29/2001	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	0.07 J	<0.39	0.086 J	<0.39	<0.39	0.16 J	<0.39	0.076 J	<0.39	<0.39	<0.39	<0.39	0.14 J	<0.39	<0.39	<0.39	<0.39	<0.39	0.13 J
DP13-11'	7/29/2001	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	0.069 J	<0.39	<0.39	<0.39	0.18 J	NA	0.46	0.45	0.49	0.25 J	0.23 J	0.26 J	NA	0.47	<0.39	<0.39	<0.39	<0.39	1.1	0.063 J	0.22 J	<0.39	0.61	<0.39	0.85
DP14-3'	7/29/2001	NA	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	NA	<35	<35	<35	<35	<35	6.5 J	NA	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35
DP14-9'	7/29/2001	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	0.25 J	<1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
DP15-2'	7/29/2001	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	0.23 J	NA	0.064 J	<0.38	<0.38	<0.38	0.29 J	0.13 J	<0.38	<0.38	<0.38	0.21 J	0.075 J	0.11 J
DP15-9'	7/29/2001	NA	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	NA	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	NA	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
DP16-2.8'	7/30/2001	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
DP16-12.5'	7/30/2001	NA	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	NA	<19	<19	<19	<19	<19	26	NA	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19
DP17-3'	7/30/2001	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
DP17-13'	7/30/2001	NA	21 J	<22	<22	<22	<22	<22	5.4 J #	5.4 J #	<22	<22	<22	3.9 J	<22	NA	<22	<22	<22	<22	<22	26	NA	<22	<22	<22	<22	<22	<22	<22	<22	<22	<22	4.7 J	<22
DP18-2'	7/30/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	0.16 J	0.19 J	0.25 J	0.12 J	0.097 J	<0.38	<0.38	0.2 J	<0.38	<0.38	<0.38	<0.38	0.37 J	<0.38	0.12 J	<0.38	0.14 J	<0.38	0.29 J
DP18-14.5'	7/30/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
DP19-2'	7/30/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	0.11 J	0.12 J	0.2 J	0.089 J	0.078 J	0.46	<0.4	0.14 J	<0.4	<0.4	<0.4	<0.4	0.27 J	<0.4	<0.4	<0.4	0.1 J	<0.4	0.2 J
DP19-13'	7/30/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	0.062 J	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
DP20-2'	7/30/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	0.1 J	0.085 J	0.11 J	<0.38	<0.38	<0.38	<0.38	0.099 J	<0.38	<0.38	<0.38	<0.38	0.25 J	<0.38	<0.38	<0.38	0.19 J	<0.38	0.19 J
DP20-14.5'	7/30/2001	<0.38	0.15 J	<0.38	0.062 J	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP23-2.5'	8/1/2001	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
DP23-9'	8/1/2001	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	NA	<0.43	<0.43	<0.43	<0.43	NA	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43
DP25-2.5'	8/7/2001	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
DP25-2.5' (Dup)	8/7/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
DP25-7.5'	8/7/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP29-5	11/9/2001	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
DP31-15	12/5/2001	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
DP36-19	12/5/2001	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
DP37-19	12/5/2001	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
DP37-19 (Dup)	12/5/2001	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
DP38-14.5	12/5/2001	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	0.062 J	NA	0.12 J	0.11 J	0.15 J	0.062 J	<0.36	<0.36	<0.36	0.12 J	<0.36	<0.36	<0.36	<0.36	0.27 J	<0.36	<0.36	<0.36	0.26 J	<0.36	0.24 J
DP56A-9.5-10.5'	3/15/2004	<170	<170	<170	<170	<170	<170	<170	NA	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170 *	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170	<170

APPENDIX A
Table A-2
Summary of Semivolatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1'-Biphenyl	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dimethylphenol	2-Methylnaphthalene	2-Methylphenol	3-Methylphenol	4-Methylphenol	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl) phthalat	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
DP58A-8.5-9.5'	3/15/2004	<21	<21	<21	<21	<21	<21	<21	NA	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21	<21
DP60A-6.6-7.4'	3/15/2004	<8.1	<8.1	<8.1	<8.1	<8.1	1.2 J	<8.1	NA	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1
DP61A-5-6'	3/15/2004	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	NA	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
DP61A-5-6' (Dup)	3/15/2004	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	NA	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9
DP64A-8.5-9.5'	3/15/2004	<18	<18	<18	<18	<18	<18	<18	NA	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18
DP66A-9.5-10.5'	3/15/2004	<19	<19	<19	<19	<19	<19	<19	NA	<19	<19	<19	<19	<19	<19	1.6 J	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19
DP67A-12.5-13.5'	3/15/2004	10 J	<35	<35	<35	<35	<35	<35	NA	<35	<35	<35	<35	<35	<35	9.3 J	<35	<35	<35	<35	<35	12 J B	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35
DP70A-9-11'	3/14/2004	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	0.68 J	<1.5	<1.5	<1.5	<1.5	<1.5	3.2 B	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
DP72A-12-13'	3/14/2004	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	NA	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	1 J	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2 *	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2
DP73A-12-13'	3/14/2004	0.67 J	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	NA	<7.2	<7.2	<7.2	<7.2	0.59 J	<7.2	2.1 J	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2
DP78A-9-10'	3/14/2004	39 J	2800	28 J	170	<50	<50	<50	NA	<50	<50	<50	<50	4.2 J	<50	<50	<50	<50	<50	<50	<50	<50 *	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
DP79A-12-13'	3/14/2004	4.2 J	11 J	<38	<38	<38	<38	<38	NA	<38	<38	<38	<38	5.9 J	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38	<38
STR01-3'	3/8/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR01-21'	3/8/2001	<0.37	0.17 J	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
STR01-73'	3/9/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR01-88'	3/9/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR02-1'	3/13/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	0.14 J	0.14 J	0.14 J	<0.4	<0.4	<0.4	<0.4	0.17 J	<0.4	<0.4	<0.4	<0.4	<0.4	0.42	<0.4	<0.4	<0.4	0.33 J	<0.4	0.36 J
STR02-12.5'	3/13/2001	<0.37	0.32 J	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
STR03-4'	3/14/2001	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR03-12.5'	3/14/2001	NA	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	NA	<18	<18	<18	<18	<18	150	NA	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18	<18
STR04-1.5'	3/19/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR04-17.5'	3/19/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR04-17.5' (Dup)	3/19/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	0.18 J	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
STR05-1.5'	3/10/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR05-11.3'	3/10/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
STR05-9'	3/10/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR06-1'	3/11/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
STR06-15'	3/11/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR07-1.5'	3/21/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR07-18'	3/21/2001	<0.38	0.61	<0.38	0.18 J	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR08-1.5'	3/26/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	0.14 J	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR08-13'	3/26/2001	<0.37	0.34 J	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
STR08-13' (Dup)	3/26/2001	<0.38	0.31 J	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR09-7.5'	4/4/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR10-1.5'	4/7/2001	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
STR10-11'	4/7/2001	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
STR11-2'	8/20/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR11-9'	8/20/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
STR11-9' (Dup)	8/20/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
T-1B2-8'	3/16/2004	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	0.055 J	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
T-1E-2-6'	3/16/2004	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
T-1N-6'	3/16/2004	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
T-1NE-4'	3/16/2004	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	0.054 J	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.033 J	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.075 J	<0.4	0.076 J	<0.4	<0.4	<0.4	<0.4
T-1W2-6'	3/16/2004	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
T-2-3	11/8/2001	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
T-2-9	11/8/2001	NA	0.28 J	<0.37	0.074 J	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
T-3-11	11/8/2001	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37

APPENDIX A
Table A-2
Summary of Semivolatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1'-Biphenyl	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dimethylphenol	2-Methylnaphthalene	2-Methylphenol	3-Methylphenol	4-Methylphenol	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl) phthalat	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
T-3-3	11/8/2001	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	0.084 J	<0.37	<0.37	<0.37	<0.37	<0.37	0.063 J
T-4-3	11/9/2001	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	0.07 J	<0.37	<0.37	<0.37	NA	0.064 J	<0.37	<0.37	<0.37	<0.37	0.098 J	<0.37	<0.37	<0.37	0.07 J	<0.37	0.068 J
T-4-9	11/9/2001	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
T-5-3	11/9/2001	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
T-5-9	11/9/2001	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
T-6-10	11/10/2001	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
T-6-3	11/10/2001	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
T-6-7.5	11/11/2001	NA	<86	<86	<86	<86	22 J	<86	<86	<86	<86	<86	<86	<86	<86	NA	<86	<86	<86	<86	<86	<86	NA	<86	<86	<86	<86	<86	<86	<86	<86	<86	<86	<86	<86
T-8-3	11/11/2001	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
T-8-9	11/11/2001	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
UAW01-30-1.5'	4/2/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	0.58	<0.38	<0.38	NA	1.5	<0.38	5.4	6.2	7	2.8	2.8	<0.38	0.48	5.9	0.82	0.32 J	<0.38	<0.38	14	0.61	2.7	<0.38	6.5	<0.38	11
UAW01-30-15'	4/2/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
UAW04-20-10'	3/23/2001	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	0.57	NA	0.46 #	<0.45	<0.45	<0.45	NA	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
UAW05-20-13'	3/23/2001	<0.38	3.3	<0.38	0.49	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
UAW06-20-1.5'	3/26/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
UAW06-20-11.5'	3/26/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
UAW08-20-13'	3/24/2001	NA	2.3	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	22	<2.4	NA	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	NA	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
UAW09-20-1.5'	3/27/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
UAW09-20-15'	3/27/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
UAW11-40-2'	4/17/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.17 J	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
UAW11-40-10'	4/17/2001	<0.37	0.12 J	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
UAW12-20-12'	3/24/2001	NA	14	0.26 J	1.3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
UAW13-20-1.5'	3/24/2001	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	0.26 J	0.23 J	0.24 J	0.14 J	<0.38	<0.38	NA	0.25 J	<0.38	<0.38	<0.38	<0.38	0.52	<0.38	0.13 J	<0.38	0.22 J	<0.38	0.38
UAW13-20-11.5'	3/24/2001	NA	0.25 J	<0.39	<0.39	<0.39	0.16 J	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	0.16 J	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
UAW14-10-1.5'	4/4/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
UAW15-20-2'	4/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
UAW15-20-2' (Dup)	4/9/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
UAW15-20-8.5'	4/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
UAW16-10-2'	8/22/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
UAW16-10-5.5'	8/22/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	0.13 J	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
UAW17-40-1.5'	4/5/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
UAW17-40-5'	4/5/2001	<8.4	<8.4	<8.4	<8.4	24	3.1 J	15	NA	35 #	<8.4	3.3 J	<8.4	NA	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	<8.4	3.5 J	<8.4	<8.4	4.6 J	4.3 J	<8.4	3.8 J	9.8	13	4.3 J
UAW18-20-1'	8/23/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
UAW18-20-15'	8/23/2001	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
UAW19-80-1.5'	4/6/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
UAW19-80-15'	4/6/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
UAW20-60-1.5'	4/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
UAW20-60-9.5'	4/9/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
UAW21-30-1.5'	4/11/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
UAW21-30-10'	4/11/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
UAW22-20-2'	9/5/2001	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	NA	<0.73	<0.73	<0.73	<0.73	NA	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	0.17 J	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73
UAW22-20-11'	9/5/2001	<0.37	0.071 J	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
Background Soil																																			
B01-1.5'	10/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
B01-11.5'	10/9/2001	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	NA	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
B02-1.5'	10/9/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38

APPENDIX A
Table A-2
Summary of Semivolatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1'-Biphenyl	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dimethylphenol	2-Methylnaphthalene	2-Methylphenol	3-Methylphenol	4-Methylphenol	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl) phthalat	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
B02-11.5'	10/9/2001	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	NA	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
B03-1.5'	10/9/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
B03-11.5'	10/9/2001	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	NA	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
B04-1.5'	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	0.06 J	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
B04-1.5' (Dup)	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	0.063 J	0.076 J	0.1 J	0.072 J	<0.35	<0.35	<0.35	0.082 J	<0.35	<0.35	<0.35	<0.35	0.15 J	<0.35	<0.35	<0.35	0.096 J	<0.35	0.14 J
B04-11.5'	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
B05-1.5'	10/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
B05-11.5'	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
B06-1.5'	10/9/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	0.12 J	0.19 J	0.18 J	0.16 J	0.096J	<0.38	<0.38	0.14 J	<0.38	<0.38	<0.38	<0.38	0.19 J	<0.38	0.15 J	<0.38	0.12 J	<0.38	0.19 J
B06-11'	10/9/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
B07-1'	10/9/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
B07-9'	10/9/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
B08-2'	10/9/2001	<19	<19	<19	<19	<19	4.3 J	<19	NA	<19	37	<19	<19	<19	26	<19	36	24	29	9.2 J	18 J	<19	4.4 J	37	3.5 J	26	<19	<19	120	32	9.2 J	3 J	110	<19	83
B08-9'	10/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	0.23 J	<0.37	NA	<0.37	0.3 J	<0.37	<0.37	<0.37	0.15 J	<0.37	0.14 J	0.08J	0.094J	<0.37	<0.37	<0.37	<0.37	0.14 J	<0.37	0.33 J	<0.37	<0.37	0.51	0.32 J	<0.37	0.088 J	0.68	<0.37	0.35 J
B09-2'	10/9/2001	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	NA	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	0.18 J	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43
B09-10'	10/9/2001	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
B10-2'	10/9/2001	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	NA	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
B10-11'	10/9/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4

APPENDIX A
Table A-2
Summary of Semivolatile Organic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1'-Biphenyl	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dimethylphenol	2-Methylnaphthalene	2-Methylphenol	3-Methylphenol	4-Methylphenol	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl) phthalat	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
Creek Bed Sediment																																			
CS-1	3/6/2002	NA	<0.4	NA	<0.4	NA	NA	<0.4	NA	<0.4	NA	NA	NA	<0.4	NA	<0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS-1A	3/25/2004	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	0.038 J	<0.39	<0.39	0.048 J	NA	<0.39	<0.39	<0.39	<0.39	<0.39	0.044 J	<0.39	<0.39	<0.39	<0.39	<0.39	0.028 J
CS-2	3/6/2002	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS-2A	3/26/2004	NA	<1.9	<1.9	<1.9	<1.9	0.25 J	<1.9	<1.9	<1.9	0.25 J	0.3 J	<1.9	<1.9	1.3 J	NA	1.4 J	1.2 J	1.3 J	0.63 J	0.62 J	<1.9	NA	1.7 J	0.19 J	0.47 J	<1.9	<1.9	4.6	0.9 J	0.58 J	0.7 J	4.8	<1.9	3.1
CS-3	3/6/2002	NA	<0.38	NA	<0.38	NA	NA	<0.38	NA	<0.38	NA	NA	NA	<0.38	NA	<0.38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS-3A	3/26/2004	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	0.24 J #	0.24 J #	<0.41	<0.41	<0.41	<0.41	0.045J	NA	0.14 J	0.18 J	0.23 J	0.14 J	0.12 J	0.098J	NA	0.25 J	0.031 J	<0.41	0.04 J	0.022 J	0.56	<0.41	0.12 J	<0.41	0.27 J	<0.41	0.39 J
CS-4	3/6/2002	NA	0.16 J	NA	<0.4	NA	NA	<0.4	NA	<0.4	<0.4	NA	NA	<0.4	NA	<0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.4	<0.4
CS-4A	3/26/2004	NA	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	<0.47	0.042J	NA	0.2 J	0.24 J	0.32 J	0.19 J	0.15 J	0.13 J	NA	0.32 J	0.049 J	<0.47	<0.47	<0.47	0.64	<0.47	0.16 J	<0.47	0.27 J	<0.47	0.46 J
CS-5	3/6/2002	NA	<0.38	NA	<0.38	NA	NA	<0.38	NA	<0.38	NA	NA	NA	<0.38	NA	<0.38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS-5A	3/25/2004	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	0.027 J	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	0.027 J	<0.36	<0.36	<0.36	<0.36	<0.36	0.021 J
CS-6	3/6/2002	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS-6A	3/25/2004	NA	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	0.033J	NA	0.087J	0.1J	0.14 J	0.067J	0.054J	0.034J	NA	0.16 J	<0.42	<0.42	<0.42	<0.42	0.37 J	<0.42	0.06 J	<0.42	0.23 J	<0.42	0.26 J
CS-6A (Dup)	3/25/2004	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	0.037J	NA	0.11 J	0.12J	0.13 J	0.07J	0.09J	0.03J	NA	0.18 J	<0.41	<0.41	<0.41	<0.41	0.4 J	<0.41	0.06 J	<0.41	0.2 J	<0.41	0.28 J
CS-7	3/6/2002	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS-7 (Dup)	3/6/2002	NA	<0.4	NA	<0.4	NA	NA	<0.4	NA	<0.4	NA	NA	NA	<0.4	NA	<0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS-8	3/6/2002	NA	<0.4	NA	<0.4	NA	NA	<0.4	NA	<0.4	NA	NA	NA	<0.4	NA	<0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Creek Bank Sediment																																			
SS-1	10/11/2001	NA	0.13 J	NA	<0.4	NA	NA	<0.4	NA	<0.4	NA	NA	NA	<0.4	NA	<0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-2	10/11/2001	NA	<0.38	NA	<0.38	NA	NA	<0.38	NA	<0.38	NA	NA	NA	<0.38	NA	<0.38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-3	10/11/2001	NA	<0.43	NA	<0.43	NA	NA	<0.43	NA	<0.43	NA	NA	NA	<0.43	NA	<0.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-4	10/11/2001	NA	<0.4	NA	<0.4	NA	NA	<0.4	NA	<0.4	NA	NA	NA	<0.4	NA	<0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-5 ~25' South	10/11/2001	NA	0.17 J	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-5 (Dup)	10/11/2001	NA	0.2 J	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-6	10/11/2001	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-7	10/11/2001	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-8	10/11/2001	NA	<0.43	NA	<0.43	NA	NA	<0.43	NA	<0.43	NA	NA	NA	<0.43	NA	<0.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-9	10/11/2001	NA	<0.42	NA	<0.42	NA	NA	<0.42	NA	<0.42	NA	NA	NA	<0.42	NA	<0.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-10	10/11/2001	NA	<0.39	NA	<0.39	NA	NA	<0.39	NA	<0.39	NA	NA	NA	<0.39	NA	<0.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-11	10/11/2001	NA	<0.43	NA	<0.43	NA	NA	<0.43	NA	<0.43	NA	NA	NA	<0.43	NA	<0.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-12	10/11/2001	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	NA	<0.41	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.

* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level

The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds. Please refer to Appendix D of the Supplemental RI for excerpts from the Quality Assurance Review (Environmental Standards, 2004) and to review data qualification of "non-detect" results.

APPENDIX A
Table A-3
Summary of Pesticide and Polychlorinated Biphenyl Detections in Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	beta-BHC	gamma-BHC (Lindane	alpha-Chlordane	gamma-Chlordane	Chlorobenzilate	Diallate	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
On-Site Soil																												
DP01-2'	7/24/2001	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	<0.038	<0.038	<0.038	<0.038	<0.038	<0.038
DP01-9.5'	7/24/2001	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	NA	NA	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	NA	<0.019	<0.039	<0.039	<0.039	<0.039	0.016 J
DP02-2'	7/24/2001	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	NA	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	<0.0076	<0.038	<0.038	<0.038	0.038	<0.038
DP02-9.5'	7/24/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
DP03-2'	7/24/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
DP03-8.5'	7/24/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	<0.0035	<0.035	<0.035	<0.035	<0.035	<0.035
DP05-1'	7/25/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
DP05-8.5'	7/25/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
DP07-9'	7/26/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
DP08-6'	7/26/2001	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	NA	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	0.0017 J	<0.042	<0.042	<0.042	<0.042	<0.042
DP08-11'	7/26/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
DP09-12'	7/27/2001	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	NA	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	<0.0076	<0.38	<0.38	<0.38	<0.38	<0.38
DP10-2'	7/27/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0037	<0.037	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037
DP10-10'	7/27/2001	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA	NA	<0.38	<3.8	<0.2	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.2	<0.38	<0.38	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8
DP10-10' (Dup)	7/27/2001	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	0.0038 J	<0.0039	NA	NA	<0.0075	<0.075	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	<0.0039	<0.0039	<0.0075	<0.0075	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP12-1.5'	7/28/2001	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	NA	NA	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	NA	<0.0068	<0.034	<0.034	<0.034	<0.034	<0.034
DP12-9'	7/28/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
DP13-3'	7/29/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0039	<0.039	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0039	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
DP13-11'	7/29/2001	<2	<2	<2	<2	<2	<2	<2	NA	NA	10 PG	<39	<2	<2	<2	<2	<2	<2	NA	<2	<2	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
DP14-3'	7/29/2001	<0.89	<0.89	<0.89	<0.89	<0.89	<0.89	<0.89	NA	NA	<1.7	<17	<0.89	<0.89	<0.89	<0.89	<0.89	<0.89	NA	<0.89	<0.89	<1.7	<1.7	<69	<69	<69	<69	<69
DP14-9'	7/29/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	NA	<0.75	<7.5	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.75	<0.75	<75	<75	<75	<75	<75
DP15-2'	7/29/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	NA	<0.76	<7.6	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.76	<0.76	<1.9	<1.9	<1.9	<1.9	<1.9
DP15-9'	7/29/2001	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	<0.04	<0.4	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	<0.02	<0.02	<0.04	<0.04	<40	<40	<40	<40	<40
DP16-2.8'	7/30/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0035	<0.035	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	<0.0018	<0.0018	<0.0035	<0.0035	<0.035	<0.035	<0.035	<0.035	<0.035
DP16-12.5'	7/30/2001	<0.99	<0.99	0.78 J	<0.99	<0.99	<0.99	<0.99	NA	NA	<1.9	<19	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	NA	<0.99	<0.99	<1.9	4.5 PG	<19	<19	<19	<19	<19
DP17-3'	7/30/2001	<0.002	0.0018 J	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.0039	<0.039	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.002	<0.002	<0.0039	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
DP17-13'	7/30/2001	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	NA	NA	<2.2	<22	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	NA	<1.1	<1.1	<2.2	<2.2	<22	<22	<22	<22	<22
DP18-2'	7/30/2001	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	NA	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	<0.0075	<0.038	<0.038	<0.038	<0.038	<0.038
DP18-14.5'	7/30/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
DP19-2'	7/30/2001	<0.0021	0.0017 J	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	0.021 J
DP19-13'	7/30/2001	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	NA	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	<0.0073	<0.036	<0.036	<0.036	<0.036	<0.036
DP20-2'	7/30/2001	<0.0019	0.0037	0.0081	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0038	<0.038	<0.038	<0.038	0.047	<0.038
DP20-14.5'	7/30/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
DP23-2.5'	8/1/2001	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	NA	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	<0.0042	<0.042	<0.042	<0.042	<0.042	<0.042
DP23-9'	8/1/2001	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	NA	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	<0.0043	<0.043	<0.043	<0.043	<0.043	<0.043
DP25-2.5'	8/7/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
DP25-2.5' (Dup)	8/7/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
DP25-7.5'	8/7/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
DP29-5	11/9/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
DP31-15	12/5/2001	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	NA	NA	<0.04	<0.078	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	NA	<0.004	<0.004	<0.0078	<0.0078	<0.039	<0.039	<0.039	0.06	<0.039
DP36-19	12/5/2001	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	NA	<0.038	<0.074	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	<0.0038	<0.0038	<0.0074	<0.0074	<0.037	<0.037	<0.037	<0.037	<0.037
DP37-19	12/5/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.019	<0.036	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0036	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
DP37-19 (Dup)	12/5/2001	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	NA	<0.037	<0.073	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	<0.0037	<0.0037	<0.0073	<0.0073	<0.036	<0.036	<0.036	<0.036	0.025 J
DP38-14.5	12/5/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.019	<0.036	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0036	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
DP56A-9.5-10.5'	3/15/2004	0.16 J	2	3.9 PG	<0.43	<0.43	<0.43	<0.43	0.14 J	1.7	NA	NA	<0.43	<0.43	1.9 PG	<0.43	0.92 PG	<0.43	1 PG	<0.43	<0.43	NA	5.5 PG	<0.41	<0.41	<0.41	<0.41	<0.41

APPENDIX A
Table A-3
Summary of Pesticide and Polychlorinated Biphenyl Detections in Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	beta-BHC	gamma-BHC (Lindane	alpha-Chlordane	gamma-Chlordane	Chlorobenzilate	Diallate	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
DP58A-8.5-9.5'	3/15/2004	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	NA	NA	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	NA	<0.21	<0.042	<0.042	<0.042	<0.042	<0.042
DP60A-6.6-7.4'	3/15/2004	0.05 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.26 PG	NA	NA	<0.1	<0.1	<0.1	0.055 J	<0.1	<0.1	0.37 PG	<0.1	<0.1	NA	0.17 J	<0.04	<0.04	<0.04	<0.04	<0.04
DP61A-5-6'	3/15/2004	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	NA	NA	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	NA	<0.4	<0.04	<0.04	<0.04	<0.04	<0.04
DP61A-5-6' (Dup)	3/15/2004	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA	NA	<0.2	<0.2	<0.2	<0.2	0.095 J	<0.2	<0.2	<0.2	<0.2	NA	<0.4	<0.04	<0.04	<0.04	<0.04	<0.04
DP64A-8.5-9.5'	3/15/2004	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	NA	NA	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	NA	<0.37	<0.037	<0.037	<0.037	<0.037	<0.037
DP66A-9.5-10.5'	3/15/2004	<0.19	<0.19	<0.19	0.26 PG	<0.19	<0.19	<0.19	<0.19	0.023 J	NA	NA	0.064 J	0.75 PG	<0.19	0.12 J	0.96 PG	<0.19	<0.19	<0.19	<0.19	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
DP67A-12.5-13.5'	3/15/2004	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	0.68 J PG	NA	NA	<0.9	<0.9	29 PG	<0.9	3.1	<0.9	<0.9	<0.9	<0.9	NA	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
DP70A-9-11'	3/14/2004	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	NA	NA	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	NA	<0.38	<0.038	<0.038	<0.038	<0.038	<0.038
DP72A-12-13'	3/14/2004	<0.18	0.064 J	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	0.16 J PG	NA	NA	<0.18	0.54 PG	<0.18	<0.18	<0.18	<0.18	0.3 PG	<0.18	<0.18	NA	<0.36	<0.036	<0.036	<0.036	<0.036	<0.036
DP73A-12-13'	3/14/2004	0.04 J	0.095 J	<0.19	0.098 J	<0.19	0.25 PG	<0.19	<0.19	0.089 J	NA	NA	0.059 J	<0.19	<0.19	<0.19	<0.19	0.22 PG	<0.19	<0.19	0.066 J	NA	0.11 J	<0.036	<0.036	<0.036	<0.036	<0.036
DP78A-9-10'	3/14/2004	<0.13	<0.13	<0.13	<0.13	0.2 PG	0.18 PG	<0.13	<0.13	0.7 PG	NA	NA	<0.13	0.14	1 PG	0.36	0.034 J	<0.13	0.35 PG	<0.13	<0.13	NA	0.78 PG	<0.05	<0.05	<0.05	<0.05	<0.05
DP79A-12-13'	3/14/2004	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	0.16	<0.098	<0.098	NA	NA	0.03 J	<0.098	0.032 J	0.48 PG	0.067 J PG	<0.098	<0.098	0.074 J	<0.098	NA	<0.19	<0.038	<0.038	<0.038	<0.038	<0.038
STR01-3'	3/8/2001	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	<0.038	<0.038	0.063	<0.038	<0.038	<0.038
STR01-21'	3/8/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	0.0017 J	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0037	<0.07	0.26	<0.07	<0.07	<0.07
STR01-73'	3/9/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.004	<0.04	0.12	<0.04	<0.04	<0.04
STR01-88'	3/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0038	<0.038	0.48	<0.038	<0.038	<0.038
STR02-1'	3/13/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
STR02-12.5'	3/13/2001	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	NA	NA	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	NA	<0.019	<0.037	<0.037	<0.037	<0.037	<0.037
STR03-4'	3/14/2001	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	NA	NA	<0.079	<0.15	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	NA	<0.0079	<0.0079	<0.015	<0.015	<0.038	<0.038	<0.038	<0.038	<0.038
STR03-12.5'	3/14/2001	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	NA	NA	<0.74	<1.4	<0.074	<0.074	<0.074	<0.074	<0.074	0.19 PG	NA	<0.074	<0.074	<0.14	<0.14	<1.8	<1.8	<1.8	<1.8	<1.8
STR04-1.5'	3/19/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
STR04-17.5'	3/19/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
STR04-17.5' (Dup)	3/19/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
STR05-1.5'	3/10/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
STR05-9'	3/10/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
STR05-11.3'	3/10/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
STR06-1'	3/11/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
STR06-15'	3/11/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
STR07-1.5'	3/21/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	0.003 J	<0.04	<0.04	<0.04	<0.04	<0.04
STR07-18'	3/21/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
STR08-1.5'	3/26/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
STR08-13'	3/26/2001	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	NA	NA	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	NA	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037
STR08-13' (Dup)	3/26/2001	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	NA	NA	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	NA	<0.075	<0.038	<0.038	<0.038	<0.038	<0.038
STR09-7.5'	4/4/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
STR10-1.5'	4/7/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.019	<0.038	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0038	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
STR10-11'	4/7/2001	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	NA	<0.022	<0.042	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	<0.0022	<0.0022	<0.0042	<0.0042	<0.042	<0.042	<0.042	<0.042	<0.042
STR11-2'	8/20/2001	<0.002	0.0041 PG	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0025 PG	NA	NA	0.0041 PG	<0.002	<0.002	0.0028 PG	<0.002	0.0032 PG	0.0017 J	<0.002	<0.002	NA	<0.004	<0.04	<0.04	<0.04	0.37	<0.04
STR11-9'	8/20/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
STR11-9' (Dup)	8/20/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
T-1B2-8'	3/16/2004	0.0032 PG	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	0.0018 J	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
T-1E-2-6'	3/16/2004	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
T-1N-6'	3/16/2004	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
T-1NE-4'	3/16/2004	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	NA	NA	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	NA	<0.4	<0.04	<0.04	<0.04	<0.04	0.02 J
T-1W2-6'	3/16/2004	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
T-2-3	11/8/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.021	<0.04	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.004	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
T-2-9	11/8/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.019	<0.037	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
T-3-11	11/8/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.019	<0.037	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037

APPENDIX A
Table A-3
Summary of Pesticide and Polychlorinated Biphenyl Detections in Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	beta-BHC	gamma-BHC (Lindane	alpha-Chlordane	gamma-Chlordane	Chlorobenzilate	Diallate	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
T-3-3	11/8/2001	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	NA	<0.038	<0.074	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	<0.0038	<0.0038	<0.0074	<0.0074	<0.037	<0.037	0.011 J	<0.037	<0.037
T-4-3	11/9/2001	<0.0019	0.0016 J	0.0022	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0037	<0.037	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
T-4-9	11/9/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0036	<0.036	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	<0.0018	<0.0018	<0.0036	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
T-5-3	11/9/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.004	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.002	<0.002	<0.004	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
T-5-9	11/9/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.004	<0.04	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.002	<0.002	<0.004	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
T-6-10	11/10/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.019	<0.036	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0036	<0.0036	<0.036	<0.036	<0.036	0.024 J	<0.036
T-6-3	11/10/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.021	<0.04	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.004	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
T-6-7.5	11/11/2001	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	NA	NA	<0.97	<1.9	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	NA	<0.098	<0.098	<0.19	<0.19	<4.8	<4.8	<4.8	<4.8	<4.8
T-8-3	11/11/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.021	<0.042	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0042	<0.0042	<0.042	<0.042	<0.042	<0.042	<0.042
T-8-9	11/11/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.019	<0.036	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0036	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
UAW01-30-1.5'	4/2/2001	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	NA	NA	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	NA	<0.019	<0.038	<0.038	<0.038	<0.038	0.012 J
UAW01-30-15'	4/2/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	<0.0035	<0.035	<0.035	<0.035	<0.035	<0.035
UAW04-20-10'	3/23/2001	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	NA	NA	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	NA	<0.22	<0.045	<0.045	<0.045	<0.045	<0.045
UAW05-20-13'	3/23/2001	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	NA	NA	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	NA	<0.19	0.016 J	<0.038	<0.038	<0.038	<0.038
UAW06-20-1.5'	3/26/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
UAW06-20-11.5'	3/26/2001	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	NA	NA	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	NA	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037
UAW08-20-13'	3/24/2001	<0.095	<0.095	<0.095	<0.095	<0.095	<0.095	<0.095	NA	NA	<0.95	<1.8	<0.095	<0.095	<0.095	<0.095	<0.095	<0.095	NA	<0.095	<0.095	<0.18	<0.18	0.016 J	<0.037	<0.037	<0.037	<0.037
UAW09-20-1.5'	3/27/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
UAW09-20-15'	3/27/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	<0.0035	<0.035	<0.035	<0.035	<0.035	<0.035
UAW11-40-2'	4/17/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
UAW11-40-10'	4/17/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
UAW12-20-12'	3/24/2001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	<1	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.2	<0.2	<0.04	0.26	<0.04	<0.04	<0.04
UAW13-20-1.5'	3/24/2001	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	NA	NA	<0.39	<0.76	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	NA	<0.039	<0.039	<0.076	<0.076	<0.038	<0.038	<0.038	<0.038	0.028 J
UAW13-20-11.5'	3/24/2001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	<1	<2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.2	<0.2	<0.039	<0.039	<0.039	<0.039	<0.039
UAW14-10-1.5'	4/4/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
UAW15-20-2'	4/9/2001	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	NA	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	<0.0073	<0.037	<0.037	<0.037	<0.037	<0.037
UAW15-20-2' (Dup)	4/9/2001	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	NA	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	<0.0073	<0.036	<0.036	<0.036	<0.036	<0.036
UAW15-20-8.5'	4/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
UAW16-10-2'	8/22/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
UAW16-10-5.5'	8/22/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
UAW17-40-1.5'	4/5/2001	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097	NA	NA	<0.0097	<0.0097	<0.0097	0.012 PG	<0.0097	0.01 PG	<0.0097	<0.0097	<0.0097	NA	<0.019	<0.38	<0.38	<0.38	0.98	<0.38
UAW17-40-5'	4/5/2001	<0.11	0.2	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	NA	NA	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	NA	<0.21	<0.042	<0.042	<0.042	0.071	<0.042
UAW18-20-1'	8/23/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
UAW18-20-15'	8/23/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	0.0023	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
UAW19-80-1.5'	4/6/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
UAW19-80-15'	4/6/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
UAW20-60-1.5'	4/9/2001	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	NA	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	<0.0074	<0.037	<0.037	<0.037	<0.037	0.011 J
UAW20-60-9.5'	4/9/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
UAW21-30-1.5'	4/11/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
UAW21-30-10'	4/11/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
UAW22-20-2'	9/5/2001	0.00064 J	0.00074 J	0.0027	<0.0019	<0.0019	<0.0019	<0.0019	0.00083 J	0.00047 J	NA	NA	0.0012 J	<0.0019	0.0015 J	<0.0019	0.0021	0.0013 J	<0.0019	<0.0019	0.0001 J	NA	<0.0037	<0.037	<0.037	<0.037	0.26	<0.037
UAW22-20-11'	9/5/2001	<0.0019	0.0002 J	0.00065 J	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	0.00015 J	<0.0019	<0.0019	<0.0019	0.00048 J	0.0013 J	<0.0019	<0.0019	<0.0019	NA	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
Background Soil																												
B01-1.5'	10/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
B01-11.5'	10/9/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0034	<0.0034	<0.034	<0.034	<0.034	<0.034	<0.034
B02-1.5'	10/9/2001	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	NA	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0075	<0.0075	<0.038	<0.038	<0.038	<0.038	<0.038

APPENDIX A
Table A-3
Summary of Pesticide and Polychlorinated Biphenyl Detections in Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	beta-BHC	gamma-BHC (Lindane	alpha-Chlordane	gamma-Chlordane	Chlorobenzilate	Diallate	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
B02-11.5'	10/9/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0034	<0.0034	<0.034	<0.034	<0.034	<0.034	<0.034
B03-1.5'	10/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0038	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
B03-11.5'	10/9/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0034	<0.0034	<0.034	<0.034	<0.034	<0.034	<0.034
B04-1.5'	10/9/2001	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	NA	NA	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0071	<0.0071	<0.035	<0.035	<0.035	<0.035	<0.035
B04-1.5' (Dup)	10/9/2001	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	NA	NA	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0071	<0.0071	<0.035	<0.035	<0.035	<0.035	<0.035
B04-11.5'	10/9/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0035	<0.0035	<0.035	<0.035	<0.035	<0.035	<0.035
B05-1.5'	10/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
B05-11.5'	10/9/2001	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	NA	NA	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	<0.0035	<0.0035	<0.035	<0.035	<0.035	<0.035	<0.035
B06-1.5'	10/9/2001	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	NA	0.041	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0075	<0.0075	<0.038	<0.038	<0.038	<0.038	0.015 J
B06-11'	10/9/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0038	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038
B07-1'	10/9/2001	<0.004	0.0015 J	<0.004	0.11	<0.004	<0.004	<0.004	<0.004	<0.004	NA	NA	0.055	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0054 J	<0.0077	<0.039	<0.039	<0.039	0.11	<0.039
B07-9'	10/9/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0039	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
B08-2'	10/9/2001	<0.02	0.019 J	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	0.031	<0.02	<0.02	<0.02	<0.02	<0.02	0.13	<0.02	<0.02	<0.038	<0.038	<0.038	<0.038	<0.038	<0.038	<0.038
B08-9'	10/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
B09-2'	10/9/2001	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	NA	NA	0.015	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0087	<0.0087	<0.043	<0.043	<0.043	<0.043	0.24
B09-10'	10/9/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0041	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
B10-2'	10/9/2001	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	NA	NA	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0022	<0.0044	<0.0044	<0.044	<0.044	<0.044	<0.044	<0.044
B10-11'	10/9/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
Creek Bed Sediment																												
CS1	3/6/2002	<0.0021	0.0014 J	0.0056	0.001 J	<0.0021	<0.0021	NA	<0.0021	NA	NA	NA	0.0022 PG	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.004	NA	NA	NA	NA	NA	NA
CS-1A	3/25/2004	<0.004	0.0016 J	<0.004	<0.004	<0.004	<0.004	<0.004	NA	NA	0.0087 J	0.032 J	0.002 J	<0.004	<0.004	<0.004	<0.004	<0.004	NA	<0.004	<0.004	<0.0078	0.0034 J	<0.039	<0.039	0.07	<0.039	<0.039
CS2	3/6/2002	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	NA	<0.0043	NA	NA	NA	<0.0043	<0.0043	<0.0043	NA	<0.0043	<0.0043	0.0014 J	<0.0043	<0.0043	<0.0083	NA	NA	NA	NA	NA	NA
CS-2A	3/26/2004	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	<0.038	<0.38	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	<0.02	<0.02	<0.038	<0.038	<0.038	<0.038	<0.038	<0.038	<0.038
CS3	3/6/2002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.002	NA	NA	NA	<0.002	<0.002	<0.002	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0038	NA	NA	NA	NA	NA	NA
CS-3A	3/26/2004	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	NA	NA	<0.21	<2.1	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	NA	<0.11	<0.11	<0.21	<0.21	<0.041	<0.041	<0.041	0.1	<0.041
CS4	3/6/2002	<0.002	0.0012 J	<0.002	<0.002	<0.002	0.01 PG	<0.002	<0.002	NA	NA	NA	0.0038 PG	<0.002	<0.002	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	NA	NA	NA	NA	NA	NA
CS-4A	3/26/2004	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	NA	NA	<0.047	<0.47	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	NA	<0.024	<0.024	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047
CS5	3/6/2002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.002	NA	NA	NA	<0.002	<0.002	<0.002	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0038	NA	NA	NA	NA	NA	NA
CS-5A	3/25/2004	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	NA	<0.037	<0.072	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	<0.0037	<0.0037	<0.0072	<0.0072	<0.036	<0.036	0.023 J	<0.036	<0.036
CS6	3/6/2002	<0.0021	0.00091 J	<0.0021	<0.0021	<0.0021	0.0046 PG	NA	<0.0021	NA	NA	NA	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0041	NA	NA	NA	NA	NA	NA
CS-6A	3/25/2004	<0.0043	0.0018 J	<0.0043	<0.0043	<0.0043	0.0046	<0.0043	NA	NA	0.024 J	0.029 J	0.024	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	NA	<0.0043	<0.0043	<0.0083	0.0056 J	<0.042	<0.042	0.06	<0.042	<0.042
CS-6A (Dup)	3/25/2004	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	NA	NA	<0.042	<0.082	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	NA	<0.0042	<0.0042	<0.0082	0.004 J	<0.041	<0.041	0.015 J	<0.041	<0.041
CS7	3/6/2002	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	NA	NA	NA	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0041	NA	NA	NA	NA	NA	NA
CS7 (Dup)	3/6/2002	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	NA	NA	NA	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.004	NA	NA	NA	NA	NA	NA
CS8	3/6/2002	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	NA	NA	NA	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.004	NA	NA	NA	NA	NA	NA
Creek Bank Sediment																												
SS-1	10/11/2001	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	NA	<0.0041	NA	NA	NA	<0.0041	<0.0041	<0.0041	NA	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0079	NA	NA	NA	NA	NA	NA
SS-2	10/11/2001	<0.0039	<0.0039	0.004	<0.0039	<0.0039	<0.0039	NA	<0.0039	NA	NA	NA	<0.0039	<0.0039	<0.0039	NA	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0075	NA	NA	NA	NA	NA	NA
SS-3	10/11/2001	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	NA	<0.022	NA	NA	NA	<0.022	<0.022	<0.022	NA	<0.022	<0.022	<0.022	<0.022	<0.022	<0.043	NA	NA	NA	NA	NA	NA
SS-4	10/11/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	0.094 PG	NA	<0.0021	NA	NA	NA	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.004	NA	NA	NA	NA	NA	NA
SS-5 ~25' South	10/11/2001	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	NA	<0.021	NA	NA	NA	<0.021	<0.021	<0.021	NA	<0.021	<0.021	<0.021	<0.021	<0.021	<0.041	NA	NA	NA	NA	NA	NA
SS-5 (Dup)	10/11/2001	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	NA	<0.021	NA	NA	NA	<0.021	<0.021	<0.021	NA	<0.021	<0.021	<0.021	<0.021	<0.021	<0.041	NA	NA	NA	NA	NA	NA
SS-6	10/11/2001	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	NA	<0.0043	NA	NA	NA	<0.0043	<0.0043	<0.0043	NA	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	<0.0083	NA	NA	NA	NA	NA	NA
SS-7	10/11/2001	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	NA	<0.021	NA	NA	NA	<0.021	<0.021	<0.021	NA	<0.021	<0.021	<0.021	<0.021	<0.021	<0.041	NA	NA	NA	NA	NA	NA
SS-8	10/11/2001	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	NA	<0.022	NA	NA	NA	<0.022	<0.022	<0.022	NA	<0.022	<0.022	<0.022	<0.022	<0.022	<0.043	NA	NA	NA	NA	NA	NA

APPENDIX A
Table A-3
Summary of Pesticide and Polychlorinated Biphenyl Detections in Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	beta-BHC	gamma-BHC (Lindane	alpha-Chlordane	gamma-Chlordane	Chlorobenzilate	Diallate	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SS-9	10/11/2001	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	NA	<0.022	NA	NA	NA	<0.022	<0.022	<0.022	NA	<0.022	<0.022	<0.022	<0.022	<0.022	<0.042	NA	NA	NA	NA	NA	NA
SS-10	10/11/2001	<0.004	0.0046 PG	<0.004	<0.004	<0.004	<0.004	NA	<0.004	NA	NA	NA	<0.004	<0.004	<0.004	NA	<0.004	<0.004	<0.004	<0.004	<0.004	<0.0078	NA	NA	NA	NA	NA	NA
SS-11	10/11/2001	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	NA	<0.0044	NA	NA	NA	<0.0044	<0.0044	<0.0044	NA	<0.0044	<0.0044	<0.0044	<0.0044	<0.0044	<0.0085	NA	NA	NA	NA	NA	NA
SS-12	10/11/2001	<0.021	0.023 PG	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	NA	NA	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.041	<0.041	NA	NA	NA	NA	NA

Notes:
J = Estimated result; result is less than reporting limit
PG = The percentage difference between the original and confirmation analyses is greater than 40%
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<0.021 = Indicates constituent not detected at or above indicated detection limit.

APPENDIX A
Table A-4
Summary of Inorganic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
On-Site Soil																												
DP01-2'	7/24/2001	NA	<58	7090 J	<1.2	5.7	51.5	0.44 B	0.25	21600	8.4	5 B	13.3	<0.58	11100	22.6	7180	302	0.012 B	10.8	569 B J	0.68	<0.58	<581	<1.2	NA	14.9	37.2
DP01-9.5'	7/24/2001	NA	64	8580 J	<1.2	7.2	55.3	0.5 B	0.84	10400	15.4	6.1	20.4	<0.58	16400	36.7	3000	430	0.022 B	15.8	648 J	0.68	<0.58	<585	<1.2	NA	19.4	84
DP02-2'	7/24/2001	NA	63	7260 J	<1.2	6	62.6	0.47 B	0.4	29900	11	5.7 B	18.5	<0.58	11900	25.8	8390	265	0.052 B	11.3	642 J	0.63	<0.58	<576	<1.2	NA	16.1	56
DP02-9.5'	7/24/2001	NA	<63	11800 J	<1.3	9.2	72.8	0.67	0.52	8390	16.6	10.4	23.2	<0.63	25300	18.2	4290	484	0.023 B	25.1	1110 J	0.87	<0.63	112 B	<1.3	NA	23	69
DP03-2'	7/24/2001	NA	64	6390 J	<1.2	5.4	51.3	0.41 B	0.21 B	16100	9	5.8	10	<0.58	11500	11.5	2880	533	0.026 B	9.6	666 J	0.49 B	<0.58	<584	<1.2	NA	14.6	39.6
DP03-8.5'	7/24/2001	NA	<53	4640 J	<1.1	8	57.4	0.44 B	0.42	107000	8.2	10.3	11	<0.53	16900	13.4	21000	1120	0.012 B	9.7	506 B J	0.52 B	<0.53	101 B	<1.1	NA	16.2	29.2
DP05-1'	7/25/2001	NA	<59	9420 J	<1.2	8.1	56.9	0.56 B	0.33	38100	12.8	5.8 B	15.4	<0.59	16900	19.9	13200	322	0.025 B	14.3	1050 J	0.66	<0.59	<592	<1.2	NA	19.5	52.6
DP05-8.5'	7/25/2001	NA	54 B	8990 J	<1.1	7.5	85.9	0.51 B	0.47	64000	12.2	8.6	16.5	<0.57	19500	9.3	22000	472	0.016 B	19.2	1670 J	0.68	<0.57	92.3 B	<1.1	NA	17.9	50.9
DP07-9'	7/26/2001	NA	170	8220 J	<1.2	4.4	44	0.46 B	0.4	102000	10.6	6.6	14.5	<0.58	16800	8.1	20800	325	<0.12	14.6	1560 J	0.37 B	<0.58	146 B	<1.2	NA	15.4	43.7
DP08-6'	7/26/2001	NA	180	14100 J	<1.3	10.2	92.8	0.73	0.4	12700	16.3	9.7	21.5	<0.64	25500	15.1	6140	429	0.026 B	20.6	1290 J	0.69	<0.64	<640	<1.3	NA	28.8	59.2
DP08-11'	7/26/2001	NA	180	8070 J	<1.2	5	40.9	0.55 B	0.17 B	6140	11.6	6.3	9.7	1.3	12800	11.6	2970	306	0.015 B	8.7	587 B J	0.68	<0.59	<593	<1.2	NA	23.4	28.3
DP09-12'	7/27/2001	NA	610	2290 J	<1.1	1.2	9 B	0.13 B	0.18 B	112000	5.5	3.1 B	6.4	<0.57	5890	3.8	27600	350	<0.11	6.3	364 B J	<0.57	<0.57	158 B	<1.1	NA	7.5	29.4
DP10-2'	7/27/2001	NA	<56	NA	<1.1	4.3	26.3	0.27 B	0.95	NA	6.6	3.8 B	9.9	<0.56	NA	7.7	NA	NA	<0.11	9.2	NA	<0.56	<0.56	NA	<1.1	27.2	10.7	31.7
DP10-10'	7/27/2001	NA	1400	NA	<1.2	0.74 B	13.9 B	0.091 B	0.25	NA	7.9	3.7 B	5.3	<0.58	NA	2.9	NA	NA	0.09 B	7.8	NA	<0.58	<0.58	NA	<1.2	531	5.7 B	100
DP10-10' (Dup)	7/27/2001	NA	820	NA	<1.1	1.2	8.2 B	0.1 B	0.18 B	NA	6.9	3.4 B	6.8	0.25 B	NA	2.7	NA	NA	0.046 B	7.8	NA	<0.57	<0.57	NA	<1.1	273	6.5	49.1
DP12-1.5'	7/28/2001	NA	<51	4930 J	<1	7.1	56.2	0.33 B	0.42	111000	7.5	8.4	17	<0.51	9380	12.9	8980	510	0.018 B	8.1	520 J	0.38 B	<0.51	596	<1	NA	11.7	39.8
DP12-9'	7/28/2001	NA	<63	11600 J	<1.3	8.4	47.7	0.41 B	0.2 B	1910	11.4	5 B	14.1	<0.63	18300	10.1	1780	292	0.014 B	12.4	762 J	0.82	<0.63	432 B	<1.3	NA	24.3	46.8
DP13-3'	7/29/2001	160	NA	NA	<1.2	5.4	51.1	0.37 B	0.35	NA	7.8	4.7 B L	11.2	<0.6	NA	11.4 L	NA	NA	<0.12	10.2 L	NA	<0.6	<0.6	NA	<1.2	17	12.5	40.5 L
DP13-11'	7/29/2001	310	NA	NA	<1.2	1.4	3.1 B	0.096 B	0.17 B	NA	2.3	1 B	9.9	<0.59	NA	5.9	NA	NA	0.024 B	5.6	NA	<0.59	<0.59	NA	<1.2	887	1.6 B	8.9
DP14-3'	7/29/2001	290	NA	NA	<1	14.3	125	0.7	1.3	NA	9.9	10	13.1	<0.52	NA	39.8	NA	NA	0.049 B	13.9	NA	<0.52	<0.52	NA	<1	78.6	20	66.1
DP14-9'	7/29/2001	600	NA	NA	<1.1	2.1	10.9 B	0.32 B	0.16 B	NA	14.9	1.8 B	11.2	<0.57	NA	7.8	NA	NA	0.082 B	9.4	NA	<0.57	<0.57	NA	<1.1	299	14.8	58.4
DP15-2'	7/29/2001	190	NA	NA	<1.2	5.8	84.2	0.72	0.31	NA	11.3	9.2	14	<0.58	NA	29.9	NA	NA	0.045 B	16.2	NA	<0.58	<0.58	NA	<1.2	46.2	16.2	62.4
DP15-9'	7/29/2001	370	NA	NA	<1.2	1.5	4.9 B	0.37 B	1.1	NA	12.3	82.8	7.5	0.36 B	NA	52.2	NA	NA	<0.12	14.1	NA	<0.6	<0.6	NA	<1.2	283	13.9	110
DP16-2.8'	7/30/2001	89	NA	NA	<1.1	3.3	16.3 B	0.19 B	0.15 B	NA	4.9	3.4 B	6.5	<0.53	NA	3.5	NA	NA	<0.11	8	NA	<0.53	<0.53	NA	<1.1	2.5 B	6.4	23.3
DP16-12.5'	7/30/2001	1100	NA	NA	<1.2	4.7	20.3 B	0.18 B	0.31	NA	7.1	4.1 B	7	0.25 B	NA	11.9	NA	NA	0.028 B	9	NA	<0.58	<0.58	NA	<1.2	2250	7	70
DP17-3'	7/30/2001	150	NA	NA	<1.2	6.7	85.1	0.57 B	0.29	NA	13.2	6.4	19.2	<0.59	NA	31.2	NA	NA	0.046 B	17.9	NA	<0.59	<0.59	NA	<1.2	2.4 B	19.1	61.2
DP17-13'	7/30/2001	990	NA	NA	<1.3	6.5	691	0.39 B	1.3	NA	55.2	54.9	42.8	<0.67	NA	57.6	NA	NA	0.57	21.1	NA	<0.67	<0.67	NA	<1.3	4150	11.4	289
DP18-2'	7/30/2001	<57	NA	7890	<1.1	7.2	49.4	0.45 B	0.49	59200	9.7	5.3 B	10.9	<0.57	13000	14.4	18200	539	0.025 B	11.3	610	<0.57	<0.57	373 B	<1.1	NA	17.2	61
DP18-14.5'	7/30/2001	100	NA	1560	<1.1	2.6	9.6 B	0.15 B	0.16 B	157000	3.5	1.7 B	7.1	<0.55	5750	2.6	48900	502	<0.11	5.1	321 B	<0.55	<0.55	165 B	<1.1	NA	5.4 B	16.4
DP19-2'	7/30/2001	270	NA	8850	<1.2	7.7	119	0.73	0.47	13800	18.6	7.5	18.5	<0.61	15200	29.8	6780	709	0.057 B	14.9	1540	<0.61	<0.61	1030	<1.2	NA	16.9	77
DP19-13'	7/30/2001	110	NA	2570	<1.1	3.1	11.3 B	0.22 B	0.15 B	91600	5.5	2.5 B	7.2	<0.55	7240	3.4	33700	302	<0.11	7.3	401 B	<0.55	<0.55	295 B	<1.1	NA	9	24.9
DP20-2'	7/30/2001	<57	NA	7480	<1.1	8.3	65.8	0.53 B	0.38	37100	11.1	6.6	18.2	<0.57	14500	25.9	9230	529	0.08 B	14.5	659	<0.57	<0.57	<569	<1.1	NA	15.6	58.1
DP20-14.5'	7/30/2001	170	NA	1380	<1.1	2	8.2 B	0.17 B	0.13 B	107000	3.1	2.1 B	6.3	<0.57	3500	2.8	50100	261	<0.11	5.3	243 B	<0.57	<0.57	217 B	<1.1	NA	5.4 B	16.7
DP23-2.5'	8/1/2001	NA	<130	12900 L	<1.3	14.2	106 L	0.75	0.098 B	13800 L	19.9 L	16.8 L	22.1 L	0.38 B	29900 L	21.6 L	4740 L	1730 L	0.03 B	25.9 L	1200	0.79	<0.63	192 B	4.7	NA	29.6 L	67 L
DP23-9'	8/1/2001	NA	<130	13100	<1.3	12.7	112	0.76	<0.26	39800	19.6	14.4	26.5	<0.66	32900	16.9	13900	652	0.018 B	33.2	2120	1.1	<0.66	204 B	2.9	NA	26.1	76.5
DP25-2.5'	8/7/2001	NA	<62	14100	<1.2	8.8	100	0.55 B	6.5	2690	15	7.6	16.2	<0.62	20100	10.2	2290	297	0.024 B	15.4	890	0.53 B	<0.62	574 B	1.5	NA	25.8	54.6
DP25-2.5' (Dup)	8/7/2001	NA	<56	6530	<1.1	6.1	49.4	0.27 B	0.33	110000	9.6	6.3	13.9	0.56	15900	6.9	27900	404	<0.11	15.8	1160	0.66	<0.56	428 B	2.7	NA	12.2	39.9
DP25-7.5'	8/7/2001	NA	<58	9050	<1.2	6	75.1	0.35 B	2	103000	12.2	7.3	16	<0.58	17300	7.6	23700	575	<0.12	16.8	2050	0.49 B	<0.58	465 B	3.1	NA	17	46.4
DP29-5	11/9/2001	NA	84	10600	<1.3	7.5	59.4 J	0.42 B	0.14 B	54200	13.9	8.9	18.8	<0.63	21100	15.3	15900	515	0.049 B	22.2	1250	<0.63	<0.63	76.2 B	<1.3	NA	18.6	70.2
DP31-15	12/5/2001	NA	<59	NA	<1.2	4.9	60.9	0.28 B	0.17 B	NA	10.6	6 B	11.3	<0.59	NA	20.1	NA	NA	0.18 J	11.1	NA	1.3 J	<0.59	NA	1.3	3.6 B J	14.7	44
DP36-19	12/5/2001	NA	<56	NA	<1.1	5.3	6.4 B	0.065 B	0.11 B	NA	20.6	4.6 B L	7.4	<0.56	NA	4	NA	NA	0.02 B J	8.6 L	NA	0.75 J	<0.56	NA	1.5	5.4 B J	6.4	22.5
DP37-19	12/5/2001	NA	<55	NA	2.2	4.7	26.1	0.059 B	0.29	NA	15.8	3.4 B	47.7	<0.55	NA	421	NA	NA	0.049 B J	8.1	NA	0.63 J	<0.55	NA	1.5	16.4 J	8	55.3
DP37-19 (Dup)	12/5/2001	NA	<55	NA	3.9	3.8	80.6	0.076 B	0.6	NA	17.3	2.6 B	126	<0.55	NA	670	NA	NA	0.16 J	7	NA	0.65 J	0.4 B	NA	1.9	51.7 J	6.6	112

APPENDIX A
Table A-4
Summary of Inorganic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
DP38-14.5	12/5/2001	NA	<54	NA	<1.1	5.3	20.6 B	0.095 B	0.21 B	NA	21.7	2.8 B	11.4	<0.54	NA	11.9	NA	NA	2.7 J	7.7	NA	0.81 J	<0.54	NA	1.9	18.8 J	7.9	179
DP39-10'	3/5/2002	NA	NA	4500 J	<1.1	5	35.3	0.26 B	0.57	101000 J	6.7	17	7.3	NA	9220	8.1	12100	450	0.021 B	59 L	421 B J L	<0.57	NA	73 B	1.3	1230 J	10.1	23
DP40-6' (Dup)	3/5/2002	NA	NA	6070 J	<1.1	2.7	39.4	0.31 B	0.13 B	39000 J	8.1	5.1 B	8.2	NA	11400	6.3	18300	277	0.016 B	9.1	518 B J	<0.57	NA	63.3 B	1.4	3.7 B J	10.3	31
DP40-6'	3/5/2002	NA	NA	5670 J	<1.1	4.8	37	0.35 B	0.2 B	83500 J	9.2	5 B	7.7	NA	14500	6.4	40500	301	0.035 B	8.9	583 J	<0.57	NA	103 B	1.2	4 B J	15.1	29
DP41-6'	3/5/2002	NA	NA	5820 J	<1.2	1.6	31.6	0.24 B	0.074 B	28800 J	8.1	4.4 B	6.2	NA	7540	5.9	11000	146	0.036 B	8.2	532 B J	<0.59	NA	79 B	0.79 B	3.5 B J	8.6	27
DP42-6'	3/5/2002	NA	NA	7570 J	<1.2	4.2	45.1	0.36 B	0.15 B	20700 J	10.1	5.6 B	8.1	NA	16600	6.9	9210	285	<0.12	11	709 J	<0.6	NA	<600	1.1 B	3.9 B J	15.3	32.6
DP43-1.5'	3/5/2002	NA	NA	5500 J	<1.1	5.5	60.2	0.22 B	0.081 B	1230 J	8	6.3	8	NA	11400	58.1	962	571	0.035 B	8.2	412 B J	<0.57	NA	<568	0.98 B	NA	15.7	29.4
DP44-1.5'	3/5/2002	NA	NA	5980 J	<1.2	6.6	50.1	0.22 B	0.21 B	20800 J	7.1	2.6 B	6.4	NA	6720	12.4	4160	130	0.04 B	8.5	3810 J	0.36 B	NA	139 B	<1.2	NA	11.7	32.4
DP45-1.5'	3/5/2002	NA	NA	4580 J	<1.1	6.1	60.6	0.2 B	0.092 B	1040 J	6.6	6.2	7.3	NA	10400	43.6	885	516	0.068 B	7.5	363 B J	<0.57	NA	<569	<1.1	NA	13.4	27.5
DP46-1.5'	3/5/2002	NA	NA	4840 J	<1.1	5.4	40	0.2 B	0.08 B	1160 J	7.7	5 B	8.7	NA	11300	24.5	1020	406	0.018 B	8.3	459 B J	<0.57	NA	<569	<1.1	NA	13.2	28.5
DP47-5'	3/9/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	18	NA	NA	NA	NA	15.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.2 B J	NA	NA
DP47-10'	3/9/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.6 B J	NA	NA
DP48-5'	3/9/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.8 B J	NA	NA
DP49-5'	3/9/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 B J	NA	NA
DP49-10'	3/9/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.7 B J	NA	NA
DP52-1-1.5'	3/10/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	55.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DP54-1-1.5'	3/10/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	217 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	202 J	NA	NA
DP55-9'	3/10/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.3 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DP56A-9.5-10.5'	3/15/2004	NA	NA	212 J	0.31 B	2.4	5 B	<0.63	<0.083*	81500 J	0.87	0.74 B	9.8	NA	110	3.5	<61.2*	1.5 B	0.044 B	1.8 B	<148*	<0.63	<0.63	<626	<1.3	852 J	0.72 B	12
DP58A-8.5-9.5'	3/15/2004	NA	NA	7400 J	<1.3	3.2	8.1 B	<0.12*	0.4	124000 J	26.1	2.1 B	14.9	NA	3310	51	10800 J	53.1	<0.01*	4.2 B	272 B J	<0.64	<0.64	162 B	<1*	720 J	21.4	29.5
DP60A-6.6-7.4'	3/15/2004	NA	NA	211 J	0.66 B	2.5	9.5 B	<0.61	0.91	45600 J	1.1	2.7 B	14	NA	259	15.9	102 B J E	4.7	0.25	7	200 B J E	<0.61	<0.61	<109*	<0.83*	1230 J	1.2 B	15.5
DP61A-5-6'	3/15/2004	NA	NA	257 J	<1.2	1.2	15.5 B	<0.6	0.14 B	40900 J	0.56 B	1.2 B	12.6	NA	127	3.3	48.2 B J	3.7	0.048 B	1.3 B	161 B J	<0.6	<0.6	357 B	0.47 B J	186 J	0.57 B	1.5 B
DP61A-5-6' (Dup)	3/15/2004	NA	NA	234 J	<1.2	1.9	12.9 B	<0.6	0.63	34500 J	0.54 B	2.1 B	10.9	NA	132	6.1	<44.9*	4.7	0.049 B	2.2 B	163 B J	<0.6	<0.6	350 B	<1.2	522 J	0.46 B	2.4
DP64A-8.5-9.5'	3/15/2004	NA	NA	5310 J	<1.1	1.2	7.2 B	0.31 B	0.15 B	96300 J	7	13.2	3.8	NA	6050	3.8	41800 J	181	0.012 B	8.8	339 B J	<0.55	<0.55	221 B	0.91 B J	701 J	8.6	20.8
DP66A-9.5-10.5'	3/15/2004	NA	NA	1890 J	<1.1	1.8	6.5 B	<0.099*	0.17 B	130000 J	5.5	3.3 B	6.9	NA	7280	3.4	30100 J	252	0.056 B	21.9	278 B J	<0.57	<0.57	310 B	<1.5*	420 J	4.4 B	289
DP67A-12.5-13.5'	3/15/2004	NA	NA	1190 J	<1.1	0.85 B	5.6 B	0.043 B	0.14 B	159000 J	4.1	1.8 B	5.6	NA	4500	2.6	54700 J	341	0.08 B	5.2	236 B J	<0.53	<0.53	289 B	0.82 B J	1210 J	5 B	98
DP70A-9-11'	3/14/2004	NA	NA	1980 J	<1.1	1.1	10.7 B	<0.57	0.17 B	127000 J	5	4.2 B	6.4	NA	6440	2.7	46200 J	337	<0.024*	9.2	309 B J	<0.57	<0.57	211 B	<1*	490 J	6	19.8
DP72A-12-13'	3/14/2004	NA	NA	1400 J	<1.1	0.77 B	5.9 B	<0.04*	<0.14*	171000 J	6.2	2.2 B	5.1	NA	4960	2.2	41000 J	310	<0.037*	5.9	229 B J	<0.54	<0.54	215 B	<0.75*	411 J	5.8	26.6
DP73A-12-13'	3/14/2004	NA	NA	1910 J	<1.1	1.3	10.5 B	<0.55	<0.13*	109000 J	4.6	2.8 B	6.6	NA	6000	2.8	32900 J	363	0.05 B	6.4	293 B J	<0.55	<0.55	302 B	<1*	286 J	5.9	68.9
DP77-14.6-15'	3/13/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DP78A-9-10'	3/14/2004	NA	NA	1840 J	0.43 B	3.4	78.1	0.087*	0.35	131000 J	143	17.2	50.1	NA	4010	31.4	2890 J	40.1	0.075 B	5.3 B	229 B J	<0.75	<0.75	<754	<0.77*	1330 J	4.8 B	148
DP79A-12-13'	3/14/2004	NA	NA	3310 J	0.27 B	2.9	32.6	<0.58	0.89	90000 J	388	294	16.6	NA	13400	45.1	22800 J	147	<0.032*	19.7	240 B J	<0.58	<0.58	276 B	<2.2*	1230 J	13.2	411
DP80-1'	3/15/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DP80-1.5'	3/15/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.5 B J	NA	NA
HA1-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.8 J	NA	NA
HA2-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.1 B J	NA	NA
HA3-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.1 B J	NA	NA
HA3-1.5' (Dup)	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 B J	NA	NA
HA4-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.8 B J	NA	NA
HA5-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.2 B J	NA	NA
HA6-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.3 B J	NA	NA
HA7-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 B J	NA	NA
HA8-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.9 B J	NA	NA
HA9-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12700 J	NA	NA

APPENDIX A
Table A-4
Summary of Inorganic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
HA10-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.4 B J	NA	NA
STR01-3'	3/8/2001	<58	NA	7920	<1.2	5.3	76	0.25 B	0.094 B	41000	9.7	5.4 B	12.8	<0.58	11800	8.6	18400	585	0.02 B	12.8	1130	<0.58	<0.58	135 B	1.6	NA	17.2	48.2 MBD
STR01-21'	3/8/2001	<56	NA	1530	<1.1	3.7	6 B	<0.56	<0.23	117000	3.8	2.1 B	5.3	<0.56	4860	2.9	35200	264	<0.11	5	319 B	<0.56	<0.56	157 B	1.1	NA	6.6	14.7 MBD
STR01-73'	3/9/2001	<60	NA	2140	<1.2	5.3	12 B	0.16 B	<0.24	104000	3.7	3.7 B	5	<0.6	9400	5.3	15200	491	<0.12	6.4	460 B	<0.6	<0.6	113 B	1.3	NA	7.9	18.1 MBD
STR01-88'	3/9/2001	<57	NA	1960	<1.1	3.1	15.9 B	0.22 B	<0.23	104000	4.1	4.1 B	4.7	<0.57	10700	5.8	11500	538	<0.11	6.3	288 B	<0.57	<0.57	79 B	0.72 B	NA	7.6	17.9 MBD
STR02-1'	3/13/2001	<120	NA	13700	<1.2	6.5	113	0.62	0.28	14800	58.9	9.4	16.5	<0.61	19700	19.5	4920	1120	0.072 B	18	1580	<0.61	<0.61	694	<1.2	NA	23.4	64
STR02-12.5'	3/13/2001	800	NA	2350	<1.1	2.1	11.8 B	0.11 B	0.16 B	175000	3.9	3.1 B	4.6	<0.56	5330	3.1	95200	192	<0.11	5.1	427 B	<0.56	<0.56	292 B	<1.1	NA	8.2	16.2
STR03-4'	3/14/2001	800	NA	NA	<1.2	3.4	60.3	0.38 B	<0.23	NA	10	6	6.9	<0.58	NA	7.6	NA	NA	0.021 B	11.4	NA	<0.58	<0.58	NA	<1.2	1.3 B	14.5	30.9
STR03-12.5'	3/14/2001	340	NA	NA	<1.1	0.94 B	6.7 B	<0.55	0.1 B	NA	7.6	2.6 B	5.6	<0.55	NA	2.2	NA	NA	0.013 B	6.2	NA	<0.55	<0.55	NA	<1.1	225	6	42.7
STR04-1.5'	3/19/2001	<120	NA	11900	<1.2	8.1	83.5	0.43 B	0.2 B	20400	15.3	10	14.1	<0.6	17100	13.5	8880	531	0.036 B	17.6	1060	<0.6	<0.6	78.7 B	0.86 B	NA	26.2	46.4
STR04-17.5'	3/19/2001	760	NA	2780	<1.2	3	12.8 B	<0.61	0.13 B	119000	4.8	2.7 B	8.1	<0.61	7050	5.6	26200	259	0.026 B	7	661	<0.61	<0.61	202 B	0.98 B	NA	8.8	28.4
STR04-17.5' (Dup)	3/19/2001	550	NA	1750	<1.1	2.6	11.9 B	0.077 B	0.16 B	162000	5.2	2.6 B	7.7	0.21 B	7110	5.1	38800	318	<0.11	6.6	334 B	<0.54	<0.54	258 B	0.83 B	NA	6.7	41.1
STR05-1.5'	3/10/2001	<57	NA	10000	<1.1	15.1	63.4	0.45 B	<0.23	3520	13.3	6.7	14.1	<0.57	21700	12.4	2420	283	0.026 B	16	884	0.53 B	<0.57	229 B	<1.1	NA	24.4	51 MBD
STR05-9'	3/10/2001	<58	NA	5400	<1.2	4.8	27	0.22 B	0.087 B	62400	7.3	4.2 B	5.4	0.28 B	14200	4.8	24500	2120	0.011 B	9.5	868	<0.58	<0.58	95 B	1.6	NA	12.9	22.9 MBD
STR05-11.3'	3/10/2001	110	NA	3910	<1.1	5.5	16.8 B	0.11 B	0.082 B	107000	7.3	4.7 B	6.7	0.23 B	9020	3.8	37800	432	<0.11	10.3	831	<0.54	<0.54	237 B	1.6	NA	9.9	21.4 MBD
STR06-1'	3/11/2001	<59	NA	11000	<1.2	7.5	87	0.42 B	<0.24	2150	12.6	8.1	11.2	<0.59	16400	13.8	1690	729	0.028 B	13.3	672	<0.59	<0.59	1310	<1.2	NA	24.3	42.9
STR06-15'	3/11/2001	<61	NA	13500	<1.2	8.4	198	0.66	0.34	42700	18	17	25.5	<0.61	27500	16.1	13200	937	0.028 B	36.3	2570	<0.61	<0.61	102 B	<1.2	NA	25.4	77.9
STR07-1.5'	3/21/2001	34 B	NA	10800	<1.2	7.4	103	0.66	0.3	7110	92.1	9.3	17.3	<0.6	19400	21.7	3440	844	0.035 B	17.3	1410	<0.6	<0.6	1470	<1.2	NA	19.8	67.4
STR07-18'	3/21/2001	<120	NA	2130	<1.2	2.3	9.5 B	0.14 B	0.2 B	175000	4.1	2.8 B	10.4	<0.58	6390	6.7	35300	314	<0.12	7.4	517 B	<0.58	<0.58	247 B	1.1 B	NA	7.9	30.8
STR08-1.5'	3/26/2001	<61	NA	13400	<1.2	5.9	120	0.73	<0.24	8260	20.2	9.4	15.8	<0.61	18600	19.5	4130	1010	0.033 B	15.9	1660	0.58 B	<0.61	<607	1.8	NA	22.2	64 MBD
STR08-13'	3/26/2001	280	NA	4460	<1.1	4.2	34.6	0.13 B	0.063 B	150000	9.4 L	5.2 B	9.7	<0.56	13400	5.9 L	41700	587	<0.11	10.5 L	1010	<0.56	<0.56	311 B	2.6	NA	10.9	38.8 MBD
STR08-13' (Dup)	3/26/2001	290	NA	3360	<1.1	3.5	25.9	0.12 B	<0.23	146000	6.8	3.5 B	6.5	0.29 B	9380	4.3	24200	414	<0.11	7.8	1020	<0.57	<0.57	240 B	1.5	NA	7.4	25.3 MBD
STR09-7.5'	4/4/2001	<61	NA	11200	<1.2	10.7	80.8	0.34 B	0.32	2670	15.9	5.9 B	22.1	<0.61	21200	9.8	2390	555	0.033 B	21.7	1030	<0.61	<0.61	<606	<1.2	NA	25.9	58.2 MBD
STR10-1.5'	4/7/2001	<57	NA	NA	<1.1	16.2	105	1	0.57	NA	15.6	10.9	21.4	<0.57	NA	21.3	NA	NA	0.021 B	21.8	NA	<0.57	<0.57	NA	<1.1	1.6 B	30.4	61.4 MBD
STR10-11'	4/7/2001	40 B	NA	NA	<1.3	4.5	57.7	0.51 B	0.23 B	NA	15.4	7.9	13.2	<0.63	NA	10	NA	NA	0.031 B	17.4	NA	<0.63	<0.63	NA	<1.3	0.96 B	20.8	50.7 MBD
STR11-2'	8/20/2001	NA	<120	10000	<1.2	8.8	44.3	0.29 B	<0.24	810	10.3	6.8	13.3	<0.6	16700	10.2	1570	386	0.022 B	14.7	632	0.38 B	<0.6	<599	<1.2	NA	21.2	48.1
STR11-9'	8/20/2001	NA	<120	10200	<1.2	19.4	54.7	0.51 B	0.15 B	35400	15	14.8	23.9	<0.59	36200	12.1	12600	317	0.012 B	36.1	1890	0.57 B	<0.59	<586	<1.2	NA	20.9	79.1
STR11-9' (Dup)	8/20/2001	NA	<120	10200	<1.2	11.8	56.9	0.57 B	0.29	54500	14.4	10	21.4	<0.59	25300	13.1	14400	279	<0.12	28.4	1960	0.42 B	<0.59	72.5 B	<1.2	NA	21.5	65
STR13-1-1.5'	3/9/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.7 B J	NA	NA
T-1B2-8'	3/16/2004	NA	NA	2460 J	<1.1	0.88 B	11 B	0.1 B	0.16 B	136000 J	4.3	4.2 B	4.7	NA	8900	3.5	29400 J	410	0.006 B	6	354 B J	<0.55	<0.55	101 B	1.5 J	30.1 J	8.1	16
T-1B-8'	3/15/2004	NA	NA	NA	NA	1.6	NA	NA	NA	NA	2.5 J	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	43.5 J	NA	NA
T-1E-2-6'	3/16/2004	NA	NA	11000 J	<1.2	4.7	91.5	0.55 B	0.16 B	5950 J	13.7	7.4	12.1	NA	18800	10.3	2630 J	829	0.028 B	15.5	836 J	<0.62	<0.62	<617	0.65 B J	3.8 B J	17.8	44
T-1E-6'	3/15/2004	NA	NA	NA	NA	5.1	NA	NA	NA	NA	12.6 J	NA	NA	NA	NA	10.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.6 B J	NA	NA
T-1N-6'	3/16/2004	NA	NA	12100 J	<1.2	4.4	83.4	0.61	0.13 B	5720 J	14.6	7.7	11.6	NA	19300	10.8	2630 J	515	0.027 B	15.3	977 J	<0.61	<0.61	<615	0.59 B J	4.7 B J	19.3	46
T-1NE-4'	3/16/2004	NA	NA	9740 J	<1.2	4.9	89	0.52 B	0.35	6260 J	14.3	7.2	13.3	NA	18200	13.2	2740 J	622	0.041 B	13.8	863 J	<0.61	<0.61	<611	1.1 B J	814 J	16.6	52.1
T-1S-5-6'	3/15/2004	NA	NA	NA	NA	7.3	NA	NA	NA	NA	13.5 J	NA	NA	NA	NA	11.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.4 B J	NA	NA
T-1W2-6'	3/16/2004	NA	NA	11800 J	0.34 B	4.8	93	0.55 B	0.08 B	5440 J	14.5	8.8	13.6	NA	20500	10.8	2610 J	746	0.026 B	16.8	926 J	<0.61	<0.61	<610	0.65 B J	4.7 B J	20.7	46.4
T-1W-6'	3/15/2004	NA	NA	NA	NA	6.1	NA	NA	NA	NA	7.8 J	NA	NA	NA	NA	6.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	488 J	NA	NA
T-2-3'	11/8/2001	NA	<60	NA	<1.2	4.5	70 J	0.49 B	0.054 B	NA	11.1	7.4	10.6	<0.6	NA	13	NA	NA	0.02 B	14.2	NA	0.73	<0.6	NA	<1.2	7.4 B J	15.4	38.4
T-2-9'	11/8/2001	NA	66	NA	<1.1	2.7	19.1 B J	0.064 B	0.085 B	NA	5.6	3.7 B	7.7	<0.57	NA	6.6	NA	NA	<0.11	8.7	NA	0.43 B	<0.57	NA	0.84 B	1.9 B J	9.6	25.9
T-3-3'	11/8/2001	NA	<56	NA	1.5	9.1	132 J	0.29 B	0.52	NA	13.8	6.4	44.8	<0.56	NA	144	NA	NA	0.18	14.9	NA	0.42 B	<0.56	NA	<1.1	57.3 J	15.2	317
T-3-11'	11/8/2001	NA	<56	NA	<1.1	6.4	42.6 J	0.23 B	0.079 B	NA	9.2	5.2 B	11.1	<0.56	NA	7.9	NA	NA	0.017 B	11.2	NA	0.4 B	<0.56	NA	<1.1	4 B J	14.4	33.4
T-4-3'	11/9/2001	NA	<56	NA	<1.1	8.9	72.6 J	0.36 B	0.11 B	NA	10.9	6.7	13.4	<0.56	NA	18.4	NA	NA	0.072 B	11.7	NA	0.6	<0.56	NA	<1.1	2.7 B J	18.9	47.2
T-4-9'	11/9/2001	NA	<54	NA	0.6 B	6.8	83.3 J	0.3 B	0.18 B	NA	10.2	6.1	44.8	<0.54	NA	38.9	NA	NA	0.056 B	11.7	NA	<0.54	<0.54	NA	<1.1	6.7 B J	16.1	87.6

APPENDIX A
Table A-4
Summary of Inorganic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
T-5-3'	11/9/2001	NA	<60	NA	<1.2	4.8	106 J	0.65	0.11 B	NA	17.5	9.2	15.2	<0.6	NA	16.1	NA	NA	0.043 B	16.4	NA	0.61	<0.6	NA	<1.2	12.4 J	17.5	59.9
T-5-9'	11/9/2001	NA	<60	NA	<1.2	2.6	56.7 J	0.39 B	0.11 B	NA	9.1	6.5	9.7	<0.6	NA	8.1	NA	NA	<0.12	12	NA	0.39 B	<0.6	NA	<1.2	12.4 J	13.2	33.5
T-6-3'	11/10/2001	NA	<61	NA	<1.2	9.7	60.2 J	0.44 B	<0.24	NA	14.5	8	16.5	<0.61	NA	13.4	NA	NA	0.041 B	18.8	NA	<0.61	<0.61	NA	<1.2	3.3 B J	23.2	55.8
T-6-7.5'	11/11/2001	NA	<72	NA	<1.4	5.2	112	<0.72	0.19 B	NA	6.5	3.1 B	24.1	0.28 B	NA	57.9	NA	NA	0.051 B	8.2	NA	<0.72	<0.72	NA	<1.4	37.8 J	7.1 B	103
T-6-10'	11/10/2001	NA	<55	NA	<1.1	6.9	78.3 J	0.4 B	0.056 B	NA	9.5	5.9	11.9	<0.55	NA	27.1	NA	NA	0.049 B	10.2	NA	<0.55	<0.55	NA	<1.1	2.1 B J	17.4	47.6
T-8-3'	11/11/2001	NA	<63	NA	<1.3	5.1	92.1	0.59 B	0.066 B	NA	13.5	9.3	11.9	<0.63	NA	11.3	NA	NA	0.027 B	17.4	NA	<0.63	<0.63	NA	<1.3	1.6 B J	19.7	43.6
T-8-9'	11/11/2001	NA	<54	NA	<1.1	4.2	56.4	0.19 B	0.11 B	NA	6.3	4 B	6.1	<0.54	NA	4.8	NA	NA	0.011 B	8.1	NA	<0.54	<0.54	NA	1.1	11.5 J	10	20.1
UAW01-30-1.5'	4/2/2001	<58	NA	11200	<1.2	8.6	109	0.48 B	0.63	23900 L	15.7 L	7.8 L	22	<0.58	18500 L	75.5 L	7000	429 L	0.071 B	17.3 L	915	<0.58	<0.58	92.9 B	<1.2	34.4	22.4 L	97.5 L MBB
UAW01-30-15'	4/2/2001	<52	NA	2310	<1	3.5	8.4 B	0.052 B	0.21	118000	4.6	3.3 B	8.5	<0.52	5900	3.7	39500	201	<0.1	6.5	443 B	<0.52	<0.52	134 B	0.7 B	NA	7.4	22.9 MBD
UAW04-20-10'	3/23/2001	30 B	NA	8730	8.9	7.8	64.5	0.46 B	0.27	26300	11.3	7.3	12.2	<0.68	14600	10	7420	483	0.016 B	15	856	<0.68	<0.68	97.3 B	<1.4	NA	15.7	44.1
UAW05-20-13'	3/23/2001	220	NA	10100	<1.2	3.4	52.6	0.48 B	0.36	99000	12.5	8	15.6	0.22 B	20500	8.8	20800	482	<0.12	18.3	2050	<0.58	<0.58	329 B	<1.2	NA	17.9	45.6
UAW06-20-1.5'	3/26/2001	<61	NA	13300	<1.2	6.4	121	0.77	0.11 B	5520	30.3	9.5	16.6	<0.61	18700	23.8	2800	646	0.045 B	16.2	1720	0.91	<0.61	450 B	0.92 B	NA	22.8	72 MBD
UAW06-20-11.5'	3/26/2001	<56	NA	1600	<1.1	1.2	5.6 B	<0.56	<0.23	124000	3.8	2 B	6.2	<0.56	4150	3.3	51000	387	<0.11	4.1 B	239 B	<0.56	<0.56	180 B	1.4	NA	6.3	20.3 MBD
UAW08-20-13'	3/24/2001	340	NA	NA	<1.1	2	36.3	<0.56	0.23	NA	51.7	28.8	20.8	0.19 B	NA	6.1	NA	NA	0.024 B	22.9	NA	<0.56	<0.56	NA	1 B	24.8	10.8	142
UAW09-20-1.5'	3/27/2001	<58	NA	6280	<1.2	5.8	45.7	0.19 B	<0.23	1530	8.5	6.7	7.8	<0.58	11300	10.6	1260	516	0.013 B	9	572 B	0.51 B	<0.58	<584	<1.2	NA	16.8	35.9 MBD
UAW09-20-15'	3/27/2001	<53	NA	1790	<1.1	4.2	7.5 B	<0.53	<0.21	106000	3.6	2.5 B	6	<0.53	5900	4.2	37100	156	<0.11	5.6	458 B	<0.53	<0.53	108 B	1.6	NA	7.1	26.8 MBD
UAW11-40-2'	4/17/2001	<60	NA	11800	<1.2	5.2	79.8	0.6	<0.24	4100	13.1	8.7	12.5	<0.6	19400	11.9	2360	560	0.026 B	16.8	903	<0.6	<0.6	701	<1.2	NA	19.6	44.8
UAW11-40-10'	4/17/2001	120	NA	1920	<1.1	2.8	5.4 B	<0.57	0.061 B	125000	4.2	3.2 B	7.4	<0.57	6680	4.1	32600	232	<0.11	8.8	224 B L	<0.57	<0.57	290 B	1.3	NA	7.5	26
UAW12-20-12'	3/24/2001	560	NA	NA	<1.2	0.75 B	3.1 B	0.074 B	0.74	NA	3.8	4 B	6.1	<0.61	NA	3.1	NA	NA	<0.12	7.6	NA	<0.61	<0.61	NA	0.72 B	7.6 B	5.9 B	139
UAW13-20-1.5'	3/24/2001	34 B	NA	NA	<1.2	4.9	62.4	0.34 B	0.37	NA	11.2	6.1	11.6	<0.58	NA	15.4	NA	NA	0.067 B	12.2	NA	<0.58	<0.58	NA	0.68 B	18.1	17.3	50.6
UAW13-20-11.5'	3/24/2001	430	NA	NA	<1.2	0.75 B	2 B	0.07 B	0.21 B	NA	3.9	3 B	5.1	0.22 B	NA	3	NA	NA	<0.12	7.9	NA	<0.6	<0.6	NA	0.61 B	11.5 B	6.1	57.6
UAW14-10-1.5'	4/4/2001	<59	NA	11500	<1.2	6.4	117	0.72	0.34	5060	16.8	8.1	16.5	<0.59	16200	19.7	2110	1050	0.048 B	16	1340	<0.59	0.37 B	<589	<1.2	NA	19.6	67.3 MBD
UAW15-20-2'	4/9/2001	26 B	NA	5910	<1.1	5.5	45.8	0.21 B	0.093 B	1530	7.5	5.8	9.7	<0.55	10400 MBB	13	1120	257	0.016 B	9.7	576	0.56	0.9	470 B	<1.1	NA	16	36
UAW15-20-2' (Dup)	4/9/2001	<55	NA	5940	<1.1	6.2	55.1	0.21 B	0.093 B	4310	7.6	5.8	10.3	<0.55	11400 MBB	11.2	1210	530	0.017 B	9.9	594	0.58	1.9	483 B	0.94 B	NA	16.1	37.4
UAW15-20-8.5'	4/9/2001	26 B	NA	6250	<1.1	6.9	38	0.18 B	0.057 B	1110	7.7	6.7	9.6	<0.56	13600 MBB	9	1590	431	0.018 B	12.5	608	0.44 B	<0.56	351 B	<1.1	NA	16.9	38.2
UAW16-10-2'	8/22/2001	NA	<120	9160	<1.2	6.3	53.3	0.49 B	0.11 B	4430	12.8	5.3 B	11.3	<0.58	19500	11.6	1880	367	0.019 B	16	891	0.49 B	<0.58	133 B	<1.2	NA	20.3	40
UAW16-10-5.5'	8/22/2001	NA	<110	1960	<1.1	2.6	8.4 B	<0.54	0.059 B	104000	4.7	2.5 B	6.6	1.7	5650	4.1	38800	371	<0.11	6.5	390 B	<0.54	<0.54	154 B	1.2	NA	6.5	19.1
UAW17-40-1.5'	4/5/2001	<57	NA	10500	<1.1	7.5	118	0.26 B	0.73	39300	17.3	6.2	27.7	0.19 B	14800	28.4	10900	515	0.041 B	17.9	1330	<0.57	0.89	125 B	<1.1	NA	19.4	97.5 MBB
UAW17-40-5'	4/5/2001	<64	NA	5160	1.8	9.1	559	0.34 B	1.8	63500	13.9	4.3 B	77.2	<0.64	16900	128	11100	940	<0.13	22.3	1150	<0.64	1.3	238 B	<1.3	NA	11.2	418 MBD
UAW18-20-1'	8/23/2001	NA	<60	7790	<1.2	4	72.1	0.39 B	0.29	21600	15.2	6.9	11.2	<0.6	13900	14.2	7400	505	0.048 B	13.2	948	0.79	<0.6	737	0.71 B	NA	15	47.2
UAW18-20-15'	8/23/2001	NA	<61	1980	<1.2	3.1	12.6 B	<0.61	0.076 B	135000	4.6	2.7 B	6.8	<0.61	7670	4	37000	295	<0.12	7	408 B	<0.61	<0.61	792	2.1	NA	6.4	21.7
UAW19-80-1.5'	4/6/2001	<61	NA	13800	<1.2	8.5	60.3	0.36 B	0.15 B	2180	14.2	7.6	13.9	<0.61	16700	12.5	1850	212	0.015 B	14	962	<0.61	<0.61	<606	<1.2	NA	26.4	48.9 MBD
UAW19-80-15'	4/6/2001	<59	NA	7980	<1.2	8.1	44.4	0.45 B	0.44	52800	11.7	9.3	19.2	<0.59	19100	10.3	14900	437	<0.12	23.5	1630	<0.59	<0.59	106 B	<1.2	NA	16.2	62.6 MBD
UAW20-60-1.5'	4/9/2001	35 B	NA	8300	<1.1	6.4	69.5	0.57	0.18 B	27800	8	5.6	13.3	<0.56	12600 MBB	22.2	4210	334	0.058 B	12.3	833	0.36 B	0.42 B	2410	<1.1	NA	16.2	49.8
UAW20-60-9.5'	4/9/2001	39 B	NA	12800	<1.2	7.7	48.9	0.66	0.38	50900	11.5	14.1	23	<0.61	25500 MBB	12.6	15900	318	0.032 B	32.8	2620	0.64	<0.61	317 B	<1.2	NA	24.7	75.1
UAW21-30-1.5'	4/11/2001	<59	NA	6490	<1.2	7.8	93	0.32 B	0.13 B	1930	9.1	6.2	9.8	<0.59	12100 MBB	780	1260	608	0.11 B	9.8	543 B	0.41 B	<0.59	224 B	<1.2	NA	17.1	56.4
UAW21-30-10'	4/11/2001	<56	NA	2220	<1.1	4.4	10.7 B	0.093 B	0.1 B	97800	3.5	2.7 B	8	<0.56	5820 MBB	9.1	30500	180	<0.11	6.4	447 B	<0.56	<0.56	131 B	<1.1	NA	6.9	21.2
UAW22-20-2'	9/5/2001	NA	<110	6180 J	<1.1	6	48	0.32 B	0.56	90100	9.6	5.4 B	11.1	<0.56	12200 J	13.5	9680	760	0.03 B J	10.9	777	<0.56	<0.56	252 B	1 B J	NA	12.5	53.3
UAW22-20-11'	9/5/2001	NA	<110	1510 J	<1.1	1.3	7.4 B	0.053 B	0.16 B	131000	3.2	1.8 B	5.4	0.44 B	5770 J	3.5	41200	257	0.019 B J	4.5	287 B	<0.56	<0.56	203 B	1.9 J	NA	5 B	16.3
Background Soil																												
B01-1.5'	10/9/2001	NA	<56	9620	<1.1	7.4	47.4 J	0.26 B	0.19 B	1210 L	10.1	7.1 L	12.5	<0.56	15600	9.5	1680	424 J	0.026 B	12.5 L	655	<0.56	<0.56	<556	<1.1	0.88 B J	20	39 L
B01-11.5'	10/9/2001	NA	<52	1620	<1	2.3	6.9 B J	<0.52	0.15 B	115000	3.8	2.8 B	6.2	0.2 B	5010	3.2	37400	171 J	<0.1	5.7	384 B	<0.52	<0.52	98.8 B	1.3	0.95 B J	5.9	18.8
B02-1.5'	10/9/2001	NA	79	10800	<1.1	8.4	58.7 J	0.37 B	0.21 B	1720	11.8	6.7	13.3	<0.57	17200	10.1	1840	379 J	0.027 B	13.2	688	<0.57	<0.57	<569	<1.1	0.79 B J	21.9	42
B02-11.5'	10/9/2001	NA	<52	1750	<1	3.9	7.1 B J	<0.52	0.16 B	113000	3.8	3 B	6.9	<0.52	6000	3.6	35700	182 J	<0.1	6.2	369 B	<0.52	<0.52	91.7 B	0.74 B	1 B J	6.1	20.1

APPENDIX A
Table A-4
Summary of Inorganic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
B03-1.5'	10/9/2001	NA	79	10800	<1.1	5.1	68 J	0.5 B	0.27	3870	12.2	8	13.4	<0.57	18700	11.1	2380	589 J	0.026 B	15.1	976	<0.57	<0.57	<569	<1.1	0.9 B J	18.3	41.1
B03-11.5'	10/9/2001	NA	<52	1650	<1	3	7.5 B J	<0.52	0.15 B	126000	4	2 B	6.2	<0.52	5620	2.8	37800	329 J	0.0089 B	4.8	370 B	<0.52	<0.52	105 B	1.5	0.93 B J	5.5	15.6
B04-1.5'	10/9/2001	NA	<54	1870	<1.1	4	9.8 B J	<0.54	0.16 B	86600	3.7	2.8 B	7.3	<0.54	5760	4.1	31100	191 J	0.0098 B	6.5	368 B	<0.54	<0.54	69.2 B	1.5	0.93 B J	6.2	22.3
B04-1.5' (Dup)	10/9/2001	NA	<53	2200	<1.1	3.7	11.4 B J	<0.53	0.16 B	97000	3.7	2.9 B	6.8	<0.53	5980	4.3	36200	198 J	<0.11	6.2	387 B	<0.53	<0.53	66.6 B	1.2	0.97 B J	6.7	21.6
B04-11.5'	10/9/2001	NA	<53	1550	<1.1	2.7	6 B J	<0.53	0.13 B	114000	3.5	2.5 B	5.4	<0.53	4670	3	37300	163 J	<0.11	5.4	346 B	<0.53	<0.53	91.1 B	1.8	0.93 B J	5.5	17.3
B05-1.5'	10/9/2001	NA	<56	13000	<1.1	10	66.1 J	0.46 B	0.22 B	2370	15.7	8	15.6	<0.56	19800	11.4	2090	393 J	0.03 B	14.9	660	<0.56	<0.56	<565	<1.1	0.82 B J	23.9	51.4
B05-11.5'	10/9/2001	NA	120	1660	<1.1	3.7	6.4 B J	<0.53	0.15 B	98200	3.2	2.3 B	7.9	<0.53	5880	4	39400	158 J	<0.11	4.8	370 B	<0.53	<0.53	92.9 B	1.5	1.1 B J	6.4	21.9
B06-1.5'	10/9/2001	NA	<57	6950	<1.1	6.2	67.7 J	0.35 B	0.52	38300	13.5	6.4	18.4	<0.57	12600	25.3	9650	585 J	0.15	12.2	1130	<0.57	<0.57	64.1 B	1.1	1.5 B J	19.9	63.3
B06-11'	10/9/2001	NA	<58	1860	<1.2	1.4	9.4 B J	0.059 B	0.2 B	119000	4.1	2.3 B	6.9	<0.58	5380	3.7	36600	196 J	0.013 B	6.3	399 B	<0.58	<0.58	111 B	1.2	0.96 B J	5.7 B	25
B07-1'	10/9/2001	NA	<59	8140	<1.2	6.2	134 J	0.64	0.43	35600	15.4	6.8	17.6	0.24 B	12600	29	8670	645 J	0.073 B	12.2	1210	0.69	<0.59	<585	<1.2	1.5 B J	16.3	49.9
B07-9'	10/9/2001	NA	<59	6520	<1.2	2.6	33.4 J	0.29 B	0.19 B	43800	8.4	5.4 B	8.8	<0.59	9050	7.2	20500	221 J	0.013 B	9.9	729	<0.59	<0.59	67.3 B	1.5	<11.8	12.1	31.7
B08-2'	10/9/2001	NA	<58	11500	<1.2	7.5	123 J	0.61	0.7	8400	69.7	8.6	22.4	<0.58	18800	59.3	2690	854 J	0.16	15.7	1810	1.6	<0.58	<580	<1.2	2.9 B J	56.4	88.1
B08-9'	10/9/2001	NA	<57	6210	<1.1	3	20.4 B J	0.23 B	0.26	65100	13.4	4.5 B	15.6	<0.57	11300	7	23000	225 J	0.01 B	7	637	<0.57	<0.57	58.9 B	<1.1	<11.3	13	30.4
B09-2'	10/9/2001	NA	<330	5780	3.3	16.2	985 J	0.85	0.33	3960	50.6	5 B	64.8	0.42 B	10600	410	838	68.6 J	0.046 B	10.6	674	2.5	<0.66	<657	0.92 B	1.9 B J	24.9	85.2
B09-10'	10/9/2001	NA	<62	12800	<1.2	6	71.5 J	0.31 B	0.2 B	13000	25.1	3.7 B	41.8	<0.62	22600	8.9	1710	81.6 J	0.026 B	14.2	1750	<0.62	<0.62	<618	<1.2	<12.4	42.3	59.2
B10-2'	10/9/2001	NA	<330	5020	<1.3	13.5	327 J	1.4	0.14 B	1910	5.9	5 B	26.1	0.25 B	4030	16.1	340 B	14.6 J	0.047 B	11.1	993	1.7	<0.66	<659	0.96 B	1.3 B J	22.8	15.7
B10-11'	10/9/2001	NA	<60	9360 J	<1.2	4.9	69 J	0.46 B	0.24	4160	16.5	3.6 B	20.4	<0.6	17100	9.4	1640	123 J	0.018 B	11.5	730	<0.6	<0.6	<599	<1.2	0.89 B J	20.8	41.5
Sediment																												
SS-1	10/11/2001	NA	73	4830	<1.2	4.9	40.2	0.19 B	0.22 B	74400	10.3	5.3 B	12.3	<0.6	12100	11.3	21200	333	<0.12	14.3	874	<0.6	NA	223 B	<1.2	30.8 J	10.7	38.2
SS-2	10/11/2001	NA	<57	7840	<1.1	6.1	62.5	0.36 B	0.41	83900	13.7	7.2	17.8	<0.57	16500	28.9	14000	586	0.06 B	17	1230	<0.57	NA	160 B	<1.1	76.3 J	14.8	54.1
SS-3	10/11/2001	NA	<65	5660	<1.3	5.2	52.1	0.27 B	0.52	58600	16	6.6	19.2	<0.65	14300	24.8	12100	601	0.051 B	17	610 B	<0.65	NA	260 B	<1.3	4.7 B J	13.3	82.8
SS-4	10/11/2001	NA	100	9330	<1.2	3.4	76.9	0.46 B	0.25	18800	16	7.5	11.9	<0.61	17400	10.8	5450	344	0.016 B	14.9	754	<0.61	NA	125 B	<1.2	24.8 J	17	42.5
SS-5 ~25' South	10/11/2001	NA	95	3370	<1.2	3.9	37.2	0.18 B	0.27	65700	9.6	4.2 B	11.3	<0.62	9740	12.5	12600	283	<0.12	9.8	486 B	<0.62	NA	175 B	<1.2	4.9 B J	9.3	38.9
SS-5 (Dup)	10/11/2001	NA	100	3870	<1.2	3.8	30.4	0.21 B	0.23 B	67000	15.3	4.5 B	9.3	<0.62	10400	14.1	14900	260	0.011 B	10	529 B	<0.62	NA	196 B	<1.2	3.9 B J	10.4	46.7
SS-6	10/11/2001	NA	<63	6190	<1.3	5.5	52.4	0.29 B	0.32	46100	13.9	6.8	16.5	<0.63	14100	29.8	12300	636	0.073 B	14.9	685	0.48 B	NA	135 B	0.67 B	5.7 B J	13.9	59.5
SS-7	10/11/2001	NA	<62	6080	<1.2	4.9	46.8	0.28 B	0.38	54800	17.2	6.7	19.3	<0.62	13500	24.5	14400	453	0.045 B	16.7	734	0.39 B	NA	173 B	<1.2	5.2 B J	13.4	68.2
SS-8	10/11/2001	NA	<66	5570	<1.3	5.3	63	0.24 B	0.39	56300	14.1	6.3 B	18.2	<0.66	14100	25.8	12500	592	0.056 B	15.9	661	<0.66	NA	275 B	<1.3	7 B J	13.5	62.4
SS-9	10/11/2001	NA	<64	5300	<1.3	4.3	40.9	0.24 B	0.32	52900	14.5	5.7 B	16.2	<0.64	11700	28.4	11500	325	0.038 B	14.6	739	<0.64	NA	341 B	<1.3	3.3 B J	12.4	64.2
SS-10	10/11/2001	NA	<59	4290	<1.2	3.9	29.8	0.17 B	0.24	57100	12.7	4.2 B	14.2	<0.59	9340	14.7	15800	345	0.045 B	12.9	590	<0.59	NA	124 B	0.69 B	3.9 B J	9.3	44.3
SS-11	10/11/2001	NA	<64	6630	<1.3	5.5	55	0.29 B	0.32	53500	16.3	6.8	16.9	<0.64	14900	27.6	13400	615	0.039 B	16.7	810	<0.64	NA	340 B	<1.3	3.6 B J	14.6	71.6
SS-12	10/11/2001	NA	<63	7760	<1.3	6.3	68.2	0.34 B	0.54	47300	22.9	7.8	26	<0.63	17200	38.3	12600	658	0.095 B	22	789	<0.63	NA	360 B	<1.3	33.2 J	16.5	101
CS1	3/6/2002	NA	NA	1910 J	<1.2	3	13.9 B	0.069 B	0.14 B	88900 J	6.5	2.7 B	5.1		6780	6.4	20300	287	<0.12	9.8	291 B J	<0.61	NA	147 B	1.1 B	9 B J	6.7	33.5
CS-1A	3/25/2004	NA	NA	NA	<1.2	5	19.6 B	0.19 B	0.29	NA	5.7 J	2.9 B	4.2	NA	NA	5.1	NA	NA	0.02 B	6	NA	<0.59	<0.59	NA	<1.2	4.5 B J	7.8	28.8
CS2	3/6/2002	NA	NA	1890 J	<1.3	2.8	19.1 B	0.099 B	0.11 B	77900 J	5.8	2.4 B	6.6	NA	6220	12	18900	245	<0.13	5.9	311 B J	<0.63	NA	143 B	1.2 B	9.8 B J	6.6	26.1
CS-2A	3/26/2004	NA	NA	NA	<1.2	6	41.8	0.18 B	0.41	NA	10.5 J E	5.5 B E	5.9 E	NA	NA	22.8	NA	NA	0.014 B	7.8	NA	<0.58	<0.58	NA	<1.2	3.5 B J	9.6	22.2
CS3	3/6/2002	NA	NA	1730 J	<1.2	3.2	8.9 B	0.16 B	0.14 B	170000 J	6.9	2.4 B	4.9	NA	6780	4.2	64400	342	<0.12	5.8	228 B J	<0.58	NA	258 B	1 B	4.6 B J	6.9	16.4
CS-3A	3/26/2004	NA	NA	NA	<1.2	3.8	13.1 B	0.14 B	0.23 B	NA	5.1 J	2.6 B	4.6	NA	NA	5.3	NA	NA	0.018 B	5	NA	<0.62	<0.62	NA	0.57 B	4 B J	5.9 B	23.7
CS4	3/6/2002	NA	NA	2440 J	<1.2	3.2	14.4 B	0.25 B	0.16 B	178000 J	11.8	3.8 B	6.5	NA	9360	14.2	19900	349	0.01 B	10.1	373 B J	<0.6	NA	174 B	1.1 B	9.3 B J	8.8	31.8
CS-4A	3/26/2004	NA	NA	NA	<1.4	4.2	39.1	0.22 B	0.37	NA	10.6 J	4.3 B	10.8	NA	NA	14.6	NA	NA	0.033 B	12.1	NA	<0.71	0.2 B	NA	0.72 B	8 B J	10.7	50.6
CS5	3/6/2002	NA	NA	2400 J	<1.2	4.2	22.3 B	0.19 B	0.18 B	148000 J	14.2	3.7 B	4.5	NA	10800	5	38800	670	<0.12	10	359 B J	<0.58	NA	166 B	2	3.4 B J	11.7	25.1
CS-5A	3/25/2004	NA	NA	NA	<1.1	4.9	17.7 B	<0.15*	0.36	NA	4 J	2.8 B	4.5	NA	NA	4	NA	NA	<0.11*	8.6	NA	<0.55	<0.55	NA	<1.1	<2.7*	6.3	22.4
CS6	3/6/2002	NA	NA	2720 J	<1.2	3.3	20.9 B	0.14 B	0.14 B	70000 J	7.8	3.3 B	5.5	NA	7660	7.7	17200	344	0.014 B	7.4	461 B J	<0.62	NA	150 B	1.7	4.2 B J	8.9	32.3
CS-6A	3/25/2004	NA	NA	NA	<1.3	4.5	14 B	0.12 B	0.24 B	NA	5.1 J	3.1 B	5.9	NA	NA	6.2	NA	NA	0.017 B	5.6	NA	<0.63	<0.63	NA	<1.3	2.7 B J	6.3	27.5
CS-6A (Dup)	3/25/2004	NA	NA	NA	<1.2	3.4	20.6 B	0.14 B	0.2 B	NA	5.2 J	2.7 B	4.3	NA	NA	5.2	NA	NA	0.018 B	4.7 B	NA	<0.62	<0.62	NA	<1.2	3.1 B J	5.9 B	20.8

APPENDIX A
Table A-4
Summary of Inorganic Detections in
Soil and Sediment Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
CS7	3/6/2002	NA	NA	1690 J	<1.2	3.3	16.8 B	0.12 B	0.16 B	114000 J	5.6	2.5 B	4.9	NA	7480	7.2	30100	380	0.028 B	5.5	290 B J	<0.62	NA	162 B	1.7	3.9 B J	6.6	29.9
CS7 (Dup)	3/6/2002	NA	NA	2160 J	<1.2	4.7	42.6	0.18 B	0.16 B	123000 J	6	3.3 B	4.4	NA	9920	7.5	37800	650	0.012 B	5.7	344 B J	<0.61	NA	145 B	2	4 B J	9.3	24.8
CS8	3/6/2002	NA	NA	2160 J	<1.2	3.7	18.3 B	0.17 B	0.12 B	163000 J	6.4	3.2 B	5.8	NA	9470	5.4	19300	622	0.01 B	6.7	416 B J	<0.6	NA	134 B	2.2	3.8 B J	7.5	26.1

Notes:
B = Estimated result; result is less than reporting limit.
E = Matrix Interference.
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
L = Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
MBB = This analyte is present at a reportable level in the associated method blank but is less than 5% of the sample amount.
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<1.1 = Indicates constituent not detected at or above indicated detection limit.
* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level.
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds.

APPENDIX A
Table A-5
Trench T-1 Samples Pre-Excavation Results
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/kg

		VOCs								SVOCs		Pesticides					Metals														Metals									
		2-Butanone	Acetone	Chloroform	Chloromethane	Iodomethane	Methylcyclohexane	Tetrachloroethene	Toluene	Acetophenone	Dibenzofuran	4,4'-DDE	Endosulfan I	Endosulfan II	Endrin	Heptachlor epoxide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
Pre-excavation Samples																																								
T-1-4	11/8/2001	<5.3	1.8 J B	<1.3	1.7	36	NA	<1.3	<1.3	<4.2	0.64 J	<0.022	<0.022	<0.022	<0.022	0.019 J	NA	65.1	580	25.8 J	0.14 B	1.3	NA	232	7.9	1260	NA	19300	NA	NA	0.028 B	35.4	NA	<0.64	5.6	NA	31.8	158000 J	4.9 B	15.4
T-1-6	11/8/2001	0.0066 J	0.012JB	<0.005	0.014	0.18	NA	<0.005	0.00085J	<0.37	<0.37	<0.0019	<0.0019	<0.0019	0.0025 PG	<0.0019	NA	<1.1	11	22.3 J	0.2 B	0.82	NA	11.5	34.9	151	NA	94.7	NA	NA	<0.11	142	NA	<0.56	<0.56	NA	<1.1	36500 J	7	32.9
Drum Contents																																								
T-1DC-4-5'	3/16/2004	<0.03	0.028JB	0.00061 J	<0.0076	NA	0.00094 J	0.013	0.0013 J	51	<21	0.07 J	0.37	0.11 J	0.084 J	<0.22	2230 J	0.3 B	2.7	13.6 B	<0.64	<0.26	1110 J	7.4	1.2 B	7.6	24200	2.2	713 J	63.4	0.012 B	4.1 B	327 B J	0.42 B	<0.64	<638	0.73 B J	9 B J	4.5 B	7.5
Trench Fill Material																																								
T-1FILL-0'	3/16/2004	<0.023	0.0066JB	<0.0058	<0.0058	NA	<0.012	<0.0058	<0.0058	<0.35	<0.35	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	1270 J	0.54 B	14.7	18.7 B	0.13 B	0.07 B	287000 J	3.4	3.7 B	4.7	8320	5	10700 J	443	0.0077B	5.2	707 J	<0.53	<0.53	136 B	1.2 J	3.1 B J	3.9 B	7.8

Notes:
The soils exhibiting elevated metal concentrations near the Trench 1 samples were excavated and removed during interim measures conducted at the site in 2004.
J - VOCs, SVOC - indicates concentration was measured below the detection limit and is estimated.
B - VOCs, SVOC - indicates constituent was also detected in the laboratory method blank.
PG = The percentage difference between the original and confirmation analyses is greater than 40%.
J - Inorganics - indicates constituent was also detected in the laboratory method blank.
B- Inorganics - indicates concentration was measured below the detection limit and is estimated.
NA - Indicates compound was not on the target analyte list for that sample.
<10 =Indicates constituent not detected at or above indicated detection limit.

APPENDIX A
Table A-6
Total Chromium vs. Hexavalent Chromium
Summary of Analytical Results
Rohm and Haas Chemicals LLC
Cincinnati, Ohio

Sample Matrix: Soil
units: mg/kg

Sample Location	Sample Date	Chromium	Hexavalent Chromium
DP47-5'	3/9/2004	18	<0.99
DP52-1-1.5'	3/10/2004	55.4	<0.96
DP54-1-1.5'	3/10/2004	217 J	0.35 B
DP55-9'	3/10/2004	6.3 J	0.56 B
DP77-14.6-15'	3/13/2004	9 J	<0.9
DP80-1'	3/15/2004	13.5 J	<0.96

Sample Matrix: Creek Bed Sediment
units: mg/kg

Sample Location	Sample Date	Chromium	Hexavalent Chromium
CS-5A	3/25/2004	4 J	<0.88
CS-6A	3/25/2004	5.1 J	<1
CS-6A (Dup)	3/25/2004	5.2 J	<1

Sample Matrix: Groundwater
units: µg/l

Sample Location	Sample Date	Chromium	Hexavalent Chromium
DP53-12.5'	3/11/2004	10.9	<20
MW-EPA-2	3/29/2004	443	<20
MW-EPA-4	4/6/2004	64.6	<20
RWV20	4/6/2004	<5	<20
UAW06-20	3/29/2004	3.3 B	<20
UAW11-40	4/6/2004	8.5	<20
UAW11-40 BLIND DUP	4/6/2004	7.7	<20

Sample Matrix: Surface Water
Units: µg/l

Sample Location	Sample Date	Chromium	Hexavalent Chromium
WS-6A	3/25/2004	<5	<20
WS-6A BLIND DUP	3/25/2004	<5	<20

Data Qualifiers:

B = Estimated result. Result is less than reporting limit.

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

APPENDIX B

DATA SUMMARY FOR CHEMICALS DETECTED

IN GROUNDWATER AND SEEP SAMPLES

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
MW-EPA-1	5/8/2001	<500	<50	<50	<50		<500	<50	<50	1600	<100	<50		<50	<50						<50	<50	<50	<50	<25	<25				19 J
	11/15/2001	63 J B	31 J	<83	<83		<830	<83	<83	3200	<170	<83		<83	<83						<83	<83	<83	<83	<42	<42				40 J
	10/20/2002	220 J	<100	<100	NA		NA	<100	NA	3900	<100	<100		NA	NA						<100	<100	<100	NA	NA	NA				<100
	11/12/2003	<2000	<200	<200	<200		<2000	<200	<200	4500	<200	<200		<200	<200						<200	<200	<200	<200	<100	<100				<200
	3/28/2004	<830	<83	<83	<83		<830	<83	<83	2800	<83	<83		<83	<83						<83	<83	<83	<83	<42	<42				<83
	11/4/2004	310 J B	49 J B	<100	<100		<1000	<100	<100	2500	<100	<100		<100	<100						<100	<100	<100	<100	<50	<50				28 J
	11/15/2005	<560	22 J	<56	<56		<560	<56	<56	1800	<56	<56		<56	<56						<56	<56	<56	<56	<28	<28				26 J
	11/8/2006	< 1200	< 120	< 120	< 120	< 120	< 1200	< 120	< 120	4400	< 120	< 120	< 120	< 120	< 120	< 250	< 120	1000	46 J	330	< 120	< 120	< 120	< 120	< 62	< 62	< 120	< 120	< 120	< 120
MW-EPA-2	5/8/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/14/2001	2 J	<3.3	<3.3	<3.3		<33	<3.3	<3.3	<3.3	<6.7	0.81 J		<3.3	<3.3						<3.3	<3.3	<3.3	<3.3	<1.7	<1.7				<3.3
	10/20/2002	3.4 J	<2.2	<2.2	NA		NA	<2.2	NA	<2.2	<2.2	1.3 J		NA	NA						<2.2	<2.2	<2.2	NA	NA	NA				<2.2
	11/11/2003	<25	<2.5	<2.5	<2.5		<25	<2.5	<2.5	<2.5	<2.5	<2.5		<2.5	<2.5						<2.5	<2.5	<2.5	<2.5	<1.2	<1.2				<2.5
	3/29/2004	<20	<2	<2	<2		<20	<2	<2	<2	<2	<2		<2	<2						<2	<2	<2	<2	<1	<1				<2
	11/4/2004	9.2 J B	0.89 J B	<3.3	<3.3		<33	<3.3	<3.3	<3.3	<3.3	1.2 J		<3.3	<3.3						<3.3	<3.3	<3.3	<3.3	<1.7	<1.7				<3.3
	11/11/2005	2.0 U	<2	<2	<2		<20	<2	<2	<2	<2	1.0 J		<2	<2						<2	<2	<2	<2	<1	<1				<2
	11/9/2006	< 140	< 14	< 14	< 14	< 14	< 140	< 14	< 14	< 14	< 14	41	< 14	< 14	< 14	< 29	< 14	< 14	< 14	< 14	< 14	7.3 J	440	2.6 J	43	< 7.1	< 14	< 14	< 14	< 14
MW-EPA-3	5/6/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/13/2001	2.6 J	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/17/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/13/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/30/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/4/2004	1.9 J B	0.31 J B	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/11/2005	0.87 U	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/7/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
MW-EPA-4	5/8/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/13/2001	2.5 J	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/18/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/16/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	4/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/10/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/7/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
Recovery Well	7/29/2001	1600	<29	<29	<29		<290	<29	<29	8.7 J	<57	<29		NA	<29						<57	<29	<29	<29	<14	<14				<29

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW01-30	5/4/2001	<10	<1	<1	<1		<10	<1	<1	1.6	<2	<1		<1	<1						0.41 J	<1	<1	<1	<0.5	<0.5				<1
	11/8/2001	<10	<1	<1	<1		<10	<1	<1	0.5 J	<2	<1		<1	<1						0.38 J	<1	<1	<1	<0.5	<0.5				<1
	10/17/2002	<10	<1	<1	NA		NA	<1	NA	0.47 J	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/11/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/24/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2004	1.1 J	<1	<1	<1		<10	<1	<1	0.23 J	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/8/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/1/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW01-80	5/4/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/10/2001	1.2 J B	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/12/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/17/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/11/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/24/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/2/2004	0.82 J	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/8/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<1	<0.5				<1
	11/1/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW02-20	5/7/2001	<10	0.49 J	<1	<1		<10	<1	<1	32	<2	<1		<1	<1						<1	0.74 J	0.42 J	<1	<0.5	<0.5				<1
	11/10/2001	<10	0.6 J	<1	<1		<10	<1	<1	32	<2	<1		<1	<1						<1	0.21 J	<1	<1	<0.5	<0.5				<1
	10/17/2002	<10	0.37 J	<1	NA		NA	<1	NA	17	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/12/2003	<10	<1	<1	<1		<10	<1	<1	13	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/26/2004	<10	<1	<1	<1		<10	<1	<1	12	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2004	0.91 J	<1	<1	<1		<10	<1	<1	10	<1	<1		0.44 J	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/9/2005	<10	<1	<1	<1		<10	<1	<1	17	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	5.3	< 1	< 1	< 1	< 1	< 1	< 2	< 1	7.2	0.27 J	2.9	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW02-40	5/7/2001	<25	<2.5	<2.5	<2.5		<25	<2.5	<2.5	<2.5	<5	<2.5		<2.5	<2.5						<2.5	28	<2.5	4.3	62	3.3				<2.5
UAW02-40 (Dup)	5/7/2001	<12	0.47 J	<1.2	<1.2		<12	<1.2	<1.2	31	<2.5	<1.2		<1.2	<1.2						<1.2	0.67 J	0.44 J	<1.2	<0.62	<0.62				<1.2
	11/10/2001	1.8 J B	<2.5	<2.5	<2.5		<25	<2.5	<2.5	<2.5	<5	<2.5		<2.5	<2.5						<2.5	27	<2.5	4.5	59	3.2				<2.5
	10/17/2002	<20	<2	<2	NA		NA	<2	NA	<2	<2	<2		NA	NA						<2	25	<2	NA	NA	NA				<2
	11/12/2003	<20	<2	<2	<2		<20	<2	<2	<2	<2	<2		<2	<2						<2	22	<2	4.4	50	2.9				<2
	3/26/2004	<20	<2	<2	<2		<20	<2	<2	<2	<2	<2		<2	<2						<2	20	<2	3.5	49	3.2				<2
	11/3/2004	1.6 J	<1.7	<1.7	<1.7		<17	<1.7	<1.7	<1.7	<1.7	<1.7		<1.7	<1.7						<1.7	20	<1.7	3.9	48	2.5				<1.7
	11/9/2005	<17	<1.7	<1.7	<1.7		<17	<1.7	<1.7	<1.7	<1.7	<1.7		<1.7	<1.7						<1.7	15	<1.7	2.5	38	2.4				<1.7
	11/3/2006	< 12	< 1.2	< 1.2	< 1.2	< 1.2	< 12	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 2.5	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	14	< 1.2	3.2	37	2.1	< 1.2	< 1.2	< 1.2	< 1.2
UAW02-40 (DUP)	11/3/2006	< 14	< 1.4	< 1.4	< 1.4	< 1.4	< 14	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 2.9	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	14	< 1.4	3.1	37	2.2	< 1.4	< 1.4	< 1.4	< 1.4

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW03-20	5/7/2001	3.4 J	1.2	<1	<1		<10	1.5	<1	8.6	<2	<1		<1	<1						<1	0.84 J	14	<1	<0.5	<0.5				0.55 J
	11/11/2001	3.8 J B	1.4 J	<2.5	<2.5		<25	<2.5	<2.5	41	<5	<2.5		0.73 J	<2.5						<2.5	<2.5	1.2 J	<2.5	<1.2	<1.2				1.6 J
	10/23/2002	12 J	<6.7	<6.7	NA		NA	<6.7	NA	55	<6.7	<6.7		NA	NA						<6.7	<6.7	<6.7	NA	NA	NA				<6.7
	11/12/2003	<100	<10	<10	<10		<100	<10	<10	130	<10	<10		<10	<10						<10	<10	<10	<10	<5	<5				<10
	3/28/2004	<130	<13	<13	<13		<130	<13	<13	150	<13	<13		<13	<13						<13	<13	<13	<13	<6.7	<6.7				<13
	11/4/2004	23 J B	4 J B	<10	<10		<100	2.8 J	<10	110	<10	<10		<10	<10						<10	<10	<10	<10	<5	<5				<10
UAW03-20 (Dup)	11/4/2004	32 J B	4.7 J B	<12	<12		<120	<12	<12	110	<12	<12		<12	<12						<12	<12	<12	<12	<6.2	<6.2				3.9 J
	11/9/2005	6.3 U	<4	<4	<4		<40	<4	<4	46	<4	<4		0.65 J	<4						<4	<4	<4	<4	<2	<2				1.4 J
	11/6/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	0.45 J	< 1	< 1	< 1	< 1	< 1	< 2	< 1	0.45 J	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW04-20	5/7/2001	<10000	<1000	<1000	<1000		<10000	<1000	<1000	<1000	<2000	<1000		<1000	<1000						<1000	<1000	<1000	<1000	<500	<500				<1000
	11/11/2001	590 J B	<250	<250	<250		<2500	<250	<250	<250	<500	<250		<250	<250						<250	<250	<250	<250	<120	<120				<250
	10/20/2002	1300 B	<33	<33	NA		NA	<33	NA	<33	<33	<33		NA	NA						<33	<33	<33	NA	NA	NA				<33
	11/12/2003	<1000	<100	<100	<100		<1000	<100	<100	<100	<100	<100		<100	<100						<100	<100	<100	<100	<50	<50				<100
	3/28/2004	<10000	<1000	<1000	<1000		<10000	<1000	<1000	<1000	<1000	<1000		<1000	<1000						<1000	<1000	<1000	<1000	<500	<500				<1000
	11/3/2004	980 J B	87 J B	<330	<330		<3300	<330	<330	<330	<330	<330		<330	<330						<330	<330	<330	<330	<170	<170				<330
	11/9/2005	<100	<10	<10	<10		<100	<10	<10	2.0 J	<10	<10		<10	<10						<10	<10	<10	<10	<5	<5				<10
	11/6/2006	< 1400	< 140	< 140	< 140	< 140	< 1400	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 290	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 71	< 71	< 140	< 140	< 140	< 140
UAW04-20 (DUP)	11/6/2006	< 1400	< 140	< 140	< 140	< 140	< 1400	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 290	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 71	< 71	< 140	< 140	< 140	< 140
UAW05-20	5/6/2001	<400	<40	<40	<40		<400	<40	<40	460	<80	<40		<40	<40						<40	<40	<40	<40	<20	<20				<40
	10/10/2001	22 J B	<40	<40	<40		<400	<40	<40	440	<80	<40		<40	<40						<40	<40	<40	<40	<20	<20				<40
	11/12/2001	<220	<22	<22	<22		<220	<22	<22	390	<44	<22		<22	<22						<22	<22	<22	<22	<11	<11				4 J
	10/20/2002	49 J B	14 J	<25	NA		NA	6.7 J	NA	310	<25	<25		NA	NA						<25	<25	<25	NA	NA	NA				<25
	11/10/2003	<250	<25	<25	<25		<250	<25	<25	770	<25	<25		<25	<25						<25	<25	<25	<25	<12	<12				<25
	3/28/2004	<200	<20	<20	<20		<200	<20	<20	580	<20	<20		<20	<20						<20	<20	<20	<20	<10	<10				<20
UAW05-20 (Dup)	3/28/2004	<170	<17	<17	<17		<170	<17	<17	540	<17	<17		<17	<17						<17	<17	<17	<17	<8.3	<8.3				<17
	11/4/2004	57 J B	8.6 J B	<20	<20		<200	6.9 J	<20	560	<20	<20		<20	<20						<20	<20	<20	<20	<10	<10				<20
	11/15/2005	<200	<20	<20	<20		<200	<20	<20	780	<20	<20		<20	<20						<20	<20	<20	<20	<10	<10				<20
	11/9/2006	< 170	< 17	< 17	< 17	< 17	< 170	< 17	< 17	550	< 17	< 17	< 17	< 17	< 17	< 33	< 17	41	5.1 J	45	< 17	< 17	< 17	< 17	< 8.3	< 8.3	< 17	< 17	< 17	< 17

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW06-20	5/6/2001	720	<10	<10	<10		<100	<10	<10	70	<20	<10		<10	<10						<10	<10	<10	<10	<5	<5				<10
	10/10/2001	11000	<170	<170	<170		<1700	<170	<170	100 J	<330	<170		<170	<170						<170	<170	<170	<170	<83	<83				<170
	11/13/2001	45000	<670	<670	<670		750 J B	<670	<670	110 J	<1300	<670		<670	<670						<670	<670	<670	<670	<330	<330				<670
	10/20/2002	170 B	1.2 J	<2.5	NA		NA	1.8 J	NA	71	<2.5	<2.5		NA	NA						<2.5	2.2 J	<2.5	NA	NA	NA				1.3 J
	11/12/2003	<33	<3.3	<3.3	<3.3		<33	<3.3	<3.3	73	<3.3	<3.3		<3.3	<3.3						<3.3	<3.3	<3.3	<3.3	<1.7	<1.7				<3.3
	3/29/2004	<25	<2.5	<2.5	<2.5		<25	<2.5	<2.5	52	<2.5	<2.5		<2.5	<2.5						<2.5	<2.5	<2.5	<2.5	<1.2	<1.2				<2.5
	11/4/2004	10 J B	1.7 J B	<3.3	<3.3		<33	1.7 J	<3.3	83	<3.3	<3.3		<3.3	<3.3						<3.3	1.2 J	<3.3	<3.3	<1.7	<1.7				1.6 J
	11/15/2005	<33	1.2 J	<3.3	<3.3		<33	<3.3	<3.3	120	<3.3	<3.3		<3.3	<3.3						<3.3	1.7 J	<3.3	<3.3	<1.7	<1.7				1.4 J
	11/9/2006	< 50	< 5	< 5	< 5	< 5	< 50	< 5	< 5	120	< 5	< 5	< 5	< 5	< 5	< 10	< 5	140	2.1 J	13	< 5	< 5	< 5	< 5	< 2.5	< 2.5	< 5	< 5	< 5	< 5
UAW07-20	5/8/2001	<20	2.1	<2	<2		<20	2.4	<2	39	<4	<2		NA	<2						<4	1.6 J	<2	<2	<1	<1				4.4
UAW07-20 (Dup)	5/8/2001	<25	1.8 J	<2.5	<2.5		<25	1.1 J	<2.5	38	<5	<2.5		NA	<2.5						<5	1.5 J	<2.5	<2.5	<1.2	<1.2				4.3
	11/15/2001	3.3 J B	5.2	<2	<2		<20	<2	<2	64	<4	<2		NA	<2						<4	1.2 J	<2	<2	<1	<1				5.6
	10/20/2002	4.8 J	5.8	<2.5	NA		NA	0.67 J	NA	71	<2.5	<2.5		NA	NA						<2.5	<2.5	<2.5	NA	NA	NA				2.2 J
	11/12/2003	<33	4.1	<3.3	<3.3		<33	<3.3	<3.3	91	<3.3	<3.3		<3.3	<3.3						<3.3	<3.3	<3.3	<3.3	<1.7	<1.7				<3.3
UAW07-20 (Dup)	11/12/2003	<33	4.1	<3.3	<3.3		<33	<3.3	<3.3	93	<3.3	<3.3		<3.3	<3.3						<3.3	<3.3	<3.3	<3.3	<1.7	<1.7				<3.3
	4/5/2004	<20	3.4	<2	<2		<20	<2	<2	69	<2	<2		<2	<2						<2	<2	<2	<2	<1	<1				2.7
	11/4/2004	14 J B	6.3 J B	<6.7	<6.7		<67	7.1	<6.7	190	<6.7	<6.7		<6.7	<6.7						<6.7	<6.7	<6.7	<6.7	<3.3	<3.3				<6.7
	11/15/2005	<83	2.7 J	<8.3	<8.3		<83	<8.3	<8.3	270	<8.3	<8.3		<8.3	<8.3						<8.3	<8.3	<8.3	<8.3	<4.2	<4.2				2.2 J
	11/6/2006	< 57	3.2 J	< 5.7	< 5.7	< 5.7	< 57	< 5.7	< 5.7	160	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	< 11	< 5.7	71	1.4 J	10	< 5.7	< 5.7	< 5.7	< 5.7	< 2.9	< 2.9	< 5.7	< 5.7	< 5.7	3.1 J
UAW08-20	5/6/2001	150 J	41	<33	<33		<330	20 J	<33	37	<67	<33		NA	<33						<67	<33	<33	<33	<17	<17				32 J
	11/13/2001	580 J	110	<100	<100		130 J B	64 J	<100	61 J	<200	<100		NA	<100						<200	<100	<100	<100	<50	<50				57 J
	10/20/2002	250 J B	110	<33	NA		NA	46	NA	48	<33	<33		NA	NA						<33	<33	<33	NA	NA	NA				40
	11/10/2003	<400	120	<40	<40		<400	<40	<40	54	<40	<40		<40	<40						<40	<40	<40	<40	<20	<20				44
	3/29/2004	<500	92	<50	<50		<500	51	<50	61	<50	<50		<50	<50						<50	<50	<50	<50	<25	<25				54
	11/4/2004	280 J B	150 B	<33	<33		29 J	59	<33	62	<33	<33		<33	<33						<33	<33	<33	<33	<17	<17				59
	11/15/2005	260 U	150	<25	<25		<250	61	<25	62	<25	<25		3.9 J	<25						<25	<25	<25	<25	<12	<12				55
	11/9/2006	< 100	87	< 10	< 10	< 10	< 100	< 10	< 10	36	< 10	< 10	< 10	1.9 J	< 10	< 20	< 10	230	3.9 J	22	< 10	< 10	< 10	< 10	< 5	< 5	< 10	< 10	< 10	30
UAW09-20	5/5/2001	<10	<1	0.49 J	<1		<10	<1	<1	<1	<2	0.4 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/9/2001	<10	<1	0.2 J	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/16/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/11/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	4/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/10/2005	<10	<1	0.54 J	<1		<10	<1	<1	<1	<1	0.74 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2006	< 10	< 1	1.3	< 1	< 1	< 10	< 1	< 1	< 1	< 1	2.7	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.19 J	< 0.5	< 0.5	< 1	< 1	< 1	< 1

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW09-60	5/5/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	0.4 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/9/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	0.32 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/16/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/11/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	4/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2004	0.83 J B	<1	0.26 J	<1		<10	<1	<1	<1	<1	6.1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/10/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW10-50	10/12/2001	1.1 J	<2	<2	<2		<20	<2	<2	<2	<4	20		<2	<2						<2	12	54	3.4	54	0.87 J				<2
	11/13/2001	3 J	<4	<4	<4		5.3 J B	<4	<4	<4	<8	35		<4	<4						<4	12	45	1.6 J	46	0.75 J				<4
	10/19/2002	1.9 J	<1.4	<1.4	NA		NA	<1.4	NA	<1.4	0.44 J	13		NA	NA						<1.4	13	23	NA	NA	NA				<1.4
	11/10/2003	<14	<1.4	<1.4	<1.4		<14	<1.4	<1.4	<1.4	<1.4	24		<1.4	<1.4						<1.4	14	10	1.7	38	0.97				<1.4
	3/30/2004	<100	<10	<10	<10		<100	<10	<10	<10	<10	68		<10	<10						<10	13	380	<10	59	<5				<10
	11/5/2004	17 J B	<9.1	<9.1	<9.1		<91	<9.1	<9.1	<9.1	6.8 J	29		<9.1	<9.1						<9.1	11	230	<9.1	52	<4.5				<9.1
	11/11/2005	<50	<5	<5	<5		<50	<5	<5	<5	<5	23		<5	<5						<5	6.7	110	<5	45	2.8				<5
	11/9/2006	< 140	< 14	< 14	< 14	< 14	< 140	< 14	< 14	< 14	< 14	22	< 14	< 14	< 14	< 29	< 14	< 14	< 14	< 14	< 14	5.4 J	420	< 14	33	< 7.1	< 14	< 14	< 14	< 14
UAW10-80	10/12/2001	35 J	<67	<67	<67		<670	<67	<67	<67	<130	24 J		<67	<67						<67	<67	2200	<67	<33	<33				<67
	11/13/2001	<1700	<170	<170	<170		190 J B	<170	<170	<170	<330	<170		<170	<170						<170	<170	3500	<170	<83	<83				<170
	10/19/2002	12 J	<6.7	<6.7	NA		NA	<6.7	NA	<6.7	<6.7	<6.7		NA	NA						<6.7	<6.7	67	NA	NA	NA				<6.7
	11/13/2003	<220	<22	<22	<22		<220	<22	<22	<22	<22	<22		<22	<22						<22	<22	530	<22	<11	<11				<22
	3/30/2004	<20	<2	<2	<2		<20	<2	<2	<2	<2	<2		<2	<2						<2	<2	63	<2	<1	<1				<2
	11/5/2004	3.4 J B	1 J B	<1.7	<1.7		<17	<1.7	<1.7	<1.7	<1.7	<1.7		<1.7	<1.7						<1.7	<1.7	49	<1.7	1	<0.84				<1.7
	11/16/2005	<25	<2.5	<2.5	<2.5		<25	<2.5	<2.5	<2.5	1.3 J	0.47 J		<2.5	<2.5						<2.5	<2.5	66	<2.5	0.97 J	<1.2				<2.5
	11/9/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	0.61 J	0.23 J	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	0.27 J	3.3	< 1	0.56	< 0.5	< 1	< 1	< 1	< 1
UAW11-10	5/8/2001	32000	<500	<500	<500		<5000	270 J	<500	<500	<1000	<500		<500	<500						<500	<500	<500	<500	<250	<250				<500
	11/10/2001	14000	<250	<250	<250		<2500	<250	<250	<250	<500	<250		<250	<250						<250	<250	<250	<250	<120	<120				<250
	10/18/2002	1100	<20	<20	NA		NA	<20	NA	32	<20	<20		NA	NA						<20	<20	<20	NA	NA	NA				<20
	11/16/2003	350	<7.1	<7.1	<7.1		<71	<7.1	<7.1	17	<7.1	<7.1		<7.1	<7.1						<7.1	<7.1	<7.1	<7.1	<3.6	<3.6				<7.1
	4/6/2004	2000	<40	<40	<40		<400	<40	<40	<40	<40	<40		<40	<40						<40	<40	<40	<40	<20	<20				<40
	11/7/2004	230 B	1.1 J	<5	<5		3.4 J	<5	<5	11	<5	<5		<5	<5						<5	1.8 J	<5	<5	1.4 J	<2.5				<5
	11/10/2005	160	0.89 J	<1	<1		4.7 U	0.31 J	<1	5.3	<1	<1		<1	<1						<1	1.1	<1	<1	0.77	<0.5				0.8 J
	11/2/2006	< 330	< 33	< 33	< 33	< 33	< 330	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 67	< 33	8.8 J	< 33	< 33	< 33	< 33	< 33	< 33	< 17	< 17	< 33	< 33	< 33	< 33

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SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW11-40	5/8/2001	<50	<5	<5	<5		<50	<5	<5	3 J	<10	2.1 J		<5	<5						<5	10	160	<5	12	<2.5				<5
	11/12/2001	6.6 J B	<5	<5	<5		<50	<5	<5	3.2 J	<10	3.5 J		<5	<5						<5	9.5	130	<5	12	<2.5				<5
	10/18/2002	<10	<1	<1	NA		NA	<1	NA	3.6	<1	1.7		NA	NA						<1	7	26	NA	NA	NA				<1
	11/16/2003	<10	<1	<1	<1		<10	<1	<1	2.4	<1	<1		<1	<1						<1	4.8	11	<1	5.8	<0.5				<1
	4/6/2004	<10	<1	<1	<1		<10	<1	<1	2.4	<1	<1		<1	<1						<1	4.5	7.3	<1	5.2	<0.5				<1
UAW11-40 (Dup)	4/6/2004	<10	<1	<1	<1		<10	<1	<1	2.3	<1	<1		<1	<1						<1	4.5	7.2	<1	5.1	<0.5				<1
	11/7/2004	0.79 J B	<1	<1	<1		<10	<1	<1	2.3	<1	0.52 J		<1	<1						<1	5.2	7.1	<1	6	0.31 J				<1
	11/10/2005	0.79 J B	<1	<1	<1		<10	<1	<1	2.2	<1	0.53 J		<1	<1						<1	5.4	7.7	0.44 J	6.1	0.29 J				<1
	11/2/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	1.6	< 1	0.7 J	< 1	< 1	< 1	< 2	< 1	0.24 J	< 1	< 1	< 1	4.6	7.2	0.29 J	6.7	0.32 J	< 1	< 1	< 1	< 1
UAW12-20	5/6/2001	<560	<56	<56	<56		<560	<56	<56	920	<110	<56		NA	<56						<110	<56	<56	<56	<28	<28				<56
	11/15/2001	<500	<50	<50	<50		<500	<50	<50	1400	<100	<50		NA	<50						<100	<50	<50	<50	<25	<25				<50
	10/20/2002	97 J	<50	<50	NA		NA	<50	NA	1300	<50	<50		NA	NA						<50	<50	<50	NA	NA	NA				<50
	11/12/2003	<670	<67	<67	<67		<670	<67	<67	1100	<67	<67		<67	<67						<67	<67	<67	<67	<33	<33				<67
	3/28/2004	<560	<56	<56	<56		<560	<56	<56	1400	<56	<56		<56	<56						<56	<56	<56	<56	<28	<28				<56
	11/4/2004	250 J B	<71	<71	<71		<710	20 J	<71	2400	<71	<71		<71	<71						<71	<71	<71	<71	<36	<36				<71
	11/14/2005	<1000	<100	<100	<100		<1000	<100	<100	2600	<100	<100		<100	<100						<100	<100	<100	<100	<50	<50				<100
	11/6/2006	< 710	< 71	< 71	< 71	< 71	< 710	< 71	< 71	2000	< 71	< 71	< 71	< 71	< 71	< 140	< 71	310	25 J	140	< 71	< 71	< 71	< 71	< 36	< 36	< 71	< 71	< 71	< 71
UAW13-20	5/6/2001	180	21	<10	<10		<100	170	<10	20	<20	<10		NA	<10						<20	4.9 J	<10	<10	1.7 J	<5				<10
	11/15/2001	450 B	20	<17	<17		38 J	140	<17	31	<33	<17		NA	<17						<33	<17	<17	<17	<8.3	<8.3				4.1 J
	10/23/2002	300 J	18 J	<40	NA		NA	410	NA	38 J	<40	<40		NA	NA						<40	<40	<40	NA	NA	NA				<40
	11/12/2003	190	19	<10	<10		<100	120	<10	29	<10	<10		<10	<10						<10	<10	<10	<10	<5	<5				<10
	3/28/2004	<200	<20	<20	<20		<200	150	<20	28	<20	<20		<20	<20						<20	<20	<20	<20	<10	<10				<20
	11/5/2004	200 B	26 B	<20	<20		21 J	180	<20	32	<20	<20		<20	<20						<20	<20	<20	<20	<10	<10				<20
	11/16/2005	95 J	22	<10	<10		16 J	120	<10	40	<10	<10		<10	<10						<10	<10	<10	<10	<5	<5				4.3 J
	10/31/2006	< 100	15	< 10	< 10	< 10	< 100	95	< 10	39	< 10	< 10	< 10	< 10	< 10	< 20	< 10	66	< 10	11	< 10	< 10	< 10	< 10	< 5	< 5	< 10	< 10	< 10	3 J
UAW14-10	5/5/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	0.37 J		<1	<1						<1	<1	0.67 J	<1	<0.5	<0.5				<1
	11/9/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/16/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/16/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	4/5/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/16/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/8/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW15-20	5/6/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	3.1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/11/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	14		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/18/2002	<10	<1	<1	NA		NA	0.24 J	NA	<1	<1	5.6		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/17/2003	<80	<8	<8	<8		<80	<8	<8	<8	<8	190		<8	<8						<8	<8	<8	<8	<4	<4				<8
	4/7/2004	<50	<5	<5	<5		<50	<5	<5	<5	<5	120		<5	<5						<5	<5	<5	<5	<2.5	<2.5				<5
	11/7/2004	5.5 J	<6.7	<6.7	<6.7		<67	<6.7	2.2 J	<6.7	<6.7	140		<6.7	<6.7						<6.7	<6.7	<6.7	<6.7	<3.3	<3.3				<6.7
	11/15/2005	3.8 U	<5	<5	<5		<50	<5	2.1 J	<5	<5	150		<5	<5						<5	<5	<5	<5	<2.5	<2.5				<5
	11/2/2006	< 14	< 1.4	< 1.4	< 1.4	< 1.4	< 14	< 1.4	1.1 J	< 1.4	< 1.4	40	< 1.4	< 1.4	< 1.4	< 2.9	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 0.72	< 0.72	< 1.4	< 1.4	< 1.4	< 1.4
UAW15-50	5/6/2001	7300	<120	<120	<120		<1200	<120	<120	<120	<250	<120		<120	<120						<120	<120	<120	<120	<62	<62				<120
	11/11/2001	10000	<170	<170	<170		<1700	<170	<170	25 J	<330	<170		<170	<170						<170	<170	<170	<170	<83	<83				<170
	10/18/2002	280	<10	<10	NA		NA	<10	NA	23	<10	<10		NA	NA						<10	<10	<10	NA	NA	NA				<10
	11/17/2003	<120	<12	<12	<12		<120	<12	<12	21	<12	<12		<12	<12						<12	<12	<12	<12	<6.2	<6.2				<12
	4/7/2004	<200	<20	<20	<20		<200	<20	<20	34	<20	<20		<20	<20						<20	<20	<20	<20	<10	<10				<20
	11/7/2004	20 J B	<10	<10	<10		4.6 J	<10	<10	19	<10	<10		<10	<10						<10	<10	<10	<10	<5	<5				<10
UAW15-50 (Dup)	11/7/2004	<100	2.8 J	<10	<10		<100	<10	<10	23	<10	<10		<10	<10						<10	<10	<10	<10	<5	<5				<10
	11/15/2005	4.3 U	<3.3	<3.3	<3.3		2 U	<3.3	<3.3	25	<3.3	<3.3		0.5 J	<3.3						<3.3	<3.3	<3.3	<3.3	<1.7	<1.7				<3.3
	11/2/2006	< 50	< 5	< 5	< 5	< 5	4.6 J	1.5 J	< 5	25	< 5	< 5	< 5	< 5	< 5	< 10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 2.5	< 2.5	< 5	< 5	< 5	< 5
UAW16-10	10/12/2001	8000	<120	<120	<120		<1200	<120	<120	23 J	<250	<120		<120	<120						<120	<120	<120	<120	<62	<62				<120
UAW16-10 (Dup)	10/12/2001	6500	<100	<100	<100		<1000	<100	<100	24 J	<200	<100		<100	<100						<100	<100	<100	<100	<50	<50				<100
	11/13/2001	6100	<100	<100	<100		<1000	<100	<100	23 J	<200	<100		<100	<100						<100	<100	<100	<100	<50	<50				<100
	10/18/2002	3.7 J	0.58 J	<1	NA		NA	<1	NA	21	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/16/2003	<10	<1	<1	<1		<10	<1	<1	17	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
UAW16-10 (Dup)	11/17/2003	<10	<1	<1	<1		<10	<1	<1	17	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	4/7/2004	<10	<1	<1	<1		<10	<1	<1	11	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/7/2004	2.9 J B	0.28 J	<1	<1		<10	0.34 J	<1	10	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/15/2005	<10	0.26 J	<1	<1		<10	<1	<1	9.1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				0.21 J
	11/6/2006	< 10	0.38 J	< 1	< 1	< 1	< 10	< 1	< 1	5.8	< 1	< 1	< 1	0.21 J	< 1	< 2	< 1	11	0.85 J	6.5	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW17-40	5/5/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/9/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/16/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	<1	NA	NA				<1
	11/16/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/31/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/14/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/31/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW18-20	10/12/2001	1.4 J	<1	<1	<1		0.42 J	5.7	<1	2.2	<2	<1		<1	<1						<1	0.29 J	<1	<1	<0.5	<0.5				<1
	11/13/2001	4.5 J	<2	<2	<2		1.4 J B	1.9 J	<2	1.7 J	<4	<2		<2	<2						<2	0.49 J	<2	<2	<1	<1				<2
	10/18/2002	<10	<1	<1	NA		NA	0.7 J	NA	2.3	<1	<1		NA	NA						<1	0.54 J	<1	NA	NA	NA				<1
	11/16/2003	<10	<1	<1	<1		<10	<1	<1	2.1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	4/7/2004	<10	<1	<1	<1		<10	<1	<1	1.7	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/7/2004	1.6 J B	<1	<1	<1		0.88 J	0.78 J	<1	1.5	<1	1.2		0.87 J	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/15/2005	5.1 U	<1	<1	<1		<10	<1	<1	0.42 J	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2006	< 10	0.25 J	< 1	< 1	< 1	< 10	< 1	< 1	3	< 1	< 1	< 1	0.13 J	< 1	< 2	< 1	4.7	0.21 J	1.8	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW19-80	5/6/2001	<17	<1.7	<1.7	<1.7		<17	<1.7	<1.7	<1.7	<3.3	19		<1.7	<1.7						<1.7	5.7	45	<1.7	1.3	<0.84				<1.7
	11/12/2001	1.3 J B	<1	<1	<1		<10	<1	<1	<1	<2	12		<1	<1						<1	4.8	33	0.29 J	1.3	<0.5				<1
UAW19-80 (Dup)	11/12/2001	6.3 J B	<5	<5	<5		<50	<5	<5	3.3 J	<10	3.7 J		<5	<5						<5	9.8	140	<5	13	<2.5				<5
	10/17/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	6		NA	NA						<1	8.4	26	NA	NA	NA				<1
UAW19-80 (Dup)	10/17/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	5.7		NA	NA						<1	8.1	25	NA	NA	NA				<1
	11/13/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	1.2		<1	<1						<1	11	26	<1	5.5	<0.5				<1
	3/30/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	1.1		<1	<1						<1	14	24	1.3	6.8	<0.5				<1
	11/5/2004	2.7 J B	0.29 J B	<1	<1		<10	<1	<1	<1	<1	1.1		<1	<1						<1	14	25	1.8	7.5	<0.5				<1
	11/11/2005	<10	<1	<1	<1		<10	<1	<1	<1	0.77 J	1.5		<1	<1						<1	16	35	1.8	11	0.46 J				<1
UAW19-80(DUP)	11/11/2005	<10	<1	<1	<1		<10	<1	<1	<1	0.73 J	1.5		<1	<1						<1	16	35	1.8	11	0.45 J				<1
	11/8/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	0.35 J	1.3	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	15	35	1.8	14	0.48 J	< 1	< 1	< 1	< 1
UAW20-60	5/7/2001	<100	<10	<10	<10		<100	<10	<10	<10	<20	40		<10	<10						<10	55	300	11	100	2 J				<10
	11/14/2001	7.8 J	<11	<11	<11		<110	<11	<11	<11	<22	39		<11	<11						<11	52	310	10 J	92	2.5 J				<11
UAW20-60 (Dup)	11/14/2001	<110	<11	<11	<11		<110	<11	<11	<11	<22	41		<11	<11						<11	58	320	11	99	1.8 J				<11
	10/19/2002	21 J	<12	<12	NA		NA	<12	NA	<12	4.4 J	35		NA	NA						<12	38	410	NA	NA	NA				<12
UAW20-60 (Dup)	10/19/2002	28 J	<15	<15	NA		NA	<15	NA	<15	<15	31		NA	NA						<15	35	380	NA	NA	NA				<15
	11/13/2003	<220	<22	<22	<22		<220	<22	<22	<22	<22	65		<22	<22						<22	32	560	<22	73	<11				<22
	3/30/2004	<330	<33	<33	<33		<330	<33	<33	<33	<33	53		<33	<33						<33	<33	730	<33	57	<17				<33
	11/5/2004	130 J B	9.3 J B	<40	<40		<400	<40	<40	<40	<40	71		<40	<40						<40	42	1200	19 J	80	<20				<40
	11/11/2005	<500	<50	<50	<50		<500	<50	<50	<50	40 J	70		<50	<50						<50	43 J	1500	9.6 J	81	<25				<50
	11/7/2006	< 500	< 50	< 50	< 50	< 50	< 500	< 50	< 50	< 50	< 50	82	< 50	< 50	< 50	< 100	< 50	< 50	< 50	< 50	< 50	26 J	1600	9.8 J	63	< 25	< 50	< 50	< 50	< 50

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Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW21-30	5/5/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/11/2001	0.8 J B	<1	<1	<1		<10	<1	<1	<1	<2	0.23 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/18/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/11/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/27/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	0.33 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/9/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	0.30 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/9/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	0.58 J	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW21-80	5/5/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	0.43 J		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/11/2001	1.3 J B	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/18/2002	<10	<1	<1	NA		NA	<1	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/11/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/27/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/8/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/8/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW22-20	10/13/2001	6.2 J B	1.3 J	<2.5	<2.5		<25	<2.5	<2.5	29	<5	<2.5		<2.5	<2.5						<2.5	53	2.5	<2.5	6.9	<1.2				<2.5
	11/13/2001	5.3 J	2.2 J	<6.9	<6.9		10 J B	<6.9	<6.9	38	<14	<6.9		<6.9	<6.9						<6.9	66	2.3 J	<6.9	16	<3.4				<6.9
	10/20/2002	3700 B	<50	<50	NA		NA	<50	NA	95	<50	<50		NA	NA						<50	<50	<50	NA	NA	NA				<50
	11/10/2003	<20	<2	<2	<2		<20	<2	<2	65	<2	<2		<2	<2						<2	12	2.7	<2	2.8	<1				<2
	3/29/2004	<10	<1	<1	<1		<10	<1	<1	34	<1	<1		<1	<1						<1	8.1	2	<1	1.6	<0.5				<1
	11/4/2004	7.5 J B	2.6 B	<2.5	<2.5		<25	<2.5	<2.5	53	<2.5	<2.5		<2.5	<2.5						<2.5	39	1.5 J	<2.5	17	<1.2				<2.5
	11/15/2005	5.6 U	1.6 J	<2	<2		<20	<2	<2	24	<2	<2		<2	<2						<2	18	0.81 J	<2.0	3.2	<1				<2
	11/9/2006	< 25	< 2.5	< 2.5	< 2.5	< 2.5	< 25	< 2.5	< 2.5	24	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 5	< 2.5	68	1.1 J	7.7	< 2.5	3.9	2.5	< 2.5	1.1 J	< 1.2	< 2.5	< 2.5	< 2.5	< 2.5
UAW23-20	10/12/2001	11 J	<20	<20	<20		<200	<20	<20	<20	<40	67		<20	<20						<20	20	660	<20	25	<10				<20
	11/14/2001	<200	<20	<20	<20		<200	<20	<20	<20	<40	60		<20	<20						<20	17 J	510	<20	21	<10				<20
	10/19/2002	<12	<1.2	<1.2	NA		NA	<1.2	NA	<1.2	<1.2	31		NA	NA						<1.2	11	34	<1.2	NA	NA				<1.2
	11/13/2003	<17	<1.7	<1.7	<1.7		<17	<1.7	<1.7	<1.7	<1.7	7.7		<1.7	<1.7						<1.7	10	20	<1.7	11	<0.84				<1.7
	3/28/2004	<14	<1.4	<1.4	<1.4		<14	<1.4	<1.4	<1.4	<1.4	8		<1.4	<1.4						<1.4	10	21	<1.4	10	0.84				<1.4
	11/5/2004	<10	0.25 J B	<1	<1		<10	<1	<1	<1	<1	5.4		<1	<1						<1	9.1	5.6	2.8	9.3	0.6				<1
	11/14/2005	<14	<1.4	<1.4	<1.4		<14	<1.4	<1.4	<1.4	<1.4	29		<1.4	<1.4						<1.4	5.9	0.52 J	0.59 J	6.8	0.62 J				<1.4
	11/6/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	37	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	5.8	0.32 J	0.38 J	6.6	0.85	< 1	< 1	< 1	< 1

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
UAW24-70	10/13/2001	<10	<1	<1	<1		<10	<1	<1	<1	<2	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/15/2001	2.9 J B	<1	<1	<1		<10	1.5	<1	<1	<2	<1		<1	<1						<1	<1	0.65 J	<1	<0.5	<0.5				<1
	10/17/2002	<10	<1	<1	NA		NA	0.55 J	NA	<1	<1	<1		NA	NA						<1	<1	<1	NA	NA	NA				<1
	11/16/2003	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	4/5/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2004	<10	<1	<1	<1		0.5 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/16/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	10/31/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW25-20	10/13/2001	1.5 J B	0.6 J	<1	<1		0.48 J	<1	<1	9	<2	<1		<1	<1						<1	0.28 J	<1	<1	<0.5	<0.5				<1
	11/13/2001	2.3 J	0.33 J	<1	<1		<10	<1	<1	11	<2	<1		<1	<1						<1	0.17 J	<1	<1	<0.5	<0.5				<1
	10/18/2002	<10	<1	<1	NA		NA	<1	NA	18	<1	<1		NA	NA						<1	0.5 J	<1	NA	NA	NA				<1
	11/12/2003	<10	<1	<1	<1		<10	<1	<1	11	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	3/27/2004	<10	<1	<1	<1		<10	<1	<1	8	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/3/2004	0.79 J	<1	<1	<1		<10	<1	<1	7.9	<1	<1		1.2	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/9/2005	<10	<1	<1	<1		<10	<1	<1	6	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/8/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	6.4	< 1	< 1	< 1	< 1	< 1	< 2	< 1	11	0.42 J	3.3	< 1	< 1	0.95 J	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW26-70	4/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/6/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/10/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
	11/7/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
UAW27-50	3/31/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	<1		<1	<1						<1	10	<1	<1	5.2	<0.5				<1
	11/5/2004	<10	<1	<1	<1		<10	<1	<1	<1	<1	0.42 J		<1	<1						<1	9.9	0.52 J	0.66 J	5.4	<0.5				<1
	11/11/2005	<10	<1	<1	<1		<10	<1	<1	<1	<1	0.51 J		<1	<1						<1	10	0.58 J	0.79 J	7.1	0.27 J				<1
	11/1/2006	< 10	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	0.33 J	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	6.4	0.4 J	0.54 J	5.5	0.24 J	< 1	< 1	< 1	< 1
LAW05-150	3/16/2002	<200	<20	<20	<20		<200	<20	<20	<20	<40	<20		NA	<20						<40	25	450	<20	26	4 J				<20
LAW05-150 (Dup)	3/16/2002	<200	<20	<20	<20		<200	<20	<20	<20	<40	<20		NA	<20						<40	24	450	<20	26	4.6 J				<20
LAW05-60	3/16/2002	5.5 J	<2.9	<2.9	<2.9		<29	<2.9	<2.9	<2.9	<5.7	1 J		NA	<2.9						<5.7	46	<2.9	9.8	64	3.5				<2.9
LAW12-60	10/13/2001	0.55 J B	<1	<1	<1		<10	<1	<1	0.14 J	<2	<1		NA	<1						<2	2.3	4.6	<1	5.3	0.73				<1
	11/16/2001	1.5 J	<1	<1	<1		<10	<1	<1	<1	<2	<1		NA	<1						<2	2.5	4.8	<1	5.1	0.68				<1

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Groundwater																														
CINEB-1	11/11/2005	5.5 J B	<1	<1	<1		0.71 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
5CINTB-1	11/15/2005	5.7 J B	<1	<1	<1		0.8 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
8CINTB-1	11/8/2005	8.6 J	<1	<1	<1		0.83 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
9CINTB-1	11/9/2005	8.4 J	<1	<1	<1		0.88 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
10CINTB-1	11/10/2005	1.1 J	<1	<1	<1		0.45 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
6CINTB-1	11/16/2005	3.2 J	<1	<1	<1		0.48 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
4CINTB-1	11/14/2005	9.2 J	<1	<1	<1		0.82 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
11CINTB-1	11/11/2005	4.8 J B	<1	<1	<1		0.65 J	<1	<1	<1	<1	<1		<1	<1						<1	<1	<1	<1	<0.5	<0.5				<1
20061102CINEB-1	11/2/2006	13 B	< 1	< 1	< 1	< 1	2.2 J	0.4 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061106CINEB-1	11/6/2006	11	< 1	< 1	< 1	< 1	2.2 J	0.78 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061106CINFB-1	11/6/2006	15	< 1	< 1	< 1	< 1	2.6 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061106TB-1	11/6/2006	3.8 J	< 1	< 1	< 1	< 1	0.61 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061106TB-2	11/6/2006	3.7 J	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061107TB-3	11/7/2006	4.1 J	< 1	< 1	< 1	< 1	0.62 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061108CINFB-1	11/8/2006	12 B	< 1	< 1	< 1	< 1	2.1 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061108TB-4	11/8/2006	3.5 J	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
20061108TB-5	11/8/2006	3.5 J	< 1	< 1	< 1	< 1	0.41 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5	< 0.5	< 1	< 1	< 1	< 1
French Drain Sump @ 46 hr	10/19/2002	210	<8	<8	NA		NA	2.1 J	NA	120	<8	<8		NA	NA						<8	<8	<8	NA	NA	NA				<8
French Drain Sump @ 72 hr	10/20/2002	230	2.1 J	<5	NA		NA	2.2 J	NA	110	<5	<5		NA	NA						<5	<5	<5	NA	NA	NA				2.4 J
Seeps																														
SS-1 (Seep)	10/11/2001	2.1 J B	1.1	<1	NA		NA	0.97 J	NA	11	<2	<1		NA	NA						<1	1	<1	NA	NA	NA				0.39 J
SS-5 (Seep)	10/11/2001	3.1 J B	0.92 J	<1.8	NA		NA	1.1 J	NA	24	<3.6	<1.8		NA	NA						<1.8	0.55 J	<1.8	NA	NA	NA				<1.8

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
MW-EPA-1	5/8/2001		<50		<50	<50	<500	<250			<50	<50		<50	<50	<50		<50	<100	30 J	<50
	11/15/2001		<83		140 B	<83	<830	<420			<83	59 J		<83	<83	<83		<83	<170	93	<83
	10/20/2002		NA		100 B	<100	NA	NA			NA	49 J		NA	NA	NA		NA	NA	<100	NA
	11/12/2003		<200		<200	<200	<2000	<1000			<200	<200		<200	<200	<200		<200	<200	<200	NA
	3/28/2004		<83		<83	<83	<830	<420			<83	<83		<83	<83	<83		<83	<83	<83	NA
	11/4/2004		<100		85 J B	<100	<1000	<500			<100	<100		<100	<100	<100		<100	<100	130	NA
	11/15/2005		<56		<56	<56	<560	<280			<56	12 J		<56	<56	<56		<56	<56	41 J	NA
	11/8/2006	< 1200	< 120	< 1200	< 120	< 120	< 1200	< 620	< 120	< 120	< 120	< 120	< 120	< 120	< 120	< 120	< 120	< 120	< 120	< 120	NA
MW-EPA-2	5/8/2001		<1		0.98 J	<1	<10	<5			11	<1		<1	<1	<1		<1	<2	<1	<1
	11/14/2001		<3.3		2 J B	<3.3	<33	<17			45	<3.3		<3.3	<3.3	<3.3		<3.3	<6.7	<3.3	<3.3
	10/20/2002		NA		1.1 J B	<2.2	NA	NA			NA	<2.2		NA	NA	NA		NA	NA	<2.2	NA
	11/11/2003		<2.5		<2.5	<2.5	<25	<12			80	<2.5		<2.5	<2.5	<2.5		<2.5	<2.5	<2.5	NA
	3/29/2004		<2		<2	<2	<20	<10			52	<2		<2	<2	<2		<2	<2	<2	NA
	11/4/2004		<3.3		2.4 J B	<3.3	<33	<17			75	<3.3		<3.3	<3.3	<3.3		<3.3	<3.3	<3.3	NA
	11/11/2005		<2		<2	<2	<20	<10			62	<2		<2	<2	<2		<2	<2	<2	NA
	11/9/2006	< 140	< 14	< 140	< 14	< 14	< 140	< 71	< 14	< 14	45	< 14	< 14	20	5 J	6 J	< 14	3.9 J	< 14	< 14	NA
MW-EPA-3	5/6/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/13/2001		<1		<1	<1	<10	<5			<1	0.3 J		<1	<1	<1		<1	<2	<1	<1
	10/17/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/13/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	3/30/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/4/2004		<1		<1	<1	<10	0.2 J			<1	0.21 J		<1	<1	<1		<1	<1	0.51 J	NA
	11/11/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/7/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
MW-EPA-4	5/8/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/13/2001		<1		<1	<1	<10	<5			<1	<1		0.2 J	<1	<1		<1	<2	<1	<1
	10/18/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/16/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	4/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/10/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/7/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
Recovery Well	7/29/2001		NA		<29	NA	<140	NA			<29	<29		<29	<29	<29		NA	<57	<29	<29

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Cincinnati Plant
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SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW01-30	5/4/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/8/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	10/17/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/11/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	3/24/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/8/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/1/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW01-80	5/4/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	1.4 J	<1	<1
	10/10/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	2.1	<1	<1
	11/12/2001		<1		<1	<1	<10	<5			<1	0.23 J		<1	<1	<1		<1	1.9 J	<1	<1
	10/17/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/11/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	2.5	<1	NA
	3/24/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	2.8	<1	NA
	11/2/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	4	<1	NA
	11/8/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	4.4	<1	NA
	11/1/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	0.29 J	< 1	< 1	< 1	< 1	< 1	< 1	4.1	< 1	NA
UAW02-20	5/7/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/10/2001		<1		<1	<1	<10	<5			<1	0.45 J		<1	<1	<1		<1	<2	<1	<1
	10/17/2002		NA		<1	<1	NA	NA			NA	0.39 J		NA	NA	NA		NA	NA	<1	NA
	11/12/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	3/26/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2004		0.59 J		<1	0.63 J B	<10	<5			<1	<1		<1	<1	<1		<1	<1	0.56 J	NA
	11/9/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	0.17 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW02-40	5/7/2001		<2.5		<2.5	<2.5	<25	<12			<2.5	<2.5		<2.5	<2.5	<2.5		<2.5	<5	<2.5	66
UAW02-40 (Dup)	5/7/2001		<1.2		<1.2	<1.2	<12	<6.2			<1.2	<1.2		<1.2	<1.2	<1.2		<1.2	<2.5	<1.2	<1.2
	11/10/2001		<2.5		<2.5	<2.5	<25	<12			<2.5	<2.5		<2.5	<2.5	<2.5		<2.5	<5	<2.5	63
	10/17/2002		NA		1.4 J B	<2	NA	NA			NA	<2		NA	NA	NA		NA	NA	<2	NA
	11/12/2003		<2		<2	<2	<20	<10			<2	<2		<2	<2	<2		<2	<2	<2	NA
	3/26/2004		<2		<2	<2	<20	<10			<2	<2		<2	<2	<2		<2	<2	<2	NA
	11/3/2004		<1.7		4.9 B	<1.7	<17	<8.4			<1.7	<1.7		<1.7	<1.7	<1.7		<1.7	0.78 J	<1.7	NA
	11/9/2005		<1.7		0.64 U	<1.7	<17	<8.4			<1.7	<1.7		<1.7	<1.7	<1.7		<1.7	0.77 J	<1.7	NA
	11/3/2006	< 12	< 1.2	< 12	< 1.2	< 1.2	< 12	< 6.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	0.56 J	< 1.2	NA
UAW02-40 (DUP)	11/3/2006	< 14	< 1.4	< 14	< 1.4	< 1.4	< 14	< 7.2	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	0.56 J	< 1.4	NA

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Groundwater																					
UAW03-20	5/7/2001		<1		<1	0.41 J	<10	<5			<1	12		<1	<1	<1		<1	<2	2.5	<1
	11/11/2001		0.34 J		1.3 J B	2.6	<25	<12			<2.5	3.6		<2.5	<2.5	<2.5		<2.5	<5	4.5	<2.5
	10/23/2002		NA		4.5 J	3.4 J	NA	NA			NA	<6.7		NA	NA	NA		NA	NA	5.9 J	NA
	11/12/2003		<10		<10	17	<100	<50			<10	<10		<10	<10	<10		<10	<10	<10	NA
	3/28/2004		<13		<13	<13	<130	<67			<13	<13		<13	<13	<13		<13	<13	<13	NA
	11/4/2004		<10		8.6 J B	6.2 J	<100	<50			<10	<10		<10	<10	<10		<10	<10	15	NA
UAW03-20 (Dup)	11/4/2004		<12		9.7 J B	<12	<120	<62			<12	<12		<12	<12	<12		<12	<12	17	NA
	11/9/2005		<4		5.1 U	3.5 J	<40	<20			<4	<4		<4	<4	<4		<4	<4	<4	NA
	11/6/2006	< 10	< 1	< 10	< 1	< 1	1.2 J	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW04-20	5/7/2001		<1000		<1000	<1000	<10000	<5000			<1000	21000		<1000	<1000	<1000		<1000	<2000	<1000	<1000
	11/11/2001		<250		200 J B	<250	<2500	<1200			<250	8800		<250	<250	<250		<250	<500	<250	<250
	10/20/2002		NA		<33	<33	NA	NA			NA	320		NA	NA	NA		NA	NA	<33	NA
	11/12/2003		<100		<100	<100	<1000	<500			<100	3500		<100	<100	<100		<100	<100	<100	NA
	3/28/2004		<1000		<1000	<1000	<10000	<5000			<1000	24000		<1000	<1000	<1000		<1000	<1000	<1000	NA
	11/3/2004		<330		280 J B	<330	<3300	<1700			<330	11000		<330	<330	<330		<330	<330	200 J	NA
	11/9/2005		<10		16 U	<10	<100	<50			<10	310		<10	<10	<10		<10	<10	6.6 J	NA
	11/6/2006	< 1400	< 140	< 1400	< 140	< 140	< 1400	< 710	< 140	< 140	< 140	3900	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 140	NA
UAW04-20 (DUP)	11/6/2006	< 1400	< 140	< 1400	< 140	< 140	< 1400	< 710	< 140	< 140	< 140	4000	< 140	< 140	< 140	< 140	< 140	< 140	< 140	< 140	NA
UAW05-20	5/6/2001		<40		<40	<40	<400	<200			<40	<40		<40	<40	<40		<40	<80	<40	<40
	10/10/2001		<40		<40	<40	<400	<200			<40	<40		<40	<40	<40		<40	<80	<40	<40
	11/12/2001		<22		<22	3.5 J	<220	<110			<22	<22		<22	<22	<22		<22	<44	10 J	<22
	10/20/2002		NA		13 J B	<25	NA	NA			NA	<25		NA	NA	NA		NA	NA	<25	NA
	11/10/2003		<25		<25	<25	<250	<120			<25	<25		<25	<25	<25		<25	<25	<25	NA
	3/28/2004		<20		<20	<20	<200	<100			<20	<20		<20	<20	<20		<20	<20	<20	NA
UAW05-20 (Dup)	3/28/2004		<17		<17	<17	<170	<83			<17	<17		<17	<17	<17		<17	<17	<17	NA
	11/4/2004		<20		16 J B	<20	<200	<100			<20	<20		<20	<20	<20		<20	<20	<20	NA
	11/15/2005		<20		<20	<20	<200	<100			<20	<20		<20	<20	<20		<20	<20	<20	NA
	11/9/2006	< 170	< 17	< 170	10 J	< 17	< 170	< 83	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	< 17	NA

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SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW06-20	5/6/2001		<10		<10	<10	<100	<50			<10	<10		<10	<10	<10		<10	<20	<10	<10
	10/10/2001		<170		<170	<170	<1700	<830			<170	<170		<170	<170	<170		<170	<330	<170	<170
	11/13/2001		<670		<670	<670	<6700	<3300			<670	<670		<670	<670	<670		<670	<1300	<670	<670
	10/20/2002		NA		<2.5	<2.5	NA	NA			NA	13		NA	NA	NA		NA	NA	<2.5	NA
	11/12/2003		<3.3		<3.3	<3.3	<33	<17			<3.3	3.8		<3.3	<3.3	<3.3		<3.3	<3.3	<3.3	NA
	3/29/2004		<2.5		<2.5	<2.5	<25	<12			<2.5	<2.5		<2.5	<2.5	<2.5		<2.5	<2.5	<2.5	NA
	11/4/2004		4.1		1.8 J B	<3.3	<33	<17			<3.3	1.3 J		<3.3	<3.3	<3.3		<3.3	<3.3	4.7	NA
	11/15/2005		<3.3		<3.3	<3.3	<33	<17			<3.3	1.5 J		<3.3	<3.3	<3.3		<3.3	<3.3	<3.3	NA
	11/9/2006	< 50	< 5	< 50	< 5	< 5	< 50	< 25	< 5	< 5	< 5	1 J	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	NA
UAW07-20	5/8/2001		NA		<2	NA	<10	NA			<2	3.5		<2	<2	<2		NA	<4	13	<2
UAW07-20 (Dup)	5/8/2001		NA		<2.5	NA	<12	NA			<2.5	3.6		<2.5	<2.5	<2.5		NA	<5	13	<2.5
	11/15/2001		NA		2.3 B	NA	<10	NA			<2	1.2 J		<2	<2	<2		NA	<4	13	<2
	10/20/2002		NA		1.4 J B	<2.5	NA	NA			NA	<2.5		NA	NA	NA		NA	NA	7.6	NA
	11/12/2003		3.4		<3.3	<3.3	<33	<17			<3.3	<3.3		<3.3	<3.3	<3.3		<3.3	<3.3	5.6	NA
UAW07-20 (Dup)	11/12/2003		3.3		<3.3	<3.3	<33	<17			<3.3	<3.3		<3.3	<3.3	<3.3		<3.3	<3.3	5.7	NA
	4/5/2004		<2		<2	<2	<20	<10			<2	<2		<2	<2	<2		<2	<2	5	NA
	11/4/2004		8.9		4.2 J B	<6.7	<67	<33			<6.7	<6.7		<6.7	<6.7	<6.7		<6.7	<6.7	13	NA
	11/15/2005		2.5 J		<8.3	<8.3	<83	<42			<8.3	<8.3		<8.3	<8.3	<8.3		<8.3	<8.3	6.5 J	NA
	11/6/2006	< 57	1.1 J	< 57	< 5.7	< 5.7	< 57	< 29	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7	4.3 J	NA
UAW08-20	5/6/2001		NA		<33	NA	<170	NA			<33	1100		<33	<33	<33		NA	<67	140	<33
	11/13/2001		NA		42 J B	NA	<500	NA			<100	1400		<100	<100	<100		NA	<200	190	<100
	10/20/2002		NA		15 J B	<33	NA	NA			NA	1100		NA	NA	NA		NA	NA	180	NA
	11/10/2003		<40		<40	<40	<400	<200			<40	1000		<40	<40	<40		<40	<40	190	NA
	3/29/2004		<50		<50	<50	<500	<250			<50	1200		<50	<50	<50		<50	<50	230	NA
	11/4/2004		<33		25 J B	17 J	66 J	<170			<33	1100		<33	<33	<33		<33	<33	270	NA
	11/15/2005		<25		<25	18 J	35 U	<120			<25	970		<25	<25	<25		<25	<25	240	NA
	11/9/2006	< 100	< 10	< 100	5.7 J	8 J	44 J	< 50	< 10	< 10	< 10	260	< 10	< 10	< 10	< 10	< 10	< 10	< 10	130	NA
UAW09-20	5/5/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/9/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	0.28 J B		<1	<2	<1	<1
	10/16/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/11/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	4/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/10/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	0.21 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW09-60	5/5/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/9/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	0.27 J B		<1	<2	<1	<1
	10/16/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/11/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	4/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/10/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW10-50	10/12/2001		<2		2.1	<2	<20	<10			0.48 J	<2		36	1.9 J	3.6		2.1	0.43 J	<2	55
	11/13/2001		<4		3.5 J B	<4	<40	<20			<4	<4		32	1.4 J	2.8 J		1.5 J	<8	<4	47
	10/19/2002		NA		0.91 J B	<1.4	NA	NA			NA	<1.4		NA	NA	NA		NA	NA	<1.4	NA
	11/10/2003		<1.4		<1.4	<1.4	<14	<7.2			<1.4	<1.4		14	<1.4	1.7		1.7	<1.4	<1.4	NA
	3/30/2004		<10		<10	<10	<100	<50			<10	<10		16	<10	<10		<10	<10	<10	NA
	11/5/2004		<9.1		3.6 J	<9.1	<91	<45			3.2 J	<9.1		13	<9.1	3.2 J		3.2 J	<9.1	<9.1	NA
	11/11/2005		<5		1.5 U	<5	<50	<25			2.7 J	<5		8.2	1.3 J	2.2 J		<5	<5	<5	NA
	11/9/2006	< 140	< 14	< 140	7.6 J	< 14	< 140	< 71	< 14	< 14	10 J	< 14	< 14	11 J	< 14	4 J	< 14	< 14	< 14	< 14	NA
UAW10-80	10/12/2001		<67		240	<67	<670	<330			<67	<67		<67	<67	<67		<67	23 J	<67	<67
	11/13/2001		<170		81 J B	<170	<1700	<830			<170	<170		<170	<170	<170		<170	<330	<170	<170
	10/19/2002		NA		3.1 J B	<6.7	NA	NA			NA	<6.7		NA	NA	NA		NA	NA	<6.7	NA
	11/13/2003		<22		<22	<22	<220	<110			<22	<22		<22	<22	<22		<22	<22	<22	NA
	3/30/2004		<2		<2	<2	<20	<10			<2	<2		<2	<2	<2		<2	<2	<2	NA
	11/5/2004		<1.7		1.8 B	<1.7	<17	<8.4			<1.7	<1.7		<1.7	<1.7	<1.7		<1.7	0.92 J	2.1	NA
	11/16/2005		<2.5		<2.5	<2.5	<25	<12			<2.5	<2.5		<2.5	<2.5	<2.5		<2.5	1.5 J	<2.5	NA
	11/9/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.47 J	< 1	NA
UAW11-10	5/8/2001		<500		<500	<500	<5000	<2500			<500	<500		<500	<500	<500		<500	<1000	<500	<500
	11/10/2001		<250		190 J B	<250	<2500	<1200			<250	<250		<250	<250	<250		<250	<500	<250	<250
	10/18/2002		NA		20 B	<20	NA	NA			NA	<20		NA	NA	NA		NA	NA	<20	NA
	11/16/2003		<7.1		<7.1	<7.1	<71	<36			<7.1	<7.1		<7.1	<7.1	<7.1		<7.1	<7.1	<7.1	NA
	4/6/2004		<40		<40	<40	<400	<200			<40	<40		<40	<40	<40		<40	<40	<40	NA
	11/7/2004		<5		7.3 B	<5	<50	<25			<5	1.3 J		<5	<5	<5		<5	<5	<5	NA
	11/10/2005		<1		<1	<1	4 U	<5			<1	0.82 J		<1	<1	<1		<1	<1	2.4	NA
	11/2/2006	< 330	< 33	< 330	< 33	< 33	< 330	< 170	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	< 33	NA

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Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW11-40	5/8/2001		<5		<5	<5	<50	<25			14	<5		15	<5	2.5 J		<5	<10	<5	12
	11/12/2001		<5		<5	<5	<50	<25			16	<5		13	<5	2.6 J		<5	<10	<5	12
	10/18/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/16/2003		<1		<1	<1	<10	<5			21	<1		8.1	<1	2.1		<1	<1	<1	NA
	4/6/2004		<1		<1	<1	<10	<5			20	<1		6.9	<1	2.2		<1	<1	<1	NA
UAW11-40 (Dup)	4/6/2004		<1		<1	<1	<10	<5			21	<1		6.6	<1	2.1		<1	<1	<1	NA
	11/7/2004		<1		<1	<1	<10	<5			26	<1		8.4	0.51 J	2.2		1.4	<1	<1	NA
	11/10/2005		<1		<1	<1	<10	<5			22	<1		7.3	0.51 J	2.1		0.76 J	<1	<1	NA
	11/2/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	13	0.29 J	< 1	6.7	0.53 J	1.7	< 1	0.68 J	< 1	< 1	NA
UAW12-20	5/6/2001		NA		<56	NA	<280	NA			<56	<56		<56	<56	<56		NA	<110	<56	<56
	11/15/2001		NA		79 B	NA	<250	NA			<50	<50		<50	<50	<50		NA	<100	<50	<50
	10/20/2002		NA		16 J B	<50	NA	NA			NA	<50		NA	NA	NA		NA	NA	<50	NA
	11/12/2003		<67		<67	<67	<670	<330			<67	<67		<67	<67	<67		<67	<67	<67	NA
	3/28/2004		<56		<56	<56	<560	<280			<56	<56		<56	<56	<56		<56	<56	<56	NA
	11/4/2004		<71		54 J B	<71	<710	<360			<71	<71		<71	<71	<71		<71	<71	<71	NA
	11/14/2005		<100		<100	<100	<1000	<500			<100	<100		<100	<100	<100		<100	<100	<100	NA
	11/6/2006	< 710	< 71	< 710	< 71	< 71	< 710	< 360	< 71	< 71	< 71	< 71	< 71	< 71	< 71	< 71	< 71	< 71	< 71	< 71	NA
UAW13-20	5/6/2001		NA		<10	NA	<50	NA			<10	250		<10	<10	<10		NA	<20	5.4 J	<10
	11/15/2001		NA		25 B	NA	22 J	NA			<17	350		<17	<17	<17		NA	<33	9.1 J	<17
	10/23/2002		NA		22 J	<40	NA	NA			NA	1400		NA	NA	NA		NA	NA	<40	NA
	11/12/2003		<10		<10	<10	<100	<50			<10	210		<10	<10	<10		<10	<10	<10	NA
	3/28/2004		<20		<20	<20	<200	<100			<20	97		<20	<20	<20		<20	<20	<20	NA
	11/5/2004		<20		<20	<20	36 J	<100			<20	52		<20	<20	<20		<20	<20	24	NA
	11/16/2005		<10		<10	<10	7.2 J	<50			<10	23		<10	<10	<10		<10	<10	8.9 J	NA
	10/31/2006	< 100	< 10	< 100	< 10	< 10	8.5 J	< 50	< 10	< 10	< 10	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	6.1 J	NA
UAW14-10	5/5/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/9/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	0.31 J B		<1	<2	<1	<1
	10/16/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/16/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	4/5/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/16/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/8/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW15-20	5/6/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/11/2001		<1		<1	<1	<10	<5			<1	5.8		<1	<1	<1		<1	<2	<1	<1
	10/18/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/17/2003		<8		<8	<8	<80	<40			<8	<8		<8	<8	<8		<8	<8	<8	NA
	4/7/2004		<5		<5	<5	<50	<25			<5	<5		<5	<5	<5		<5	<5	<5	NA
	11/7/2004		<6.7		<6.7	<6.7	<67	<33			<6.7	<6.7		<6.7	<6.7	<6.7		<6.7	<6.7	<6.7	NA
	11/15/2005		<5		<5	<5	<50	<25			<5	<5		<5	<5	<5		<5	<5	<5	NA
	11/2/2006	< 14	< 1.4	< 14	< 1.4	< 1.4	< 14	< 7.2	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	NA
UAW15-50	5/6/2001		<120		<120	<120	<1200	<620			<120	230		<120	<120	<120		<120	<250	<120	<120
	11/11/2001		<170		110 J B	<170	<1700	<830			<170	200		<170	<170	<170		<170	<330	<170	<170
	10/18/2002		NA		6.3 J B	<10	NA	NA			NA	140		NA	NA	NA		NA	NA	<10	NA
	11/17/2003		<12		<12	<12	<120	<62			<12	87		<12	<12	<12		<12	<12	<12	NA
	4/7/2004		<20		<20	<20	<200	<100			<20	200		<20	<20	<20		<20	<20	<20	NA
	11/7/2004		<10		<10	<10	6.2 J	<50			<10	64		<10	<10	<10		<10	<10	<10	NA
UAW15-50 (Dup)	11/7/2004		<10		12 B	<10	18 J	<50			<10	79		<10	<10	<10		<10	<10	<10	NA
	11/15/2005		<3.3		<3.3	<3.3	6.3 U	<17			<3.3	43		<3.3	<3.3	<3.3		<3.3	<3.3	<3.3	NA
	11/2/2006	< 50	< 5	< 50	< 5	< 5	8 J	< 25	< 5	< 5	< 5	11	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	NA
UAW16-10	10/12/2001		<120		<120	<120	<1200	<620			<120	<120		<120	<120	<120		<120	<250	<120	<120
UAW16-10 (Dup)	10/12/2001		<100		<100	<100	<1000	<500			<100	<100		<100	<100	<100		<100	<200	<100	<100
	11/13/2001		<100		57 J B	<100	<1000	<500			<100	<100		<100	<100	<100		<100	<200	<100	<100
	10/18/2002		NA		<1	1.8	NA	NA			NA	1.1		NA	NA	NA		NA	NA	<1	NA
	11/16/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
UAW16-10 (Dup)	11/17/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	4/7/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/7/2004		<1		<1	0.75 J	<10	<5			<1	0.3 J		<1	<1	<1		<1	<1	1.1	NA
	11/15/2005		<1		<1	0.95 J	34	<5			<1	0.84 J		<1	<1	<1		<1	<1	<1	NA
	11/6/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	0.3 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW17-40	5/5/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/9/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	0.24 J B		<1	<2	<1	<1
	10/16/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	<1		NA	NA	<1	NA
	11/16/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	3/31/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/14/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	10/31/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA

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Cincinnati Plant
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SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW18-20	10/12/2001		<1		<1	<1	<10	<5			<1	0.22 J		<1	<1	<1		<1	<2	<1	<1
	11/13/2001		<2		<2	<2	<20	<10			<2	<2		<2	<2	<2		<2	<4	<2	<2
	10/18/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/16/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	4/7/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/7/2004		0.58 J		<1	0.63 J	2 J	<5			<1	0.43 J		<1	<1	<1		<1	<1	0.52 J	NA
	11/15/2005		<1		<1	<1	0.92 U	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2006	< 10	< 1	< 10	< 1	< 1	0.71 J	< 5	< 1	< 1	< 1	0.31 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW19-80	5/6/2001		<1.7		0.56 J	<1.7	<17	<8.4			<1.7	<1.7		<1.7	<1.7	<1.7		<1.7	<3.3	<1.7	1.3 J
	11/12/2001		<1		<1	<1	<10	<5			<1	0.36 J		0.25 J	<1	<1		<1	<2	<1	1.3
UAW19-80 (Dup)	11/12/2001		<5		<5	<5	<50	<25			15	<5		13	<5	2.7 J		<5	<10	<5	13
	10/17/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
UAW19-80 (Dup)	10/17/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/13/2003		<1		<1	<1	<10	<5			<1	<1		1.9	<1	<1		<1	<1	<1	NA
	3/30/2004		<1		<1	<1	<10	<5			<1	<1		2.5	<1	<1		<1	<1	<1	NA
	11/5/2004		<1		<1	<1	<10	<5			<1	<1		2.8	<1	<1		<1	<1	<1	NA
	11/11/2005		<1		<1	<1	<10	<5			<1	<1		5.4	0.32 J	<1		<1	<1	<1	NA
UAW19-80(DUP)	11/11/2005		<1		<1	<1	<10	<5			<1	<1		5.3	0.35 J	<1		<1	<1	<1	NA
	11/8/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	6.4	0.29 J	< 1	< 1	< 1	< 1	< 1	NA
UAW20-60	5/7/2001		<10		<10	<10	<100	<50			17	<10		83	3.4 J	6.4 J		3.7 J	<20	<10	110
	11/14/2001		<11		8 J B	<11	<110	<56			20	<11		94	4.2 J	7 J		4.5 J	<22	<11	95
UAW20-60 (Dup)	11/14/2001		<11		7.8 J B	<11	<110	<56			20	<11		98	<11	7.9 J		4.8 J	<22	<11	100
	10/19/2002		NA		5.3 J B	<12	NA	NA			NA	<12		NA	NA	NA		NA	NA	<12	NA
UAW20-60 (Dup)	10/19/2002		NA		6.7 J B	<15	NA	NA			NA	<15		NA	NA	NA		NA	NA	<15	NA
	11/13/2003		<22		<22	<22	<220	<110			32	<22		69	<22	<22		<22	<22	<22	NA
	3/30/2004		<33		<33	<33	<330	<170			<33	<33		39	<33	<33		<33	<33	<33	NA
	11/5/2004		<40		36 J B	<40	<400	<200			41	<40		60	<40	<40		<40	<40	<40	NA
	11/11/2005		<50		18 U	<50	<500	<250			43 J	<50		69	<50	<50		<50	<50	<50	NA
	11/7/2006	< 500	< 50	< 500	< 50	< 50	< 500	< 250	< 50	< 50	55	< 50	< 50	56	< 50	< 50	< 50	< 50	< 50	< 50	NA

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW21-30	5/5/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/11/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	10/18/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/11/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	3/27/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2004		<1		<1	<1	<10	<5			0.45 J	<1		<1	<1	<1		<1	<1	<1	NA
	11/9/2005		<1		<1	<1	<10	<5			0.22 J	<1		<1	<1	<1		<1	<1	<1	NA
	11/9/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW21-80	5/5/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/11/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	10/18/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/11/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	3/27/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/8/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	0.22 J	<1	NA
	11/8/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW22-20	10/13/2001		<2.5		1.6 J B	<2.5	<25	<12			<2.5	0.92 J		<2.5	<2.5	0.39 J		<2.5	14	<2.5	6.9
	11/13/2001		<6.9		4.4 J B	<6.9	<69	<34			<6.9	1.3 J		<6.9	<6.9	2 J		<6.9	15	<6.9	16
	10/20/2002		NA		32 J	<50	NA	NA			NA	<50		NA	NA	NA		NA	NA	<50	NA
	11/10/2003		<2		<2	<2	<20	<10			<2	<2		<2	<2	<2		<2	7.5	<2	NA
	3/29/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	3.3	<1	NA
	11/4/2004		<2.5		1.8 J B	<2.5	<25	<12			<2.5	0.59 J		<2.5	<2.5	0.8 J		<2.5	4	2.4 J	NA
	11/15/2005		<2		<2	<2	<20	<10			<2	0.58 J		<2	<2	<2		<2	5.6	<2	NA
	11/9/2006	< 25	< 2.5	< 25	< 2.5	< 2.5	< 25	< 12	< 2.5	< 2.5	< 2.5	0.54 J	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	1.3 J	< 2.5	NA
UAW23-20	10/12/2001		<20		<20	<20	<200	<100			82	<20		51	6.3 J	8.4 J		<20	<40	<20	25
	11/14/2001		<20		15 J B	<20	<200	<100			61	<20		50	<20	8.8 J		<20	<40	<20	21
	10/19/2002		NA		0.45 J B	<1.2	NA	NA			NA	<1.2		NA	NA	7.2		NA	NA	<1.2	NA
	11/13/2003		<1.7		<1.7	<1.7	<17	<8.4			40	<1.7		22	2.9	5		2.2	<1.7	<1.7	NA
	3/28/2004		<1.4		<1.4	<1.4	<14	<7.2			39	<1.4		20	2.6	4.5		2.4	<1.4	<1.4	NA
	11/5/2004		<1		<1	<1	<10	<5			47	<1		16	2.6	5.1		<1	<1	<1	NA
	11/14/2005		<1.4		<1.4	<1.4	<14	<7.2			39	<1.4		13	2.7	3.8		1.4	<1.4	<1.4	NA
	11/6/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	27	< 1	< 1	14	2.6	3.8	< 1	1.9	< 1	< 1	NA

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
UAW24-70	10/13/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	11/15/2001		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<2	<1	<1
	10/17/2002		NA		<1	<1	NA	NA			NA	0.48 J		NA	NA	NA		NA	NA	<1	NA
	11/16/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	4/5/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/16/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	10/31/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	0.31 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW25-20	10/13/2001		<1		<1	<1	<10	<5			<1	0.61 J		<1	<1	<1		<1	<2	<1	<1
	11/13/2001		<1		<1	<1	<10	<5			<1	0.77 J		<1	<1	<1		<1	<2	<1	<1
	10/18/2002		NA		<1	<1	NA	NA			NA	<1		NA	NA	NA		NA	NA	<1	NA
	11/12/2003		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	3/27/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/3/2004		0.57 J		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	0.48 J	NA
	11/9/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/8/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	0.19 J	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW26-70	4/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/6/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/10/2005		<1		<1	<1	<10	<5			<1	0.21 J		<1	<1	<1		<1	<1	<1	NA
	11/7/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
UAW27-50	3/31/2004		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
	11/5/2004		<1		<1	<1	<10	<5			<1	<1		0.98 J	<1	<1		<1	<1	<1	NA
	11/11/2005		<1		<1	<1	<10	<5			<1	<1		1.6	<1	<1		<1	<1	<1	NA
	11/1/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	0.41 J	< 1	1.1	< 1	< 1	< 1	< 1	< 1	< 1	NA
LAW05-150	3/16/2002		NA		<20	NA	<100	NA			<20	<20		<20	<20	<20		NA	<40	<20	30
LAW05-150 (Dup)	3/16/2002		NA		<20	NA	<100	NA			<20	<20		<20	<20	<20		NA	<40	<20	30
LAW05-60	3/16/2002		NA		<2.9	NA	<14	NA			<2.9	<2.9		<2.9	<2.9	<2.9		NA	0.78 J	<2.9	68
LAW12-60	10/13/2001		NA		<1	NA	<5	NA			<1	<1		<1	<1	<1		NA	0.2 J	<1	6
	11/16/2001		NA		<1	NA	<5	NA			<1	<1		<1	<1	<1		NA	<2	<1	5.8

Table B-1
Summary of Volatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Groundwater																					
CINEB-1	11/11/2005		<1		<1	<1	<10	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
5CINTB-1	11/15/2005		<1		<1	<1	0.9 J	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
8CINTB-1	11/8/2005		<1		<1	<1	0.73 J	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
9CINTB-1	11/9/2005		<1		<1	<1	0.69 J	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
10CINTB-1	11/10/2005		<1		<1	<1	0.69 J	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
6CINTB-1	11/16/2005		<1		<1	<1	0.51 J	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
4CINTB-1	11/14/2005		<1		<1	<1	0.62 J	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
11CINTB-1	11/11/2005		<1		<1	<1	0.73 J	<5			<1	<1		<1	<1	<1		<1	<1	<1	NA
20061102CINEB-1	11/2/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061106CINEB-1	11/6/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061106CINFB-1	11/6/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061106TB-1	11/6/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061106TB-2	11/6/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061107TB-3	11/7/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061108CINFB-1	11/8/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061108TB-4	11/8/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
20061108TB-5	11/8/2006	< 10	< 1	< 10	< 1	< 1	< 10	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	NA
French Drain Sump @ 46 hr	10/19/2002		NA		9.7 B	<8	NA	NA			NA	66		NA	NA	NA		NA	NA	<8	NA
French Drain Sump @ 72 hr	10/20/2002		NA		1.5 J B	<5	NA	NA			NA	60		NA	NA	NA		NA	NA	7.4	NA
Seeps																					
SS-1 (Seep)	10/11/2001		NA		<1	0.49 J	NA	NA			NA	0.45 J		NA	NA	NA		NA	NA	1.7	NA
SS-5 (Seep)	10/11/2001		NA		<1.8	0.3 J	NA	NA			NA	0.55 J		NA	NA	NA		NA	NA	<1.8	NA

Notes:
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
NA indicates chemical was not on the target analyte list for that sample.
<5 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more Facility Investigation samples.

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
MW-EPA-1	5/8/2001	NA	<120										<120	<120			<120		<120	<120	<120				<120				
	11/15/2001	NA	<200										<200	<200			<200		<200	<200	<200				<200				
	10/20/2002	<1000	NA										<1000	NA			NA		NA	NA	NA				NA				
	11/12/2003	<500	<500										<500	<500			<500		<500	<500	<500				<500				
	3/28/2004	<500	<500										<500	<500			<500		<500	<500	<500				<500				
	11/4/2004	28 J	<500										<500	<500			<500		<500	<500	<500				<500				
	11/15/2005	37	<10										3.2 J	<10			1.7 U		<10	3.6 J	<10				<10				
	11/8/2006	36 J	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	16 J	< 50	< 50	< 50	< 50
MW-EPA-2	5/8/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/20/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/11/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/29/2004	<10	<10										<10	<10			34		<10	<10	<10				<10				
	11/4/2004	<10	<10										<10	<10			<10		<10	1.7 J	<10				<10				
	11/11/2005	<10	<10										<10	<10			0.78 U		<10	3.2 J	<10				<10				
	11/9/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-EPA-3	5/6/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/17/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/13/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/30/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/4/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/11/2005	<10	<10										<10	<10			0.48 U		<10	1.6 J	<10				<10				
	11/7/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-EPA-4	5/8/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/18/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/16/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/10/2005	<10	<10										<10	<10			0.65 U		<10	1.2 J	<10				<10				
	11/7/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Recovery Well	7/29/2001	4.6 J	<10										NA	NA			<10		<10	NA	NA				<10				

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW01-30	5/4/2001	NA	<10										<10	<10			3.4 J		<10	<10	<10				<10				
	11/8/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/17/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/11/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/24/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/3/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/8/2005	<10	<10										<10	<10			1.2 J		<10	<10	<10				<10				
UAW01-30(DUP)	11/8/2005	<10	<10										<10	<10			3.9 U		<10	<10	<10				<10				
	11/1/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW01-80	5/12/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/15/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/19/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/10/2004	<67	<67										<67	<67			<67		<67	<67	<67				<67				
	11/6/2004	<10	<10										<10	<10			1.5 J B		<10	<10	<10				<10				
	11/8/2005	<10	<10										<10	<10			1.2 U		<10	<10	<10				<10				
	11/1/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW02-20	5/7/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
UAW02-20 (Dup)	5/7/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/10/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/17/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/12/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/26/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/3/2004	1.5 J	<10										<10	<10			3.2 J B		<10	<10	<10				<10				
	11/9/2005	0.69 J	<10										<10	<10			<10		<10	1.3 J	<10				<10				
	11/3/2006	1 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.5 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW02-40	5/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/17/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/20/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/12/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/9/2005	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/3/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.6 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW02-40 (DUP)	11/3/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.6 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW03-20	5/7/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/11/2001	NA	<20										<20	<20			<20		<20	<20	<20				<20				
	10/23/2002	11 J	NA										<67	NA			NA		NA	NA	NA				NA				
	11/12/2003	<100	<100										<100	<100			<100		<100	<100	<100				<100				
	3/28/2004	<100	<100										<100	<100			<100		<100	<100	<100				<100				
	11/4/2004	6.2 J	<67										<67	<67			<67		<67	<67	<67				<67				
UAW03-20 (Dup)	11/4/2004	5.2 J	<40										<40	<40			<40		<40	<40	<40				<40				
	11/9/2005	1.5 J	<10										<10	<10			0.57 U		<10	<10	<10				<10				
	11/6/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW04-20	5/7/2001	NA	<40										53	<40			<40		<40	<40	<40				<40				
	11/11/2001	NA	<100										<100	<100			<100		<100	<100	<100				<100				
	10/20/2002	410	NA										<120	NA			NA		NA	NA	NA				NA				
	11/12/2003	12	<10										<10	<10			<10		<10	<10	<10				<10				
	3/28/2004	<50	<50										<50	<50			<50		<50	<50	<50				<50				
	11/3/2004	4.6 J	<50										<50	<50			<50		<50	<50	<50				<50				
	11/9/2005	2.6 J	<10										<10	<10			0.65 U		<10	0.88 J	<10				<10				
	11/6/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW04-20 (DUP)	11/6/2006	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40
UAW05-20	5/6/2001	NA	<100										<100	<100			<100		<100	<100	<100				<100				
	10/10/2001	NA	<10										<10	<10			<10		<10	<10	<10				6.3 J				
	11/12/2001	NA	<100										<100	<100			<100		<100	<100	<100				<100				
	10/20/2002	<200	NA										<200	NA			NA		NA	NA	NA				NA				
	11/10/2003	<50	<50										<50	<50			<50		<50	<50	<50				<50				
	3/28/2004	<25	<25										<25	<25			<25		<25	<25	<25				<25				
UAW05-20 (Dup)	3/28/2004	<40	<40										<40	<40			<40		<40	<40	<40				<40				
	11/4/2004	10 J	<25										1.7 J	<25			<25		<25	<25	<25				<25				
	11/14/2005	10 J	<25										3.7 J	<25			<25		<25	<25	<25				<25				
	11/9/2006	7.4 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2.7 J	< 10	< 10	< 10	< 10
UAW06-20	5/6/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/10/2001	NA	<25										<25	<25			<25		<25	<25	<25				<25				
	11/13/2001	NA	6.4 J										<25	7.3 J			<25		<25	<25	<25				<25				
	10/20/2002	37 J	NA										<50	NA			NA		NA	NA	NA				NA				
	11/12/2003	<100	<100										<100	<100			<100		<100	<100	<100				<100				
	3/29/2004	<20	<20										<20	<20			<20		<20	<20	<20				<20				
	11/4/2004	<40	<40										<40	<40			<40		<40	5.5 J	<40				<40				
	11/15/2005	3.0 J	1.7 J										<10	<10			2.4 U		<10	11	<10				<10				
	11/9/2006	5.2 J	1.2 J	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	7.7 J	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW07-20	5/8/2001	150	<100										NA	NA			<100		<100	NA	<100				<100				
UAW07-20 (Dup)	5/8/2001	44	<25										NA	NA			<25		<25	NA	NA				<25				
	11/15/2001	120	<40										NA	NA			<40		<40	NA	NA				<40				
	10/20/2002	9.1 J	NA										<40	NA			NA		NA	NA	NA				NA				
	11/12/2003	<50	<50										<50	62			<50		<50	<50	<50				<50				
UAW07-20 (Dup)	11/12/2003	<40	<40										<40	56			<40		<40	<40	<40				<40				
	4/5/2004	<100	<100										<100	<100			<100		<100	<100	<100				<100				
	11/4/2004	19 J	<100										<100	60 J			<100		<100	<100	<100				<100				
	11/15/2005	7.7 J	<10										1.3 J	15			1.6 U		<10	3.4 J	<10				<10				
	11/6/2006	16 J	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
UAW08-20	5/6/2001	12000	<1700										NA	NA			<1700		<1700	NA	NA				<1700				
	11/13/2001	12000	<1300										NA	NA			<1300		<1300	NA	NA				<1300				
	10/20/2002	4400	NA										<1000	NA			NA		NA	NA	NA				NA				
	11/10/2003	8300	<2500										<2500	<2500			<2500		<2500	<2500	<2500				<2500				
	3/29/2004	5900	<4000										<4000	<4000			<4000		<4000	<4000	<4000				<4000				
	11/4/2004	5900	<2000										<2000	<2000			<2000		<2000	<2000	<2000				<2000				
	11/15/2005	3000	<1000										<1000	<1000			<1000		<1000	<1000	<1000				<1000				
	11/9/2006	1700	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800
UAW09-20	5/5/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/16/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/11/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			0.4 J		<10	<10	<10				<10				
UAW09-20(DUP)	11/15/2005	<10	<10										<10	<10			0.57 J		<10	<10	<10				<10				
	11/10/2005	<10	<10										<10	<10			0.77 U		<10	<10	<10				<10				
	11/3/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.6 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW09-60	5/11/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/9/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/16/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/24/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
UAW09-60(DUP)	11/24/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			3.5 J		<10	<10	<10				<10				
	11/10/2005	<10	<10										<10	<10			0.57 U		<10	<10	<10				<10				
	11/3/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.5 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW10-50	10/12/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/19/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/24/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/8/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/12/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/11/2005	<10	<10										<10	<10			4.8 U		<10	11	<10				<10				
	11/9/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW10-80	10/18/2001	NA	<10										<10	<10			<10		<10	NA	<10				<10				
	11/15/2001	NA	<10										<10	<10			<10		2.4 J	11	<10				<10				
	10/19/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/25/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/8/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/12/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/16/2005	<10	<10										<10	<10			1.3 U		<10	0.94 J	<10				<10				
	11/9/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.1 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW11-10	5/8/2001	NA	<500										<500	<500			<500		<500	<500	<500				<500				
	11/10/2001	NA	<25										<25	<25			<25		<25	<25	<25				<25				
	10/18/2002	97 E	NA										<10	NA			NA		NA	NA	NA				NA				
	11/16/2003	44	<10										<10	<10			<10		<10	<10	<10				<10				
	4/6/2004	<40	<40										<40	<40			<40		<40	<40	<40				<40				
	11/7/2004	16	<10										<10	<10			29 B		<10	<10	<10				<10				
	11/10/2005	28 J	<100										<100	<100			<100		<100	19 J	<100				<100				
	11/2/2006	200	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	16 J	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67
UAW11-40	5/18/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/18/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/30/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
UAW11-40 (Dup)	4/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/16/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/10/2005	<10	<10										<10	<10			0.48 U		<10	0.99 J	<10				<10				
	11/2/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.8 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW12-20	5/6/2001	<250	<250										NA	NA			<250		<250	NA	NA				<250				
	11/15/2001	<200	<200										NA	NA			<200		<200	NA	NA				<200				
	10/20/2002	<500	NA										<500	NA			NA		NA	NA	NA				NA				
	11/12/2003	<500	<500										<500	<500			<500		<500	<500	<500				<500				
	3/28/2004	<500	<500										<500	<500			<500		<500	<500	<500				<500				
	11/4/2004	<400	<400										<400	<400			<400		<400	<400	<400				<400				
	11/14/2005	4.3 J	<40										<40	<40			<40		<40	<40	<40				<40				
	11/6/2006	4.6 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.6 J	< 10	< 10	< 10	< 10	4.1 J	< 10	< 10	< 10	< 10
UAW13-20	5/6/2001	400	<200										NA	NA			<200		<200	NA	NA				<200				
	11/15/2001	<200	<200										NA	NA			<200		<200	NA	<200				<200				
	10/23/2002	830	NA										<250	NA			NA		NA	NA	NA				NA				
	11/12/2003	<100	<100										<100	<100			<100		<100	<100	<100				<100				
	3/28/2004	<250	<250										<250	<250			<250		<250	<250	<250				<250				
	11/5/2004	160	<100										<100	<100			<100		<100	<100	<100				<100				
	11/16/2005	48 J	<50										<50	<50			<50		<50	<50	<50				<50				
	10/31/2006	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
UAW14-10	5/5/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/9/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/16/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/16/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/5/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/16/2005	<10	<10										<10	<10			3.3 U		<10	0.76 J	<10				<10				
	11/8/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW15-20	5/6/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/11/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/18/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/17/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/7/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/7/2004	<10	<10										<10	<10			1 J B		<10	<10	<10				<10				
	11/15/2005	<10	<10										<10	<10			9.5 U		<10	0.91 J	<10				<10				
	11/2/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.6 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW15-50	5/6/2001	NA	<200										<200	<200			<200		<200	<200	<200				<200				
	11/19/2001	NA	<500										<500	<500			<500		<500	<500	<500				<500				
	10/18/2002	<500	NA										<500	NA			NA		NA	NA	NA				NA				
	12/4/2003	<200	<200										<200	<200			<200		<200	<200	<200				<200				
	4/7/2004	<100	<100										<100	<100			<100		<100	<100	<100				<100				
	11/7/2004	<100	<100										<100	<100			<100		<100	<100	<100				<100				
UAW15-50 (Dup)	11/7/2004	<100	<100										<100	<100			<100		<100	<100	<100				<100				
	11/15/2005	<200	<200										<200	<200			<200		<200	27 J	<200				<200				
	11/2/2006	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
UAW16-10	10/12/2001	NA	<10										<10	<10			<10		<10	19	<10				<10				
UAW16-10 (Dup)	10/12/2001	NA	<10										<10	<10			<10		<10	17	<10				<10				
	11/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/18/2002	9.5 J	NA										<10	NA			NA		NA	NA	NA				NA				
	11/16/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
UAW16-10 (Dup)	11/17/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/7/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/7/2004	<40	<40										<40	<40			<40		<40	<40	<40				<40				
	11/15/2005	4.1 J	<10										<10	<10			0.7 U		<10	1.1 J	<10				<10				
	11/6/2006	1.9 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW17-40	5/5/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/9/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/16/2002	<10	<10										<10	NA			NA		NA	NA	NA				<10				
	11/16/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/31/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/14/2005	<10	<10										<10	<10			1.2 U		<10	<10	<10				<10				
	10/31/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW18-20	10/12/2001	NA	<10										<10	<10			<10		<10	6 J	<10				<10				
	11/13/2001	NA	<10										<10	<10			<10		2.7 J	14	<10				<10				
	10/18/2002	32	NA										<10	NA			NA		NA	NA	NA				NA				
	11/16/2003	16	<10										<10	<10			<10		<10	<10	<10				<10				
	4/7/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/7/2004	25	<10										<10	<10			<10		<10	<10	<10				<10				
	11/15/2005	2 J	<10										<10	<10			1.5 U		<10	1.4 J	<10				<10				
	11/6/2006	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40

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Rohm and Haas Chemicals LLC
Cincinnati Plant
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SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW19-80	5/11/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
UAW19-80	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
UAW19-80 (Dup)	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/17/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
UAW19-80 (Dup)	10/17/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/13/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/30/2004	<10	<10										<10	<10			14		<10	<10	<10				<10				
	11/5/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
UAW19-80N	11/11/2005	<10	<10										<10	<10			1.2 U		<10	61 J	<10				<10				
UAW19-80N(DUP)	11/11/2005	<20	<20										<20	<20			1.1 J B		<20	63	<20				<20				
UAW19-80FD(DUP)	11/11/2005	<10	<10										<10	<10			1.4 U		1.6 J	47	<10				<10				
	11/8/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW20-60	5/7/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
UAW20-60 (Dup)	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/19/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
UAW20-60 (Dup)	10/19/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/13/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/30/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/5/2004	<10	<10										<10	<10			1.2 J		<10	<10	<10				<10				
	11/11/2005	<10	<10										<10	<10			0.58 U		<10	35	<10				<10				
	11/7/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW21-30	5/5/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/11/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/18/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/11/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/27/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/3/2004	<10	<10										<10	<10			1.2 J		<10	<10	<10				<10				
	11/9/2005	<10	<10										<10	<10			<10		<10	<10	<10				<10				
UAW21-30(DUP)	11/9/2005	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/9/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.2 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW21-80	5/5/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/11/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/18/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/11/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/27/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/3/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/8/2005	<10	<10										<10	<10			1.0 J B		<10	<10	<10				<10				
	11/8/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

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Rohm and Haas Chemicals LLC
Cincinnati Plant
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SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW22-20	10/13/2001	NA	<10										<10	<10			<10		<10	2.5 J	<10				<10				
	11/13/2001	NA	<10										<10	<10			<10		2.3 J	2.6 J	<10				<10				
	10/20/2002	<50	NA										<50	NA			NA		NA	NA	NA				NA				
	11/10/2003	<20	<20										<20	<20			<20		<20	<20	<20				<20				
	3/29/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/4/2004	2.2 J	<10										<10	<10			<10		<10	2 J	<10				<10				
	11/14/2005	1.9 J	<40										<40	<40			<40		<40	5.7 J	<40				<40				
	11/9/2006	1.2 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW23-20	10/12/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/14/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/19/2002	<10	<10										<10	NA			NA		NA	NA	NA				<10				
	11/13/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/28/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/5/2004	<10	<10										<10	<10			<10		<10	0.91 J	<10				<10				
	11/14/2005	<10	<10										<10	<10			0.60 J		<10	<10	<10				<10				
	11/6/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW24-70	10/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/15/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/17/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/16/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	4/5/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/16/2005	<10	<10										<10	<10			0.79 U		<10	0.84 J	<10				<10				
	10/31/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW25-20	10/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	11/13/2001	NA	<10										<10	<10			<10		<10	<10	<10				<10				
	10/18/2002	<10	NA										<10	NA			NA		NA	NA	NA				NA				
	11/12/2003	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	3/27/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/3/2004	1.3 J	<10										<10	<10			2.3 J B		<10	<10	<10				<10				
	11/9/2005	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/8/2006	1.9 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
UAW26-70	4/6/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/6/2004	<10	<10										<10	<10			1.7 J B		<10	<10	<10				<10				
	11/10/2005	<10	<10										<10	<10			0.99 U		<10	1.5 J	<10				<10				
	11/7/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Groundwater																													
UAW27-50	3/31/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/5/2004	<10	<10										<10	<10			<10		<10	<10	<10				<10				
	11/11/2005	<10	<10										<10	<10			0.59 U		<10	1.7 J	<10				<10				
	11/1/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.1 J B	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
LAW05-150	3/16/2002	<10	<10										NA	NA			<10		<10	NA	NA				<10				
LAW05-150 (Dup)	3/16/2002	<10	<10										NA	NA			<10		<10	NA	NA				<10				
LAW05-60	3/16/2002	<10	<10										NA	NA			<10		<10	NA	NA				<10				
LAW12-60	10/13/2001	<10	<10										NA	NA			<10		<10	NA	NA				<10				
	11/16/2001	<10	<10										NA	NA			<10		<10	NA	NA				<10				
20061102CINEB-1	11/2/2006	< 10	< 10	< 10	0.99 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.3 J	< 10	< 10	< 10	0.93 J	< 10	< 10	< 10	< 10	< 10	2.7 J	< 10	< 10	< 10	< 10	< 10	< 10
20061106CINEB-1	11/6/2006	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.6 J	< 10	< 10	< 10	< 10	< 10	< 10
20061106CINFB-1	11/6/2006	< 10	< 10	< 10	0.72 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1.6 J B	< 10	< 10	< 10	< 10	< 10	1.9 J	< 10	< 10	< 10	< 10	< 10	< 10
20061108CINFB-1	11/8/2006	< 10	< 10	< 10	1.1 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	1 J	< 10	< 10	< 10	< 10	< 10	1.4 J	< 10	< 10	< 10	< 10	< 10	< 10
French Drain Sump @ 46 hr	10/19/2002	150	NA										<50	NA			NA		NA	NA	NA				NA				
French Drain Sump @ 72 hr	10/20/2002	91 J	NA										<100	NA			NA		NA	NA	NA				NA				
Seeps																													
SS-1 (Seep)	10/11/2001	<10	NA										<10	NA			NA		NA	NA	NA				NA				
SS-5 (Seep)	10/11/2001	<10	NA										<10	NA			NA		NA	NA	NA				NA				

Notes:
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
NA indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more Facility Investigation samples.

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
MW-EPA-1	5/8/2001		<120		<120	<120								<120							<120	<120	<120	<120					
	11/15/2001		<200		<200	<200								<200							<200	<200	<200	<200					
	10/20/2002		NA		NA	NA								NA							NA	<1000	<1000	NA					
	11/12/2003		<500		<500	<500								<500							<500	<500	<500	<500					
	3/28/2004		<500		<500	<500								<500							<500	<500	<500	<500					
	11/4/2004		<500		<500	<500								<500							<500	<500	<500	<500					
	11/15/2005		0.96 J		<10	<10								<10							<10	<10	<10	<10					
	11/8/2006	< 250	< 50	< 50	< 50	< 50	< 50	< 250	< 250	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 250	< 50	< 50	< 50	< 50	< 50	< 50	11 J	< 250	< 250	< 250	< 50	< 50
MW-EPA-2	5/8/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/14/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/20/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/11/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/29/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/4/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
MW-EPA-3	5/6/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/17/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/13/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/30/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/4/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
MW-EPA-4	5/8/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/16/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/10/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
Recovery Well	7/29/2001		<10		<10	<10								<10							<10	<10	<10	<10					

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW01-30	5/4/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/8/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/17/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/11/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/24/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/8/2005		<10		<10	<10								<10							<10	<10	<10	<10					
UAW01-30(DUP)	11/8/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/1/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW01-80	5/12/2001		<10		<10	<10								<10							<0.050	<10	<10	<10					
	11/15/2001		<10		<10	<10								<10							<0.050	<10	<10	<10					
	11/19/2003		<10		<10	<10								<10							<0.050	<10	<10	<10					
	4/10/2004		<67		<67	<67								<67							<0.050	<67	<67	<10					
	11/6/2004		<10		<10	<10								<10							<0.050	<10	<10	<10					
	11/8/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/1/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	0.45 J	< 50	< 50	< 50	< 10	< 10
UAW02-20	5/7/2001		<10		<10	<10								<10							<10	<10	<10	<10					
UAW02-20 (Dup)	5/7/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/10/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/17/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/12/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/26/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW02-40	5/13/2001		<10		<10	<10								<10							<0.050	<10	<10	<10					
	11/14/2001		<10		<10	<10								<10							<0.050	<10	<10	<10					
	10/17/2002		NA		NA	NA								NA							<0.050	<10	<10	<10					
	11/20/2003		<10		<10	<10								<10							<0.050	<10	<10	<10					
	4/12/2004		<10		<10	<10								<10							<0.050	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							<0.050	<10	<10	<10					
	11/9/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW02-40 (DUP)	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW03-20	5/7/2001		<10		<10	<10								<10							<10	<10	7.7 J #	<10					
	11/11/2001		<20		<20	<20								<20							<20	<20	<20	<20					
	10/23/2002		NA		NA	NA								NA							NA	<67	<67	NA					
	11/12/2003		<100		<100	<100								<100							<100	<100	<100	<100					
	3/28/2004		<100		<100	<100								<100							<100	<100	<100	<100					
	11/4/2004		<67		<67	<67								<67							<67	<67	<67	<67					
UAW03-20 (Dup)	11/4/2004		<40		<40	<40								<40							<40	<40	<40	<40					
	11/9/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW04-20	5/7/2001		<40		<40	<40								<40							<40	140	150 #	<40					
	11/11/2001		<100		<100	<100								<100							<100	47 J	57 J #	<100					
	10/20/2002		NA		NA	NA								NA							NA	<120	<120	NA					
	11/12/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/28/2004		<50		<50	<50								<50							<50	79	<50	<50					
	11/3/2004		<50		<50	<50								<50							<50	15 J	28 J #	<50					
	11/9/2005		<10		<10	<10								<10							<10	0.86 J	1.4 J,#	<10					
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	12	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW04-20 (DUP)	11/6/2006	< 200	< 40	< 40	< 40	< 40	< 40	< 200	< 200	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 200	< 40	< 40	< 40	< 40	9.5 J	12 J	< 40	< 200	< 200	< 200	< 40	< 40
UAW05-20	5/6/2001		<100		<100	<100								<100							<100	<100	<100	<100					
	10/10/2001		2.8 J		<10	<10								<10							<10	<10	<10	<10					
	11/12/2001		<100		<100	<100								<100							<100	<100	<100	<100					
	10/20/2002		NA		NA	NA								NA							NA	<200	<200	NA					
	11/10/2003		<50		<50	<50								<50							<50	<50	<50	<50					
	3/28/2004		<25		<25	<25								<25							<25	<25	<25	<25					
UAW05-20 (Dup)	3/28/2004		<40		<40	<40								<40							<40	<40	<40	<40					
	11/4/2004		<25		<25	<25								<25							<25	<25	<25	<25					
	11/14/2005		<25		<25	<25								<25							<25	<25	<25	<25					
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	2.1 J	< 50	< 50	< 50	< 10	< 10
UAW06-20	5/6/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/10/2001		<25		<25	<25								<25							<25	<25	<25	<25					
	11/13/2001		<25		<25	<25								5.9 J							<25	<25	5.4 J #	<25					
	10/20/2002		NA		NA	NA								NA							NA	<50	<50	NA					
	11/12/2003		<100		<100	<100								<100							<100	<100	<100	<100					
	3/29/2004		<20		<20	<20								<20							<20	<20	<20	<20					
	11/4/2004		<40		<40	<40								<40							<40	<40	<40	<40					
	11/15/2005		<10		<10	<10								0.87 J							<10	<10	<10	<10					
	11/9/2006	< 250	< 50	< 50	< 50	< 50	< 50	< 250	< 250	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 250	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 250	< 250	< 250	< 50	< 50

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW07-20	5/8/2001		<100		<100	<100								<100							<100	<100	<100	<100					
UAW07-20 (Dup)	5/8/2001		<25		<25	<25								<25							<25	<25	<25	<25					
	11/15/2001		<40		<40	<40								<40							<40	<40	<40	<40					
	10/20/2002		NA		NA	NA								NA							NA	<40	<40	NA					
	11/12/2003		<50		<50	<50								<50							<50	<50	<50	<50					
UAW07-20 (Dup)	11/12/2003		<40		<40	<40								<40							<40	<40	<40	<40					
	4/5/2004		<100		<100	<100								<100							<100	<100	<100	<100					
	11/4/2004		<100		<100	<100								<100							<100	<100	<100	<100					
	11/15/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2006	< 500	< 100	< 100	< 100	< 100	< 100	< 500	< 500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 500	< 500	< 500	< 100	< 100
UAW08-20	5/6/2001		<1700		<1700	<1700								<1700							<1700	<1700	<1700	<1700					
	11/13/2001		<1300		<1300	<1300								<1300							<1300	<1300	330 J #	<1300					
	10/20/2002		NA		NA	NA								NA							NA	<1000	200 J	NA					
	11/10/2003		<2500		<2500	<2500								<2500							<2500	<2500	<2500	<2500					
	3/29/2004		<4000		<4000	<4000								<4000							<4000	<4000	<4000	<4000					
	11/4/2004		<2000		<2000	<2000								<2000							<2000	<2000	<2000	<2000					
	11/15/2005		<1000		<1000	<1000								<1000							<1000	<1000	140 J,#	<1000					
	11/9/2006	< 4000	< 800	< 800	< 800	< 800	< 800	< 4000	< 4000	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 4000	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 4000	< 4000	< 4000	< 800	< 800
UAW09-20	5/5/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/14/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/16/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/11/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
UAW09-20(DUP)	11/15/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/10/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW09-60	5/11/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/16/2002		NA		NA	NA								NA							NA	<10	<10	<10					
	11/24/2003		<10		<10	<10								<10							<10	<10	<10	<10					
UAW09-60(DUP)	11/24/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							NA	<10	<10	<10					
	11/10/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW10-50	10/12/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/19/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/24/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/8/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/12/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW10-80	10/18/2001		<10		<10	1.5 J								<10							<10	<10	<10	<10					
	11/15/2001		<10		<10	1.2 J								<10							<10	<10	<10	<10					
	10/19/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/25/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/8/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/12/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/16/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW11-10	5/8/2001		<500		<500	<500								<500							<500	<500	<500	<500					
	11/10/2001		<25		<25	<25								<25							<25	<25	9 J #	<25					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/16/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/6/2004		<40		<40	<40								<40							<40	<40	<40	<40					
	11/7/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/10/2005		<100		<100	<100								<100							<100	<100	<100	<100					
	11/2/2006	< 330	< 67	< 67	< 67	< 67	< 67	< 330	< 330	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 330	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 330	< 330	< 330	< 67	< 67
UAW11-40	5/18/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/14/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							<10	<10	<10	<10					
	11/30/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
UAW11-40 (Dup)	4/6/2004		<10		<10	<10								<10							NA	<10	<10	NA					
	11/16/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/10/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/2/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW12-20	5/6/2001		<250		<250	<250								<250							<250	<250	<250	<250					
	11/15/2001		<200		<200	<200								<200							<200	<200	<200	<200					
	10/20/2002		NA		NA	NA								NA							NA	<500	<500	NA					
	11/12/2003		<500		<500	<500								<500							<500	<500	<500	<500					
	3/28/2004		<500		<500	<500								<500							<500	<500	<500	<500					
	11/4/2004		<400		<400	<400								<400							<400	<400	<400	<400					
	11/14/2005		<40		<40	<40								<40							<40	<40	<40	<40					
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	3.5 J	< 50	< 50	< 50	< 10	< 10
UAW13-20	5/6/2001		<200		<200	<200								<200							<200	<200	<200	<200					
	11/15/2001		<200		<200	<200								<200							<200	<200	<200	<200					
	10/23/2002		NA		NA	NA								NA							NA	<250	<250	NA					
	11/12/2003		<100		<100	<100								<100							<100	<100	<100	<100					
	3/28/2004		<250		<250	<250								<250							<250	<250	<250	<250					
	11/5/2004		<100		<100	<100								<100							8.6J	<100	<100	<100					
	11/16/2005		<50		<50	<50								<50							6.5 J	<50	<50	2.6 J					
	10/31/2006	< 250	< 50	< 50	< 50	< 50	< 50	< 250	< 250	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 250	< 50	< 50	< 50	5.7 J	< 50	< 50	< 50	< 250	< 250	< 250	< 50	< 50
UAW14-10	5/5/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/16/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/16/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/5/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/16/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW15-20	5/6/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/17/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/7/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/7/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/15/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/2/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10

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Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW15-50	5/6/2001		<200		<200	<200								<200							<200	<200	<200	<200					
	11/19/2001		<500		<500	<500								<500							<500	<500	110 J #	<500					
	10/18/2002		NA		NA	NA								NA							<500	<500	<500	<500					
	12/4/2003		<200		<200	<200								<200							<200	<200	<200	<200					
	4/7/2004		<100		<100	<100								<100							<100	<100	<100	<100					
	11/7/2004		<100		<100	<100								<100							<100	<100	11 J #	<100					
UAW15-50 (Dup)	11/7/2004		<100		<100	<100								<100							NA	<100	12 J #	NA					
	11/15/2005		<200		<200	<200								<200							<200	<200	8.2 J #	<200					
	11/2/2006	< 500	< 100	< 100	< 100	< 100	< 100	< 500	< 500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 500	< 500	< 500	< 100	< 100
UAW16-10	10/12/2001		<10		<10	<10								<10							<10	<10	2.4 J #	<10					
UAW16-10 (Dup)	10/12/2001		<10		<10	<10								<10							<10	<10	3.4 J #	<10					
	11/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/16/2003		<10		<10	<10								<10							<10	<10	<10	<10					
UAW16-10 (Dup)	11/17/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/7/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/7/2004		<40		<40	<40								<40							<40	<40	<40	<40					
	11/15/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW17-40	5/5/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/16/2002		NA		NA	NA								NA							<10	<10	<10	<10					
	11/16/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/31/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/14/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	10/31/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW18-20	10/12/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/16/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/7/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/7/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/15/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2006	< 200	< 40	< 40	< 40	< 40	< 40	< 200	< 200	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 200	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 200	< 200	< 200	< 40	< 40

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Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW19-80	5/11/2001		<10		<10	<10								<10							<10	<10	<10	<10					
UAW19-80	11/14/2001		<10		<10	<10								<10							<10	<10	<10	<10					
UAW19-80 (Dup)	11/14/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/17/2002		NA		NA	NA								NA							NA	<10	<10	NA					
UAW19-80 (Dup)	10/17/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/13/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/30/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/5/2004		<10		<10	<10								<10							<10	<10	<10	<10					
UAW19-80N	11/11/2005		<10		<10	<10								<10							<10	<10	<10	<10					
UAW19-80N(DUP)	11/11/2005		<20		<20	<20								<20							<20	<20	<20	<20					
UAW19-80FD(DUP)	11/11/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW20-60	5/7/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/14/2001		<10		<10	<10								<10							<10	<10	<10	<10					
UAW20-60 (Dup)	11/14/2001		<10		<10	<10								<10							<10	<10	<10	NA					
	10/19/2002		NA		NA	NA								NA							<10	<10	<10	<10					
UAW20-60 (Dup)	10/19/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/13/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/30/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/5/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW21-30	5/5/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/11/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/27/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2005		<10		<10	<10								<10							<10	<10	<10	<10					
UAW21-30(DUP)	11/9/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2006	< 50	< 10	< 10	< 10	< 10	0.62 J	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW21-80	5/5/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/11/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/27/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/8/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW22-20	10/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/20/2002		NA		NA	NA								NA							NA	<50	<50	NA					
	11/10/2003		<20		<20	<20								<20							<20	<20	<20	<20					
	3/29/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/4/2004		<10		<10	<10								<10							<10	<10	<10	0.89 J					
	11/14/2005		<40		<40	<40								<40							<40	<40	<40	<40					
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW23-20	10/12/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/14/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/19/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/13/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/28/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/5/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/14/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW24-70	10/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/15/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/17/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/16/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	4/5/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/16/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	10/31/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW25-20	10/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	11/13/2001		<10		<10	<10								<10							<10	<10	<10	<10					
	10/18/2002		NA		NA	NA								NA							NA	<10	<10	NA					
	11/12/2003		<10		<10	<10								<10							<10	<10	<10	<10					
	3/27/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/3/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/9/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
UAW26-70	4/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/6/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/10/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Groundwater																													
UAW27-50	3/31/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/5/2004		<10		<10	<10								<10							<10	<10	<10	<10					
	11/11/2005		<10		<10	<10								<10							<10	<10	<10	<10					
	11/1/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
LAW05-150	3/16/2002		<10		<10	<10								<10							<10	<10	<10	<10					
LAW05-150 (Dup)	3/16/2002		<10		<10	<10								<10							<10	<10	<10	<10					
LAW05-60	3/16/2002		<10		<10	<10								<10							<10	<10	<10	<10					
LAW12-60	10/13/2001		<10		1.6 J B	<10								<10							<10	<10	<10	<10					
	11/16/2001		<10		<10	<10								<10							<10	<10	<10	<10					
20061102CINEB-1	11/2/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
20061106CINEB-1	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
20061106CINFB-1	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
20061108CINFB-1	11/8/2006	< 50	< 10	0.74 J	< 10	< 10	< 10	< 50	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 50	< 50	< 50	< 10	< 10
French Drain Sump @ 46 hr	10/19/2002		NA		NA	NA								NA							NA	<50	<50	NA					
French Drain Sump @ 72 hr	10/20/2002		NA		NA	NA								NA							NA	<100	<100	NA					
Seeps																													
SS-1 (Seep)	10/11/2001		NA		NA	NA								NA							NA	<10	<10	NA					
SS-5 (Seep)	10/11/2001		NA		NA	NA								NA							NA	<10	<10	NA					

Notes:
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
NA indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more Facility Investigation samples.

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
MW-EPA-1	5/8/2001							<120				<120	940	<120	160	NA
	11/15/2001							<200				<200	1700	35 J	260	NA
	10/20/2002							NA				NA	1900	NA	300 J	NA
	11/12/2003							<500				<500	1700	<500	<500	NA
	3/28/2004							<500				<500	1300	<500	<500	NA
	11/4/2004							<500				<500	1100	35 J	250 J	NA
	11/15/2005							<10				<56	1000	33 J	220	NA
	11/8/2006	< 250	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	NA	NA	NA	NA	NA
MW-EPA-2	5/8/2001							<10				<10	<10	<10	<10	NA
	11/14/2001							<10				<10	<10	<10	<10	NA
	10/20/2002							NA				NA	<10	NA	<10	NA
	11/11/2003							<10				<10	<10	<10	<10	NA
	3/29/2004							<10				<10	<10	<10	<10	NA
	11/4/2004							<10				<10	<10	<10	<10	NA
	11/11/2005							<10				<2	<2	<2	<2	NA
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
MW-EPA-3	5/6/2001							<10				<10	<10	<10	<10	NA
	11/13/2001							<10				<10	<10	<10	<10	NA
	10/17/2002							NA				NA	<10	NA	<10	NA
	11/13/2003							<10				<10	<10	<10	<10	NA
	3/30/2004							<10				<10	<10	<10	<10	NA
	11/4/2004							<10				<1	<1	<1	<1	NA
	11/11/2005							<10				<1	<1	<1	<1	NA
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
MW-EPA-4	5/8/2001							<10				<10	<10	<10	<10	NA
	11/13/2001							<10				<10	<10	<10	<10	NA
	10/18/2002							NA				NA	<10	NA	<10	NA
	11/16/2003							<10				<10	<10	<10	<10	NA
	4/6/2004							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/10/2005							<10				<1	<1	<1	<1	NA
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
Recovery Well	7/29/2001							<10				<10	2.4 J	<10	<10	<10

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW01-30	5/4/2001							<10				<10	<10	<10	<10	NA
	11/8/2001							<10				<10	<10	<10	<10	NA
	10/17/2002							NA				NA	<10	NA	<10	NA
	11/11/2003							<10				<10	<10	<10	<10	NA
	3/24/2004							<10				<10	<10	<10	<10	NA
	11/3/2004							<10				<10	<10	<10	<10	NA
	11/8/2005							<10				<1	<1	<1	<1	NA
UAW01-30(DUP)	11/8/2005							<10				NA	NA	NA	NA	NA
	11/1/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW01-80	5/12/2001							<10				<10	<10	<10	<10	NA
	11/15/2001							<10				<10	<10	<10	<10	NA
	11/19/2003							<10				<10	<10	<10	<10	NA
	4/10/2004							<67				<67	<67	<67	<67	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/8/2005							<10				<1	<1	<1	<1	NA
	11/1/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW02-20	5/7/2001							<10				<10	12	<10	3.7 J	NA
UAW02-20 (Dup)	5/7/2001							<10				<10	11	<10	3.5 J	NA
	11/10/2001							<10				<10	12	<10	4.1 J	NA
	10/17/2002							NA				NA	5.1 J	NA	1.7 J	NA
	11/12/2003							<10				<10	<10	<10	<10	NA
	3/26/2004							<10				<10	<10	<10	<10	NA
	11/3/2004							<10				<10	10	<10	3.8 J	NA
	11/9/2005							<10				<1	15	0.61 J	6.1	NA
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW02-40	5/13/2001							<10				<10	<10	<10	<10	NA
	11/14/2001							<10				<10	<10	<10	<10	NA
	10/17/2002							NA				NA	<10	NA	<10	NA
	11/20/2003							<10				<10	<10	<10	<10	NA
	4/12/2004							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/9/2005							<10				<1.7	<1.7	<1.7	<1.7	NA
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW02-40 (DUP)	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW03-20	5/7/2001							<10				<10	19	<10	3.3 J	NA
	11/11/2001							<20				<20	140	3.5 J	19 J	NA
	10/23/2002							NA				NA	190	NA	27 J	NA
	11/12/2003							<100				<100	190	<100	<100	NA
	3/28/2004							<100				<100	360	<100	<100	NA
	11/4/2004							<67				<67	220	5 J	36 J	NA
UAW03-20 (Dup)	11/4/2004							<40				<40	160	4 J	26 J	NA
	11/9/2005							<10				<4	150	3.5 J	20	NA
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW04-20	5/7/2001							<40				<40	<40	<40	<40	NA
	11/11/2001							<100				<100	<100	<100	<100	NA
	10/20/2002							NA				NA	<120	NA	<120	NA
	11/12/2003							<10				<10	<10	<10	<10	NA
	3/28/2004							<50				<50	<50	<50	<50	NA
	11/3/2004							<50				<50	3.8 J	<50	<50	NA
	11/9/2005							<10				<10	<10	<10	<10	NA
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW04-20 (DUP)	11/6/2006	< 200	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	NA	NA	NA	NA	NA
UAW05-20	5/6/2001							<100				<100	880	<100	120	NA
	10/10/2001							<10				2.4 J	NA	20	NA	NA
	11/12/2001							<100				<100	590	16 J	82 J	NA
	10/20/2002							NA				NA	540	NA	82 J	NA
	11/10/2003							<50				<50	200	<50	63	NA
	3/28/2004							<25				<25	91	<25	44	NA
UAW05-20 (Dup)	3/28/2004							<40				<40	95	<40	47	NA
	11/4/2004							<25				<25	90	7.3 J	52	NA
	11/14/2005							1.9 J				<20	100	9.4 J	71	NA
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW06-20	5/6/2001							<10				<10	14	<10	<10	NA
	10/10/2001							<25				<25	16 J	<25	<25	NA
	11/13/2001							<25				<25	25	<25	4 J	NA
	10/20/2002							NA				NA	18 J	NA	<50	NA
	11/12/2003							<100				<100	<100	<100	<100	NA
	3/29/2004							<20				<20	41	<20	<20	NA
	11/4/2004							<40				<40	52	<40	5.1 J	NA
	11/15/2005							<10				<3.3	100	1.7 J	10	NA
	11/9/2006	< 250	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW07-20	5/8/2001							<100				<100	37 J	<100	<100	<100
UAW07-20 (Dup)	5/8/2001							<25				<25	34	<25	<25	<25
	11/15/2001							<40				<40	57	<40	8 J	<40
	10/20/2002							NA				NA	61	NA	7.2 J	NA
	11/12/2003							<50				<50	100	<50	<50	NA
UAW07-20 (Dup)	11/12/2003							<40				<40	83	<40	<40	NA
	4/5/2004							<100				<100	<100	<100	<100	NA
	11/4/2004							<100				<100	100	<100	12 J	NA
	11/15/2005							<10				<8.3	180	1.7 J	17	NA
	11/6/2006	< 500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	NA	NA	NA	NA	NA
UAW08-20	5/6/2001							<1700				<1700	<1700	<1700	<1700	<1700
	11/13/2001							<1300				<1300	530 J	<1300	<1300	<1300
	10/20/2002							NA				NA	280 J	NA	<1000	NA
	11/10/2003							<2500				<2500	<2500	<2500	<2500	NA
	3/29/2004							<4000				<4000	<4000	<4000	<4000	NA
	11/4/2004							160 J				<2000	380 J	<2000	<2000	NA
	11/15/2005							92 J				<25	380	7.6 J	41	NA
	11/9/2006	< 4000	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	< 800	NA	NA	NA	NA	NA
UAW09-20	5/5/2001							<10				<10	<10	<10	<10	NA
	11/14/2001							<10				<10	<10	<10	<10	NA
	10/16/2002							NA				NA	<10	NA	<10	NA
	11/11/2003							<10				<10	<10	<10	<10	NA
	4/6/2004							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
UAW09-20(DUP)	11/15/2005							<10				<1	<1	<1	<1	NA
	11/10/2005							<10				<1	<1	<1	<1	NA
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW09-60	5/11/2001							<10				<10	<10	<10	<10	NA
	11/9/2001							<10				<10	<10	<10	<10	NA
	10/16/2002							NA				NA	<10	NA	<10	NA
	11/24/2003							<10				<10	<10	<10	<10	NA
UAW09-60(DUP)	11/24/2003							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/10/2005							<10				<1	<1	<1	<1	NA
	11/3/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW10-50	10/12/2001							<10				<10	<10	<10	<10	NA
	11/13/2001							<10				<10	5 J	<10	2.3 J	NA
	10/19/2002							NA				NA	<10	NA	<10	NA
	11/24/2003							<10				<10	<10	<10	<10	NA
	4/8/2004							<10				<10	<10	<10	<10	NA
	11/12/2004							<10				<10	<10	<10	<10	NA
	11/11/2005							<10				<5	<5	<5	<5	NA
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW10-80	10/18/2001							19				<10	<10	<10	<10	NA
	11/15/2001							<10				<10	<10	<10	<10	NA
	10/19/2002							NA				NA	<10	NA	<10	NA
	11/25/2003							<10				<10	<10	<10	<10	NA
	4/8/2004							<10				<10	<10	<10	<10	NA
	11/12/2004							<10				<10	<10	<10	<10	NA
	11/16/2005							<10				<2.5	<2.5	<2.5	<2.5	NA
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW11-10	5/8/2001							<500				<500	<500	<500	<500	NA
	11/10/2001							<25				<25	13 J	<25	3.7 J	NA
	10/18/2002							NA				NA	9.1 J	NA	3 J	NA
	11/16/2003							<10				<10	<10	<10	<10	NA
	4/6/2004							<40				<40	<40	<40	<40	NA
	11/7/2004							<10				<10	8.9 J	<10	3.7 J	NA
	11/10/2005							<100				<1	20	1.1	8.6	NA
	11/2/2006	< 330	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	< 67	NA	NA	NA	NA	NA
UAW11-40	5/18/2001							<10				<10	<10	<10	<10	NA
	11/14/2001							<10				<10	<10	<10	<10	NA
	10/18/2002							NA				NA	<10	NA	<10	NA
	11/30/2003							<10				<10	<10	<10	<10	NA
	4/6/2004							<10				<10	<10	<10	<10	NA
UAW11-40 (Dup)	4/6/2004							<10				<10	<10	<10	<10	NA
	11/16/2004							<10				<10	<10	<10	<10	NA
	11/10/2005							<10				<1	0.52 J	<1	<1	NA
	11/2/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW12-20	5/6/2001							<250				<250	1600	<250	150 J	<250
	11/15/2001							<200				<200	1900	41 J	230	<200
	10/20/2002							NA				NA	1100	NA	130 J	NA
	11/12/2003							<500				<500	1600	<500	<500	NA
	3/28/2004							<500				<500	1500	<500	<500	NA
	11/4/2004							<400				<400	1100	35 J	180 J	NA
	11/14/2005							<40				<100	1100	46 J	220	NA
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW13-20	5/6/2001							<200				<200	<200	<200	<200	<200
	11/15/2001							<200				<200	49 J	<200	<200	<200
	10/23/2002							NA				NA	55 J	NA	<250	NA
	11/12/2003							<100				<100	<100	<100	<100	NA
	3/28/2004							<250				<250	<250	<250	<250	NA
	11/5/2004							<100				<100	53 J	<100	11 J	NA
	11/16/2005							<50				<10	66	<10	11	NA
	10/31/2006	< 250	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	NA	NA	NA	NA	NA
UAW14-10	5/5/2001							<10				<10	<10	<10	<10	NA
	11/9/2001							<10				<10	<10	<10	<10	NA
	10/16/2002							NA				NA	<10	NA	<10	NA
	11/16/2003							<10				<10	<10	<10	<10	NA
	4/5/2004							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/16/2005							<10				<1	<1	<1	<1	NA
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW15-20	5/6/2001							<10				<10	<10	<10	<10	NA
	11/11/2001							<10				<10	<10	<10	<10	NA
	10/18/2002							NA				NA	<10	NA	<10	NA
	11/17/2003							<10				<10	<10	<10	<10	NA
	4/7/2004							<10				<10	<10	<10	<10	NA
	11/7/2004							<10				<10	<10	<10	<10	NA
	11/15/2005							<10				<5	<5	<5	<5	NA
	11/2/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW15-50	5/6/2001							<200				<200	<200	<200	<200	NA
	11/19/2001							<500				<500	<500	<500	<500	NA
	10/18/2002							NA				NA	<500	NA	<500	NA
	12/4/2003							<200				<200	<200	<200	<200	NA
	4/7/2004							<100				<100	<100	<100	<100	NA
	11/7/2004							<100				<100	<100	<100	<100	NA
UAW15-50 (Dup)	11/7/2004							<100				<100	<100	<100	<100	NA
	11/15/2005							<200				<3.3	<3.3	<3.3	<3.3	NA
	11/2/2006	< 500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	NA	NA	NA	NA	NA
UAW16-10	10/12/2001							<10				<10	6.9 J	<10	12	NA
UAW16-10 (Dup)	10/12/2001							<10				<10	6.2 J	<10	11	NA
	11/13/2001							<10				<10	7.5 J	<10	10	NA
	10/18/2002							NA				NA	7 J	NA	8.3 J	NA
	11/16/2003							<10				<10	<10	<10	<10	NA
UAW16-10 (Dup)	11/17/2003							<10				<10	<10	<10	<10	NA
	4/7/2004							<10				<10	<10	<10	<10	NA
	11/7/2004							<40				<40	7.5 J	<40	6.5 J	NA
	11/15/2005							<10				<1	14	0.97 J	7.9	NA
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW17-40	5/5/2001							<10				<10	<10	<10	<10	NA
	11/9/2001							<10				<10	<10	<10	<10	NA
	10/16/2002							<10				<10	<10	NA	<10	NA
	11/16/2003							<10				<10	<10	<10	<10	NA
	3/31/2004							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/14/2005							<10				<1	<1	<1	<1	NA
	10/31/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW18-20	10/12/2001							<10				<10	5.7 J	<10	2.8 J	NA
	11/13/2001							<10				<10	<10	<10	<10	NA
	10/18/2002							NA				NA	3 J	NA	1.8 J	NA
	11/16/2003							<10				<10	<10	<10	<10	NA
	4/7/2004							<10				<10	<10	<10	<10	NA
	11/7/2004							<10				<10	2.3 J	<10	1.3 J	NA
	11/15/2005							<10				<1	0.39 J	<1	0.24 J	NA
	11/6/2006	< 200	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	< 40	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW19-80	5/11/2001							<10				<10	<10	<10	<10	NA
UAW19-80	11/14/2001							<10				<10	<10	<10	<10	NA
UAW19-80 (Dup)	11/14/2001							<10				<10	<10	<10	<10	NA
	10/17/2002							NA				NA	<10	NA	<10	NA
UAW19-80 (Dup)	10/17/2002							NA				NA	<10	NA	<10	NA
	11/13/2003							<10				<10	<10	<10	<10	NA
	3/30/2004							<10				<10	<10	<10	<10	NA
	11/5/2004							<10				<10	<10	<10	<10	NA
UAW19-80N	11/11/2005							<10				<1	<1	<1	<1	NA
UAW19-80N(DUP)	11/11/2005							<20				<1	<1	<1	<1	NA
UAW19-80FD(DUP)	11/11/2005							<10				<1	<1	<1	<1	NA
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW20-60	5/7/2001							<10				<10	<10	<10	<10	NA
	11/14/2001							<10				<10	<10	<10	<10	NA
UAW20-60 (Dup)	11/14/2001							<10				<10	<10	<10	<10	NA
	10/19/2002							NA				NA	<10	NA	<10	NA
UAW20-60 (Dup)	10/19/2002							NA				NA	<10	NA	<10	NA
	11/13/2003							<10				<10	<10	<10	<10	NA
	3/30/2004							<10				<10	<10	<10	<10	NA
	11/5/2004							<10				<10	<10	<10	<10	NA
	11/11/2005							<10				<50	<50	<50	<50	NA
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW21-30	5/5/2001							<10				<10	<10	<10	<10	NA
	11/11/2001							<10				<10	<10	<10	<10	NA
	10/18/2002							NA				NA	<10	NA	<10	NA
	11/11/2003							<10				<10	<10	<10	<10	NA
	3/27/2004							<10				<10	<10	<10	<10	NA
	11/3/2004							<10				<10	<10	<10	<10	NA
	11/9/2005							<10				<1	<1	<1	<1	NA
UAW21-30(DUP)	11/9/2005							<10				NA	NA	NA	NA	NA
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW21-80	5/5/2001							<10				<10	<10	<10	<10	NA
	11/11/2001							<10				<10	<10	<10	<10	NA
	10/18/2002							NA				NA	<10	NA	<10	NA
	11/11/2003							<10				<10	<10	<10	<10	NA
	3/27/2004							<10				<10	<10	<10	<10	NA
	11/3/2004							<10				<10	<10	<10	<10	NA
	11/8/2005							<10				<1	<1	<1	<1	NA
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW22-20	10/13/2001							<10				<10	70	1.6 J	9.7 J	NA
	11/13/2001							<10				<10	78	1.7 J	9.9 J	NA
	10/20/2002							NA				NA	60	NA	10 J	NA
	11/10/2003							<20				<20	44	<20	<20	NA
	3/29/2004							<10				<10	31	<10	<10	NA
	11/4/2004							<10				<10	34	0.88 J	6.8 J	NA
	11/14/2005							<40				<2	74	1.4 J	8.7	NA
	11/9/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW23-20	10/12/2001							<10				<10	<10	<10	<10	NA
	11/14/2001							<10				<10	<10	<10	<10	NA
	10/19/2002							<10				<10	<10	NA	<10	NA
	11/13/2003							<10				<10	<10	<10	<10	NA
	3/28/2004							<10				<10	<10	<10	<10	NA
	11/5/2004							<10				<10	<10	<10	<10	NA
	11/14/2005							<10				<1.4	<1.4	<1.4	<1.4	NA
	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW24-70	10/13/2001							<10				<10	<10	<10	<10	NA
	11/15/2001							<10				<10	<10	<10	<10	NA
	10/17/2002							NA				NA	<10	NA	<10	NA
	11/16/2003							<10				<10	<10	<10	<10	NA
	4/5/2004							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/16/2005							<10				<1	<1	<1	<1	NA
	10/31/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW25-20	10/13/2001							<10				<10	11	<10	3 J	NA
	11/13/2001							<10				<10	11	<10	3.2 J	NA
	10/18/2002							NA				NA	5.6 J	NA	1.7 J	NA
	11/12/2003							<10				<10	<10	<10	<10	NA
	3/27/2004							<10				<10	<10	<10	<10	NA
	11/3/2004							<10				<10	6.4 J	<10	2.4 J	NA
	11/9/2005							<10				<1	10	0.42 J	3.3	NA
	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
UAW26-70	4/6/2004							<10				<10	<10	<10	<10	NA
	11/6/2004							<10				<10	<10	<10	<10	NA
	11/10/2005							<10				<1	<1	<1	<1	NA
	11/7/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA

Table B-2
Summary of Semivolatile Organic Detections in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Groundwater																
UAW27-50	3/31/2004							<10				<10	<10	<10	<10	NA
	11/5/2004							<10				<10	<10	<10	<10	NA
	11/11/2005							<10				<1	<1	<1	<1	NA
	11/1/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
LAW05-150	3/16/2002							<10				<10	<10	<10	<10	<10
LAW05-150 (Dup)	3/16/2002							<10				<10	<10	<10	<10	<10
LAW05-60	3/16/2002							<10				<10	<10	<10	<10	<10
LAW12-60	10/13/2001							<10				<10	<10	<10	<10	1.6 J
	11/16/2001							<10				<10	<10	<10	<10	1.5 J
20061102CINEB-1	11/2/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
20061106CINEB-1	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
20061106CINFB-1	11/6/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
20061108CINFB-1	11/8/2006	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NA	NA	NA	NA	NA
French Drain Sump @ 46 hr	10/19/2002							NA				NA	200	NA	27 J	NA
French Drain Sump @ 72 hr	10/20/2002							NA				NA	140	NA	22 J	NA
Seeps																
SS-1 (Seep)	10/11/2001							NA				NA	21	NA	2.6 J	NA
SS-5 (Seep)	10/11/2001							NA				NA	14	NA	1.7 J	NA

Notes:
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
NA indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more Facility Investigation samples.

Table B-3
Summary of Pesticide and Polychlorinated Biphenyl Detections
in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Toxaphene	Aroclor 1242
Groundwater	**(units: ug/L)**																							
MW-EPA-1	5/8/2001	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.11 J	<0.25	0.13 J	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.5	<10	<1
	11/15/2001	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	<5	<100	<1
	10/20/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
	11/12/2003	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<1	<20	<1
	3/28/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	<2	<40	<10
	11/4/2004	0.035 J	0.052 PG	<0.05	0.076 PG	<0.05	<0.05	0.077 PG	0.031 J	0.07 PG	<0.05	0.27 PG	<0.05	0.021 J	0.057	0.032 J	0.04 J	<0.05	<0.05	0.061 PG	NA	<0.1	<2	<1
MW-EPA-2	5/8/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/14/2001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.2	<4	<1
	10/20/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	<1	<1	<1	NA	NA	<1	<1	<2	NA	NA	NA
	11/11/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/29/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	NA	<0.1	<2	<1
	11/4/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.032 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
MW-EPA-3	5/6/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/13/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/30/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/4/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.019 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
MW-EPA-4	5/8/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
Recovery Well	7/29/2001	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA	<0.1	<0.1	<0.2	<0.2	<4	<200
UAW01-30	5/4/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03 J	<0.05	NA	<0.1	<2	<1
	11/8/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/11/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/24/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/3/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.033 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.0092 J	<0.05	NA	<0.1	<2	<1
UAW01-80	5/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/15/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/19/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/10/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW02-20	5/7/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW02-20 (Dup)	5/7/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/10/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/12/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/26/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/3/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1

Table B-3
Summary of Pesticide and Polychlorinated Biphenyl Detections
in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Toxaphene	Aroclor 1242
Groundwater	**(units: ug/L)**																							
UAW02-40	5/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/10/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/12/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/26/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/3/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW03-20	5/7/2001	0.074 PG	<0.05	<0.05	<0.05	<0.05	0.053 PG	<0.05	<0.05	0.062 PG	<0.05	<0.05	<0.05	<0.05	<0.05	0.14 PG	<0.05	<0.05	<0.05	0.041 J	NA	<0.1	<2	<2
	11/11/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/23/2002	0.025 J	<0.05	<0.05	<0.05	<0.05	<0.05	0.02 J	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/12/2003	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<1	<20	<1
	3/28/2004	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<1	<20	<1
	11/4/2004	0.057	<0.05	<0.05	<0.05	<0.05	<0.05	0.055 PG	<0.05	0.24 PG	<0.05	<0.05	<0.05	0.04 J	0.042 J	<0.05	<0.05	0.034 J	0.11 PG	<0.05	NA	<0.1	<2	<1
UAW03-20 (Dup)	11/4/2004	0.02 J	<0.05	<0.05	<0.05	<0.05	<0.05	0.22 PG	<0.05	0.26 PG	<0.05	<0.05	<0.05	0.039 J	<0.05	<0.05	<0.05	0.17 PG	0.22 PG	<0.05	NA	0.082 J	<2	<1
UAW04-20	5/7/2001	<0.05	<0.05	<0.05	<0.05	<0.05	0.039 J	0.041 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/11/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/20/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	<1	<1	<1	NA	NA	<1	<1	<2	NA	NA	NA
	11/12/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/28/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/3/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.089	<0.05	<0.05	<0.05	<0.05	<0.05	0.15 PG	0.16 PG	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW05-20	5/6/2001	0.03 J	<0.05	<0.05	<0.05	0.029 J	<0.05	<0.05	<0.05	<0.05	0.021 J	0.028 J	<0.05	<0.05	0.097 PG	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/10/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.022 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.028 J	NA	<0.1	<2	<1
	11/11/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	0.92 J
	10/20/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
	11/10/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/28/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW05-20 (Dup)	3/28/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/4/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.045 J	<0.05	<0.05	<0.05	0.027 J	<0.05	0.014 J	0.075	<0.05	0.02 J	<0.05	0.013 J	0.37 PG	NA	0.029 J	<2	<1
UAW06-20	5/6/2001	<0.05	0.024 J	0.022 J	<0.05	<0.05	<0.05	0.16 PG	0.023 J	0.033 J	<0.05	0.039 J	<0.05	<0.05	<0.05	0.045 J	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/10/2001	<0.05	<0.05	<0.05	<0.05	<0.05	0.026 J	0.12	<0.05	0.022 J	<0.05	0.034 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.054 PG	<0.05	NA	<0.1	<2	<1
	11/13/2001	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	NA	<50	<1000	<1
	10/20/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
	11/12/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	<2	<40	<1
	3/29/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/4/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.042 J	<0.05	<0.05	<0.05	0.021 J	<0.05	<0.05	<0.05	<0.05	0.019 J	<0.05	0.1 PG	<0.05	NA	<0.1	<2	<1
UAW07-20	5/8/2001	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	0.19 J	0.13 J	<0.25	<0.25	<0.25	NA	<0.25	NA	<0.25	<0.25	<0.5	<0.5	<10	<1
UAW07-20 (Dup)	5/8/2001	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.35 J	NA	<0.5	NA	<0.5	<0.5	<1	<1	<20	<10
	11/15/2001	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<5	<5	<100	<1
	10/20/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.092	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/12/2003	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<1	<20	<1
UAW07-20 (Dup)	11/12/2003	<0.05	0.2 PG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	0.33 PG	<0.05	<0.05	NA	<0.1	<2	<1
	4/5/2004	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<1	<20	<1
	11/4/2004	0.14 J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.25 J	<0.5	0.14 J	<0.5	<0.5	<0.5	0.37 J	<0.5	0.29 J	NA	0.47 J	<20	<1

Table B-3
Summary of Pesticide and Polychlorinated Biphenyl Detections
in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Toxaphene	Aroclor 1242
Groundwater	**(units: ug/L)**																							
UAW08-20	5/6/2001	<1	<1	<1	<1	<1	NA	<1	<1	<1	<1	<1	<1	<1	<1	NA	<1	NA	<1	<1	<2	<2	<40	<1
	11/13/2001	<0.5	<0.5	<0.5	<0.5	0.32 J	NA	<0.5	<0.5	0.52 PG	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	0.49 J	0.32 J	<1	<1	<20	<1
	10/20/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	NA	NA	<0.5	<0.5	<1	NA	NA	NA
	11/10/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	<2	<40	<1
	3/29/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	<2	<40	<10
	11/4/2004	0.08 J	0.29 PG	<0.25	<0.25	<0.25	<0.25	0.056 J	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.47 PG	<0.25	<0.25	0.2 J	NA	<0.5	<10	<1
UAW09-20	5/5/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/9/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/11/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW09-60	5/5/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/9/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/11/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW10-50	10/12/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/19/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
	11/10/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/30/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/5/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.044 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.97	NA	<0.2	<4	<1
UAW10-80	10/12/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.081	NA	<0.1	<2	<1
	11/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/19/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	NA	NA	<0.5	<0.5	<1	NA	NA	NA
	11/13/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/30/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/5/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.081 PG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW11-10	5/8/2001	<0.05	<0.05	<0.05	0.42	<0.05	<0.05	<0.05	0.11	0.054 PG	<0.05	<0.05	<0.05	0.043 J	<0.05	<0.05	<0.05	<0.05	0.1 PG	<0.05	NA	<0.1	<2	<1
	11/10/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/18/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<5
	11/7/2004	0.0085 J	0.016 J	0.016 J	<0.05	<0.05	<0.05	0.13	0.0074 J	<0.05	0.015 J	0.044 J	<0.05	<0.05	0.51	<0.05	<0.05	0.025 J	<0.05	0.033 J	NA	0.024 J	<2	<1
UAW11-40	5/8/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/12/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	0.52 J
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW11-40 (Dup)	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.073	<0.05	<0.05	<0.05	0.025 J	<0.05	<0.05	<0.05	<0.05	0.51	NA	<0.1	<2	<1

Table B-3
Summary of Pesticide and Polychlorinated Biphenyl Detections
in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Toxaphene	Aroclor 1242
Groundwater	**(units: ug/L)**																							
UAW12-20	5/6/2001	0.045 J	<0.05	<0.05	<0.05	<0.05	NA	0.017 J	0.058	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	0.017 J	<0.1	<2	<1
	11/15/2001	0.022 J	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.033 J	NA	<0.05	NA	0.09 PG	<0.05	<0.1	<0.1	<2	<1
	10/20/2002	0.039 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/12/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/28/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/4/2004	0.02 J	0.3 PG	0.036 J	<0.05	0.01 J	<0.05	0.39 PG	0.038 J	0.27 PG	0.041 J	<0.05	0.17 PG	<0.05	0.036 J	<0.05	0.028 J	<0.05	0.27 PG	<0.05	NA	<0.1	<2	<1
UAW13-20	5/6/2001	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	<0.5	0.25 J	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	<0.5	0.91 PG	<1	<1	<20	<1
	11/15/2001	<5	<5	<5	<5	<5	NA	<5	<5	<5	<5	<5	<5	<5	<5	NA	<5	NA	<5	<5	<10	<10	<200	<1
	10/23/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
	11/12/2003	<1	<1	<1	<1	<1	<1	<1	<1	2.7 PG	<1	<1	<1	<1	<1	<1	<1	<1	6	<1	NA	<2	<40	<1
	3/28/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	<2	<40	<10
	11/5/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.31 J	<1	<1	<1	<1	<1	NA	<2	<40	<1
UAW14-10	5/5/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/9/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/5/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.34 PG	NA	<0.1	<2	<1
UAW15-20	5/6/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/11/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/18/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
	11/17/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.094	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.018 J	NA	<0.1	<2	<1
UAW15-50	5/6/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/11/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.024 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.034 J	0.031 J	NA	<0.1	<2	0.55 J
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/17/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6.9	<0.05	<0.05	<0.05	<0.05	0.11	NA	<0.1	<2	<1
UAW15-50 (Dup)	11/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	4.4	<0.05	<0.05	<0.05	<0.05	0.031 J	NA	<0.1	<2	<1
UAW16-10	10/12/2001	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	<5	<100	130 J
UAW16-10 (Dup)	10/12/2001	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	<20	<400	<100
	11/13/2001	<0.05	<0.05	<0.05	<0.05	0.053	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.041 J PG	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW16-10 (Dup)	11/17/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.23 PG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/7/2004	0.017 J	<0.05	<0.05	<0.05	<0.05	<0.05	0.057	0.009 J	<0.05	<0.05	0.047 J	<0.05	<0.05	<0.05	<0.05	<0.05	0.009 J	<0.05	<0.05	NA	0.022 J	<2	<1
UAW17-40	5/5/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/9/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/31/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1

Table B-3
Summary of Pesticide and Polychlorinated Biphenyl Detections
in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Toxaphene	Aroclor 1242
Groundwater	**(units: ug/L)**																							
UAW18-20	10/12/2001	<0.05	0.021 J	<0.05	0.03 J	<0.05	<0.05	0.51 PG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/13/2001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.24	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.2	<4	<1
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	0.03 J	0.12 PG	<0.05	<0.05	<0.05	0.033 J	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.26 PG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/7/2004	<0.05	<0.05	<0.05	<0.05	<0.05	0.039 J	0.1	0.0084 J	<0.05	<0.05	0.02 J	<0.05	0.018 J	0.13	<0.05	0.0063 J	<0.05	0.014 J	0.048 J	NA	<0.1	1 J	<1
UAW19-80	5/6/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/12/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW19-80 (Dup)	11/12/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
UAW19-80 (Dup)	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/13/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/30/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/5/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW20-60	5/7/2001	<0.05	<0.05	<0.05	<0.05	<0.05	0.021 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/14/2001	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	<10	<200	<1
UAW20-60 (Dup)	11/14/2001	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.5	<10	<1
	10/19/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	NA	NA	<0.5	<0.5	<1	NA	NA	NA
UAW20-60 (Dup)	10/19/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	NA	NA	<0.5	<0.5	<1	NA	NA	NA
	11/13/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/30/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/5/2004	<0.05	<0.05	<0.05	<0.05	0.025 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.039 J	<0.05	NA	<0.1	<2	<1
UAW21-30	5/5/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/11/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	0.45 J
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/11/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/27/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/3/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW21-80	5/5/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/11/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/11/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/27/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/3/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW22-20	10/13/2001	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.5	<10	<1
	11/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.21	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/20/2002	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	NA	NA	<0.1	<0.1	<0.2	NA	NA	NA
	11/10/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/29/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/4/2004	0.028 J	0.054 PG	<0.05	<0.05	<0.05	<0.05	<0.05	0.033 J	<0.05	<0.05	<0.05	<0.05	<0.05	0.22 PG	<0.05	<0.05	<0.05	0.14 PG	<0.05	NA	<0.1	<2	<1

Table B-3
Summary of Pesticide and Polychlorinated Biphenyl Detections
in Groundwater and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Toxaphene	Aroclor 1242
Groundwater	**(units: ug/L)**																							
UAW23-20	10/12/2001	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	NA	<4	<80	<1
	11/14/2001	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	<5	<100	<1
	10/19/2002	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	<2.5	<2.5	<2.5	<2.5	NA	<2.5	<2.5	<5	NA	NA	NA
	11/13/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/28/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/5/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	<0.05	0.032 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.023 J	<0.05	NA	<0.1	<2	<1
UAW24-70	10/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/15/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	10/17/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/16/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	4/5/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW25-20	10/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14 PG	<0.05	0.051 PG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.022 J PG	NA	<0.1	<2	<1
	10/18/2002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
	11/12/2003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.065	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	3/27/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/3/2004	<0.05	<0.05	<0.05	<0.05	0.021 J	<0.05	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.049 J	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW26-70	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
UAW27-50	3/31/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.1	<2	<1
	11/5/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.22	0.18 PG	NA	<0.1	<2	<1
LAW05-60	3/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	<0.1	<0.1	<2	<1
LAW05-150	3/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	<0.1	<0.1	<2	<1
LAW05-150 (Dup)	3/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	<0.1	<0.1	<2	<1
LAW12-60	10/13/2001	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	<0.1	<0.1	<2	<1
	11/16/2001	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	<0.1	<0.1	<2	<1
French Drain Sump @ 46 hr	10/19/2002	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	NA	NA	<0.25	<0.25	<0.5	NA	NA	NA
French Drain Sump @ 72 hr	10/20/2002	0.028 J	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA
Seeps																								
SS-1 (Seep)	10/11/2001	<0.05	<0.05	0.028 J	<0.05	<0.05	<0.05	0.042 J	<0.05	0.053 PG	<0.05	0.046 J	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	0.033 J	0.005 J	NA	NA	NA
SS-5 (Seep)	10/11/2001	<0.05	0.025 J	<0.05	<0.05	<0.05	0.02 J	0.056	<0.05	<0.05	0.03 J	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA

Notes:

J = Estimated result; result is less than reporting limit

PG = The percentage difference between the original and confirmation analyses is greater than 40%

NA indicates chemical was not on the target analyte list for that sample.

<0.05 = Indicates constituent not detected at or above indicated detection limit.

This table only includes target analytes detected in one or more Facility Investigation samples.

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
DP53-12.5'	3/11/2004	NA	NA	NA	NA	15.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.9	NA	NA	NA	NA	NA	NA	<20	NA	NA	8.1	NA	NA	NA
MW-EPA-1	5/8/2001	129 B	NA	3.3 B	NA	246	NA	287	NA	<5	NA	<2	NA	354000	365000	73	NA	2.1 B	NA	<25	NA	<10	NA	7800	<100	<3	NA	126000	127000
	11/15/2001	138 B J	NA	<10	NA	611	NA	217 J	NA	<5	NA	<2	NA	435000 J	418000 J	9.8	NA	1.4 B	NA	<25	NA	3.6 B	NA	2140	240	<3	NA	173000	152000
	10/20/2002	164 B J	NA	<10	NA	460	NA	244	NA	<5	NA	<2	NA	302000 J	NA	14.7	NA	1.1 B	NA	<25	NA	<10	NA	2540	NA	<3	NA	172000	NA
	11/12/2003	215	NA	3.1 B	NA	465	NA	260 J	NA	<5	NA	<2	NA	425000 J	NA	26.2	NA	<7	NA	<25	NA	<10	NA	2450	NA	<3	NA	173000 J	NA
	3/28/2004	313 J	NA	<10	NA	483	NA	246	NA	<5	NA	<2	NA	466000	NA	37.2	NA	<7	NA	5 B J	NA	<10	NA	1600	NA	<3	NA	148000	NA
	11/4/2004	365 J	NA	<10	NA	215	NA	209	NA	<5	NA	0.38 B J	NA	338000	NA	14.4	NA	1.5 B J	NA	<25	NA	<10	NA	2030	NA	<3	NA	123000 J	NA
	11/15/2005	69.4 B	NA	<10	NA	596	NA	145 B	NA	0.59 U	NA	0.45 B	NA	370000	NA	12.9	NA	2.5 B	NA	3.0 B	NA	NA	NA	1810	NA	<3	NA	97500	NA
	11/8/2006	138 B	NA	< 10	NA	293	NA	243	NA	< 5	NA	< 2	NA	289000 J	NA	31.2	NA	< 7	NA	4 B J	NA	NA	NA	1980	NA	< 3	NA	123000	NA
MW-EPA-2	5/8/2001	38400	NA	3.6 B	NA	27.4	NA	496	NA	1.9 B	NA	0.65 B	NA	327000	266000	1250	NA	38.9	NA	74.3	NA	<10	NA	64800	<100	27.6	NA	114000	91100
	11/14/2001	39300 J	NA	5.4 B	NA	31.7	NA	292	NA	1.8 B	NA	5.2	NA	254000	151000	1750	NA	51.2	NA	109	NA	2.6 B	NA	74600	<100	32.4	NA	88100 J	50700 J
	10/20/2002	1260 J	NA	<10	NA	3.1 B	NA	113 B	NA	<5	NA	0.5 B	NA	142000 J	NA	80.1	NA	3.3 B	NA	4.7 B	NA	<10	NA	1860	NA	<3	NA	45500	NA
	11/11/2003	1490	NA	<10	NA	<10	NA	105 B J	NA	<5	NA	1 B	NA	154000 J	NA	492	NA	5.4 B	NA	9.4 B	NA	<10	NA	3320	NA	<3	NA	47700 J	NA
	3/29/2004	2020 J E	NA	<10	NA	<10	NA	129 B	NA	<5	NA	0.33 B	NA	190000	NA	443	NA	6.4 B	NA	13 B J	NA	<10	<20	3610	NA	<3	NA	62000	NA
	11/4/2004	425 J	NA	<10	NA	<10	NA	190 B	NA	<5	NA	1 B J	NA	274000	NA	65.6	NA	3.9 B J	NA	5.7 B	NA	<10	NA	868	NA	<3	NA	87100 J	NA
	11/11/2005	889	NA	<10	NA	<10	NA	249	NA	<5	NA	<2	NA	305000 J	NA	243	NA	3.0 B	NA	7.1 B J	NA	NA	NA	1880	NA	<3	NA	97600	NA
	11/9/2006	179 B	NA	< 10	NA	< 10	NA	32.3 B	NA	0.33 B	NA	5.3	NA	228000 J	NA	10.7	NA	1.3 B	NA	13.2 B	NA	NA	NA	1510	NA	6.6	NA	66000	NA
MW-EPA-3	5/6/2001	1330	NA	<10	NA	<10	NA	71.9 B	NA	<5	NA	1.5 B	NA	188000	274000	29.9	NA	2.8 B	NA	11.2 B	NA	<10	NA	5540	<100	<3	NA	68900	94600
	11/13/2001	16400	NA	<10	NA	14.1	NA	120 B	NA	1.1 B	NA	1.2 B	NA	470000 J	332000 J	75.8	NA	14.5	NA	37.5	NA	<10	NA	40500	2700	13.7	NA	175000 J	123000 J
	10/17/2002	20800	NA	<10	NA	23	NA	146 B	NA	0.79 B	NA	1.7 B	NA	467000 J	NA	117	NA	20.7	NA	41.5	NA	<10	NA	51400	NA	20.6	NA	153000 J	NA
	11/13/2003	4770	NA	<10	NA	6.7 B	NA	86.6 B J	NA	0.83 B	NA	0.76 B	NA	414000 J	NA	69.3	NA	7.1	NA	7 B	NA	<10	NA	16300 J	NA	7.5	NA	118000	NA
	3/30/2004	19200 J	NA	<10	NA	22.2	NA	117 B	NA	0.52 B	NA	2.1	NA	464000	NA	143	NA	21	NA	50	NA	<10	NA	55200	NA	20.5	NA	165000	NA
	11/4/2004	4240 J	NA	<10	NA	5.3 B	NA	174 B	NA	<5	NA	2 J	NA	305000	NA	22.8	NA	11.9 J	NA	16.2 B	NA	<10	NA	8830	NA	2 B	NA	108000 J	NA
	11/11/2005	239	NA	<10	NA	<10	NA	98.7 B	NA	<5	NA	<2	NA	342000 J	NA	<5	NA	2.6 B	NA	2.0 B J	NA	NA	NA	6630	NA	<3	NA	124000	NA
	11/7/2006	872	NA	< 10	NA	< 10	NA	144 B	NA	< 5	NA	0.68 B	NA	377000 J	NA	10.7	NA	2.9 B	NA	3.6 B J	NA	NA	NA	7140	NA	< 3	NA	139000	NA
MW-EPA-4	5/8/2001	<200	NA	<10	NA	<10	NA	235	NA	<5	NA	0.31 B	NA	269000	271000	37.7	NA	2.8 B	NA	<25	NA	<10	NA	950	<100	<3	NA	63600	64000
	11/13/2001	41.7 B	NA	<10	NA	<10	NA	114 B	NA	<5	NA	<2	NA	157000 J	136000 J	130	NA	11.4	NA	<25	NA	<10	NA	8220	398	<3	NA	40600 J	35200 J
	10/18/2002	<200	NA	<10	NA	<10	NA	87.9 B	NA	<5	NA	<2	NA	120000 J	NA	207	NA	4.1 B	NA	<25	NA	<10	NA	1980	NA	<3	NA	27900 J	NA
	11/16/2003	<200	NA	<10	NA	<10	NA	165 B J	NA	<5	NA	1.1 B J	NA	196000 J	NA	37.2 J	NA	6.6 B J	NA	3.7 B J	NA	<10	NA	3340	NA	<3	NA	48600 J	NA
	4/6/2004	<200	NA	<10	NA	<10	NA	137 B J	NA	<5	NA	<2	NA	182000	NA	64.6	NA	2.4 B	NA	<25	NA	<10	<20	1080	NA	<3	NA	42400 J	NA
	11/6/2004	120 B	NA	<10	NA	<10	NA	169 B	NA	<5	NA	<2	NA	201000	NA	36.1	NA	1.9 B	NA	3.3 B	NA	<10	NA	1470	NA	<3	NA	47300	NA
	11/9/2005	<200	NA	<10	NA	<10	NA	209	NA	0.34 B	NA	<2	NA	280000 J	NA	41.5	NA	2.6 B	NA	<25	NA	NA	NA	1280	NA	<3	NA	67700	NA
	11/7/2006	< 200	NA	< 10	NA	< 10	NA	257	NA	< 5	NA	< 2	NA	252000 J	NA	197	NA	1.4 B	NA	4.6 B J	NA	NA	NA	684	NA	< 3	NA	64300	NA
Recovery Well	7/29/2001	NA	NA	<10	NA	39.6	NA	328	NA	<5	NA	8.6	NA	NA	NA	264	NA	11.1	NA	4640	NA	<10	NA	NA	NA	405	NA	NA	NA
RWV20	4/6/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA	NA	NA	NA	NA	<20	NA	NA	NA	NA	NA	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW01-30	5/4/2001	82.1 B	NA	<10	NA	13	NA	339	NA	<5	NA	<2	NA	341000	358000	7.7	NA	2.2 B	NA	<25	NA	8 B	NA	9970	150	<3	NA	77200	84600
	11/8/2001	81.8 B J	NA	<10	NA	5.1 B	NA	164 B J	NA	0.58 B	NA	0.29 B	NA	151000 J	146000 J	15.2	NA	14.8	NA	<25	NA	<10	NA	8940	7700	<3	NA	31800	30900
	10/17/2002	<200	NA	<10	NA	7.6 B	NA	93.9 B	NA	<5	NA	<2	NA	110000 J	NA	32.8	NA	4.7 B	NA	<25	NA	<10	NA	2830	NA	<3	NA	25000 J	NA
	11/11/2003	<200	NA	<10	NA	5.9 B	NA	109 B J	NA	<5	NA	<2	NA	138000 J	NA	32.1	NA	<7	NA	<25	NA	<10	NA	1380	NA	<3	NA	32500 J	NA
	3/24/2004	<200	NA	<10	NA	7.1 B	NA	81.3 B J	NA	0.8 B J	NA	<2	NA	109000 J	NA	9.8	NA	1.4 B	NA	6 B J	NA	<10	NA	1530	NA	<3	NA	25700 J	NA
	11/3/2004	<200	NA	<10	NA	10.1	NA	206	NA	<5	NA	<2	NA	210000	NA	20.3	NA	2.7 B	NA	3.2 B	NA	<10	NA	6590	NA	<3	NA	48600	NA
	11/8/2005	<200	NA	<10	NA	11	NA	224	NA	<5	NA	<2	NA	193000 J	NA	28.9	NA	5.4 B	NA	3.4 B	NA	NA	NA	9800	NA	<3	NA	45100	NA
	11/1/2006	< 200	NA	< 10	NA	13.2	NA	218	NA	< 5	NA	< 2	NA	221000 J	NA	9	NA	1.6 B	NA	< 25	NA	NA	NA	7130	NA	< 3	NA	46000	NA
UAW01-80	5/4/2001	331	NA	<10	NA	3.9 B	NA	309	NA	<5	NA	<2	NA	117000	118000	2.4 B	NA	<7	NA	<25	NA	<10	NA	10600	3070	<3	NA	30800	31900
	11/12/2001	105 B J	NA	<10	NA	<10	NA	308	NA	<5	NA	<2	NA	112000	115000	<5	NA	<7	NA	<25	NA	<10	NA	9600	279	<3	NA	29900	31000
	10/17/2002	98.7 B	NA	<10	NA	2.4 B	NA	350	NA	<5	NA	<2	NA	113000 J	NA	3.5 B	NA	<7	NA	<25	NA	<10	NA	10600	NA	<3	NA	29200 J	NA
	11/11/2003	<200	NA	<10	NA	3.5 B	NA	326 J	NA	<5	NA	<2	NA	120000 J	NA	2.7 B	NA	<7	NA	<25	NA	<10	NA	10100	NA	<3	NA	30400 J	NA
	3/24/2004	<200	NA	<10	NA	5 B	NA	346 J	NA	0.77 B J	NA	0.46 B	NA	122000 J	NA	<5	NA	<7	NA	5 B J	NA	<10	NA	10300	NA	<3	NA	30700 J	NA
	11/2/2004	<200	NA	<10	NA	3.4 B	NA	332	NA	<5	NA	0.32 B	NA	113000	NA	<5	NA	<7	NA	<25	NA	<10	NA	10000	NA	<3	NA	28300	NA
	11/8/2005	<200	NA	<10	NA	<10	NA	325	NA	<5	NA	<2	NA	107000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	9860	NA	<3	NA	28000	NA
	11/1/2006	< 200	NA	< 10	NA	< 10	NA	337	NA	< 5	NA	< 2	NA	114000 J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	10400	NA	< 3	NA	29100	NA
UAW02-20	5/7/2001	49.1 B	NA	<10	NA	3.9 B	NA	400	NA	<5	NA	<2	NA	331000	316000	3.3 B	NA	<7	NA	<25	NA	<10	NA	4200	641	<3	NA	58700	59200
UAW02-20 (Dup)	5/7/2001	61.2 B	NA	<10	NA	6.1 B	NA	395	NA	<5	NA	<2	NA	316000	302000	22.6	NA	<7	NA	<25	NA	<10	NA	4480	659	<3	NA	56200	53400
	11/10/2001	<200	NA	2.9 B	NA	<10	NA	169 B	NA	<5	NA	<2	NA	177000 J	157000 J	<5	NA	<7	NA	<25	NA	<10	NA	1940	340	<3	NA	33200 J	29800 J
	10/17/2002	<200	NA	<10	NA	3.2 B	NA	311	NA	<5	NA	0.67 B	NA	203000 J	NA	8.1	NA	2.2 B	NA	<25	NA	2.2 B	NA	2600	NA	<3	NA	34000 J	NA
	11/12/2003	<200	NA	<10	NA	<10	NA	124 B J	NA	<5	NA	<2	NA	175000 J	NA	2.7 B	NA	<7	NA	<25	NA	<10	NA	2170	NA	<3	NA	32600 J	NA
	3/26/2004	35 B J	NA	<10	NA	<10	NA	271	NA	<5	NA	<2	NA	255000 J	NA	<5	NA	<7	NA	<25	NA	<10	NA	3650	NA	<3	NA	45700 J	NA
	11/3/2004	<200	NA	<10	NA	<10	NA	77.4 B	NA	<5	NA	<2	NA	109000	NA	<5	NA	<7	NA	<25	NA	<10	NA	1150	NA	<3	NA	20800	NA
	11/9/2005	<200	NA	<10	NA	<10	NA	77.5 B	NA	0.32 B	NA	<2	NA	125000 J	NA	2.0 B	NA	<7	NA	<25	NA	NA	NA	1620	NA	<3	NA	25500	NA
	11/3/2006	47.3 B	NA	< 10	NA	< 10	NA	119 B	NA	< 5	NA	0.64 B	NA	156000 J	NA	5.2	NA	< 7	NA	2.8 B J	NA	NA	NA	4270	NA	< 3	NA	31500	NA
UAW02-40	5/7/2001	213	NA	<10	NA	<10	NA	130 B	NA	<5	NA	<2	NA	98800	99200	<5	NA	<7	NA	<25	NA	<10	NA	4260	100	<3	NA	36100	36000
	11/10/2001	<200	NA	2.5 B	NA	<10	NA	156 B	NA	<5	NA	0.36 B	NA	106000 J	101000 J	<5	NA	<7	NA	<25	NA	<10	NA	3110	122	<3	NA	40000 J	38400 J
	10/17/2002	<200	NA	<10	NA	<10	NA	129 B	NA	<5	NA	<2	NA	98400 J	NA	<5	NA	0.94 B	NA	<25	NA	<10	NA	4080	NA	<3	NA	37600 J	NA
	11/12/2003	<200	NA	<10	NA	<10	NA	117 B J	NA	<5	NA	<2	NA	111000 J	NA	1.4 B	NA	<7	NA	<25	NA	<10	NA	5190	NA	<3	NA	41600 J	NA
	3/26/2004	36.9 B J	NA	<10	NA	<10	NA	135 B	NA	<5	NA	<2	NA	121000 J	NA	<5	NA	<7	NA	<25	NA	<10	NA	6210	NA	<3	NA	44700 J	NA
	11/3/2004	<200	NA	<10	NA	<10	NA	125 B	NA	<5	NA	<2	NA	123000	NA	<5	NA	<7	NA	<25	NA	<10	NA	4680	NA	<3	NA	44800	NA
	11/9/2005	<200	NA	<10	NA	<10	NA	190 B	NA	0.32 B	NA	<2	NA	121000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	4730	NA	<3	NA	44900	NA
	11/3/2006	< 200	NA	< 10	NA	< 10	NA	136 B	NA	< 5	NA	< 2	NA	106000 J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	5500	NA	< 3	NA	38100	NA
UAW02-40 (dup)	11/3/2006	< 200	NA	< 10	NA	< 10	NA	136 B	NA	< 5	NA	< 2	NA	106000 J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	5420	NA	< 3	NA	38100	NA

Table B-4
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Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW03-20	5/7/2001	39.6 B	NA	<10	NA	20.4	NA	422	NA	<5	NA	<2	NA	524000	551000	2.8 B	NA	3.8 B	NA	<25	NA	<10	NA	2490	1650	<3	NA	92100	80300
	11/11/2001	124 B J	NA	<10	NA	17.6	NA	235	NA	<5	NA	<2	NA	219000	210000	3.5 B	NA	10.7	NA	<25	NA	<10	NA	1720	978	<3	NA	37500	36100
	10/23/2002	<200	NA	<10	NA	21 J	NA	250	NA	<5	NA	<2	NA	169000	NA	5.3	NA	4.4 B	NA	3.2 B	NA	<10	NA	2390	NA	<3	NA	34000	NA
	11/12/2003	<200	NA	<10	NA	12.1	NA	185 B J	NA	<5	NA	<2	NA	227000 J	NA	6.7	NA	<7	NA	<25	NA	<10	NA	370	NA	<3	NA	40700 J	NA
	3/28/2004	83.7 B J	NA	<10	NA	9.5 B	NA	227	NA	<5	NA	<2	NA	283000	NA	2.4 B	NA	<7	NA	<25	NA	<10	NA	422	NA	<3	NA	49600	NA
	11/4/2004	75.7 B J	NA	<10	NA	<10	NA	70.1 B	NA	<5	NA	0.5 B J	NA	108000	NA	2 B	NA	1.5 B J	NA	<25	NA	<10	NA	424	NA	<3	NA	19700 J	NA
UAW03-20 (Dup)	11/4/2004	82.3 B J	NA	<10	NA	3.1 B	NA	68.9 B	NA	<5	NA	0.48 B J	NA	107000	NA	<5	NA	1.4 B J	NA	<25	NA	<10	NA	410	NA	<3	NA	19400 J	NA
	11/9/2005	1310	NA	<10	NA	<10	NA	104 B	NA	0.40 B	NA	<2	NA	141000 J	NA	2.8 B	NA	<7	NA	4.8 B J	NA	NA	NA	4550	NA	<3	NA	26300	NA
	11/6/2006	5520	NA	< 10	NA	6.9 B	NA	101 B	NA	0.35 B	NA	1.3 B	NA	121000 J	NA	12.8	NA	5.9 B	NA	27.8 J	NA	NA	NA	9460	NA	22.8	NA	26300	NA
UAW04-20	5/7/2001	42.6 B	NA	11.9	NA	82.4	NA	771	NA	<5	NA	<2	NA	343000	339000	6	NA	17.3	NA	<25	NA	7.3 B	NA	10500	2410	<3	NA	65600	64000
	11/11/2001	78.5 B J	NA	7.6 B	NA	20.5	NA	600	NA	<5	NA	1.5 B	NA	255000	235000	4 B	NA	7.1	NA	<25	NA	<10	NA	5060	1820	<3	NA	43100	39600
	10/20/2002	82.9 B J	NA	3.7 B	NA	33.5	NA	798	NA	<5	NA	<2	NA	205000 J	NA	6.5	NA	3.2 B	NA	<25	NA	<10	NA	6650	NA	<3	NA	47400	NA
	11/12/2003	<200	NA	<10	NA	26.6	NA	443 J	NA	<5	NA	<2	NA	219000 J	NA	2.8 B	NA	<7	NA	<25	NA	<10	NA	6010	NA	<3	NA	64600 J	NA
	3/28/2004	68.2 B J	NA	27.6	NA	30.8	NA	233	NA	<5	NA	1.2 B	NA	192000	NA	<5	NA	<7	NA	3.4 B J	NA	<10	NA	5230	NA	<3	NA	36700	NA
	11/3/2004	70.1 B J	NA	<10	NA	10.7	NA	129 B	NA	<5	NA	0.31 B J	NA	114000	NA	<5	NA	1.2 B J	NA	<25	NA	<10	NA	1250	NA	<3	NA	21700 J	NA
	11/9/2005	<200	NA	14.9	NA	25.7	NA	299	NA	0.35 B	NA	<2	NA	155000 J	NA	<5	NA	<7	NA	2.5 B J	NA	NA	NA	6340	NA	<3	NA	39800	NA
	11/6/2006	< 200	NA	19.8	NA	22.4	NA	217	NA	< 5	NA	< 2	NA	164000 J	NA	< 5	NA	< 7	NA	2.6 B J	NA	NA	NA	2530	NA	< 3	NA	31900	NA
UAW04-20 (dup)	11/6/2006	< 200	NA	21.4	NA	26	NA	215	NA	< 5	NA	< 2	NA	161000 J	NA	< 5	NA	< 7	NA	3 B J	NA	NA	NA	2730	NA	< 3	NA	31600	NA
UAW05-20	5/6/2001	2550	NA	<10	NA	8.7 B	NA	102 B	NA	<5	NA	<2	NA	338000	391000	8.1	NA	2.2 B	NA	7.8 B	NA	<10	NA	3900	<100	<3	NA	60200	66900
	10/10/2001	189 B	NA	<10	NA	21	NA	67.9 B	NA	<5	NA	<2	NA	292000	334000	7.3	NA	<7	NA	<25	NA	<10	NA	2750	<100	<3	NA	45300	50300
	11/12/2001	558 J	NA	<10	NA	18.7	NA	68.6 B	NA	<5	NA	<2	NA	265000	280000	8.8	NA	1.8 B	NA	5.3 B	NA	<10	NA	2930	<100	<3	NA	49300	45900
	10/20/2002	110 B J	NA	<10	NA	21.8	NA	72.2 B	NA	<5	NA	0.3 B	NA	253000 J	NA	5.1	NA	<7	NA	<25	NA	<10	NA	986	NA	<3	NA	38300	NA
	11/10/2003	<200	NA	<10	NA	16.8	NA	55.9 B J	NA	<5	NA	<2	NA	299000 J	NA	2 B	NA	1.5 B	NA	<25	NA	<10	NA	1020	NA	<3	NA	40200 J	NA
	3/28/2004	102 B J	NA	<10	NA	2.9 B	NA	59.3 B	NA	<5	NA	<2	NA	273000	NA	2.6 B	NA	<7	NA	2.9 B J	NA	<10	NA	948	NA	<3	NA	42500	NA
UAW05-20 (Dup)	3/28/2004	121 B J	NA	<10	NA	2.7 B	NA	63.7 B	NA	<5	NA	<2	NA	295000	NA	4.2 B	NA	<7	NA	3.3 B J	NA	<10	NA	1090	NA	<3	NA	45700	NA
	11/4/2004	103 B J	NA	<10	NA	3.7 B	NA	63.1 B	NA	<5	NA	0.45 B J	NA	253000	NA	3.2 B	NA	1.7 B J	NA	<25	NA	<10	NA	637	NA	<3	NA	38600 J	NA
	11/14/2005	523	NA	<10	NA	45.4	NA	123 B	NA	<5	NA	<2	NA	360000 J	NA	110	NA	2.4 B	NA	4.1 B	NA	NA	NA	4110	NA	<3	NA	65000	NA
	11/9/2006	6760	NA	< 10	NA	17.5	NA	79.2 B	NA	0.59 B	NA	1.1 B	NA	170000 J	NA	421	NA	13	NA	26.1	NA	NA	NA	10600	NA	6.4	NA	33500	NA
UAW06-20	5/6/2001	754	NA	<10	NA	13.4	NA	105 B	NA	<5	NA	<2	NA	310000	344000	3.9 B	NA	2.6 B	NA	4.5 B	NA	<10	NA	3880	1150	<3	NA	48300	54200
	10/10/2001	391	NA	<10	NA	26.7	NA	132 B	NA	<5	NA	<2	NA	343000	294000	10.8	NA	1.5 B	NA	<25	NA	<10	NA	1330	178	<3	NA	43800	38800
	11/13/2001	330	NA	<10	NA	34.3	NA	154 B	NA	<5	NA	<2	NA	407000 J	376000 J	13.4	NA	<7	NA	<25	NA	4.2 B	NA	1020	<100	<3	NA	58000 J	52800 J
	10/20/2002	126 B J	NA	16.5	NA	30.8	NA	173 B	NA	<5	NA	<2	NA	268000 J	NA	6.2	NA	1.3 B	NA	2.7 B	NA	<10	NA	2580	NA	<3	NA	40800	NA
	11/12/2003	<200	NA	3.3 B	NA	17.8	NA	139 B J	NA	<5	NA	<2	NA	221000 J	NA	3.2 B	NA	<7	NA	<25	NA	<10	NA	1170	NA	<3	NA	35700 J	NA
	3/29/2004	91.7 B J	NA	<10	NA	20.7	NA	135 B	NA	<5	NA	<2	NA	229000	NA	3.3 B	NA	<7	NA	<25	NA	<10	<20	647	NA	<3	NA	41300	NA
	11/4/2004	84.9 B J	NA	<10	NA	20.4	NA	132 B	NA	<5	NA	0.34 B J	NA	305000	NA	<5	NA	1.5 B J	NA	<25	NA	<10	NA	2630	NA	<3	NA	45700 J	NA
	11/15/2005	<200	NA	<10	NA	21.7	NA	113 B	NA	0.45 U	NA	<2	NA	312000	NA	<5	NA	<7	NA	4.2 B	NA	NA	NA	3120	NA	<3	NA	44700	NA
	11/9/2006	999	NA	< 10	NA	16.5	NA	71.6 B	NA	0.36 B	NA	0.53 B	NA	251000 J	NA	5.7	NA	2.3 B	NA	20.3 B	NA	NA	NA	4210	NA	< 3	NA	35200	NA

Table B-4
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Rohm and Haas Chemicals LLC
Cincinnati, Ohio
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Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW07-20	5/8/2001	NA	NA	<10	NA	<10	NA	90.3 B	NA	<5	NA	<2	NA	466000	453000	1.6 B	NA	<7	NA	<25	NA	<10	NA	270	<100	<3	NA	58000	57200
UAW07-20 (Dup)	5/8/2001	NA	NA	<10	NA	4.6 B	NA	95.8 B	NA	<5	NA	0.32 B	NA	496000	479000	<5	NA	<7	NA	<25	NA	<10	NA	303	<100	<3	NA	61600	60400
	11/15/2001	NA	NA	<10	NA	<10	NA	80.4 B	NA	<5	NA	<2	NA	NA	421000	<5	NA	<7	NA	87.7	NA	3.1 B	NA	NA	<100	<3	NA	NA	55200
	10/20/2002	111 B J	NA	<10	NA	3 B	NA	79.6 B	NA	<5	NA	0.39 B	NA	374000 J	NA	3.3 B	NA	<7	NA	<25	NA	<10	NA	174	NA	<3	NA	48700	NA
	11/12/2003	280	NA	<10	NA	4.9 B	NA	83.9 B J	NA	0.55 B	NA	<2	NA	391000 J	NA	3.3 B	NA	<7	NA	<25	NA	<10	NA	787 J	NA	3.7	NA	51400	NA
UAW07-20 (Dup)	11/12/2003	106 B	NA	<10	NA	3.4 B	NA	70.6 B J	NA	<5	NA	<2	NA	350000 J	NA	1.8 B	NA	<7	NA	<25	NA	<10	NA	506 J	NA	<3	NA	45100	NA
	4/5/2004	238 J	NA	<10	NA	2.6 B	NA	40.3 B J	NA	<5	NA	<2	NA	263000	NA	3.2 B	NA	<7	NA	<25	NA	<10	NA	1050	NA	<3	NA	36600 J	NA
	11/4/2004	50.7 B	NA	<10	NA	2.9 B	NA	75.4 B	NA	<5	NA	<2	NA	408000	NA	2.1 B	NA	<7	NA	<25	NA	<10	NA	55.5 B	NA	<3	NA	48700 J	NA
	11/15/2005	124 B	NA	<10	NA	<10	NA	81.2 B	NA	0.65 U	NA	0.87 B	NA	435000	NA	16.1	NA	<7	NA	<25	NA	NA	NA	454	NA	<3	NA	544000	NA
	11/6/2006	560	NA	< 10	NA	< 10	NA	32.7 B	NA	< 5	NA	4.1	NA	197000 J	NA	50.3	NA	< 7	NA	19 B J	NA	NA	NA	1820	NA	< 3	NA	30100	NA
UAW08-20	5/6/2001	NA	NA	3.8 B	NA	36.2	NA	87.3 B	NA	<5	NA	0.44 B	NA	810000	925000	15	NA	8.7	NA	13.8 B	NA	<10	NA	4680	<100	<3	NA	179000	203000
	11/13/2001	NA	NA	<10	NA	113	NA	144 B	NA	0.96 B	NA	0.61 B	NA	969000 J	935000 J	67.6	NA	15	NA	41.9	NA	<10	NA	22000	132	15.8	NA	141000 J	129000 J
	10/20/2002	172 B J	NA	6.8 B	NA	88.4	NA	82 B	NA	<5	NA	<2	NA	988000 J	NA	28.3	NA	2 B	NA	<25	NA	<10	NA	2670	NA	<3	NA	142000	NA
	11/10/2003	31000	NA	7.8 B	NA	200	NA	262 J	NA	1.3 B	NA	21.7	NA	1040000 J	NA	173	NA	41.7	NA	333	NA	<10	NA	95500	NA	79.2	NA	289000 J	NA
	3/29/2004	193 B J	NA	4.9 B	NA	68.7	NA	73 B	NA	<5	NA	<2	NA	955000	NA	24.3	NA	1.6 B	NA	3.7 B J	NA	<10	NA	1020	NA	<3	NA	141000	NA
	11/4/2004	105 B J	NA	<10	NA	75.2	NA	84.9 B	NA	<5	NA	2.7 J	NA	1020000	NA	27.7	NA	2.9 B J	NA	<25	NA	<10	NA	1160	NA	<3	NA	134000 J	NA
	11/15/2005	84.5 B	NA	5.1 B	NA	79.7	NA	91.4 B	NA	0.45 U	NA	<2	NA	952000	NA	24.9	NA	1.8 B	NA	<25	NA	NA	NA	2240	NA	<3	NA	135000	NA
	11/9/2006	3560	NA	< 10	NA	74.3	NA	93.7 B	NA	0.58 B	NA	4.4	NA	834000 J	NA	37.8	NA	5.6 B	NA	41.9	NA	NA	NA	11200	NA	4.2	NA	143000	NA
UAW09-20	5/5/2001	90.6 B	NA	<10	NA	<10	NA	80.3 B	NA	<5	NA	<2	NA	108000	106000	<5	NA	<7	NA	<25	NA	<10	NA	<100	<100	<3	NA	31000	31500
	11/9/2001	<200	NA	<10	NA	<10	NA	78.7 B	NA	<5	NA	<2	NA	109000 J	101000 J	10.4	NA	1.4 B	NA	<25	NA	<10	NA	288	212	<3	NA	25000 J	23100 J
	10/16/2002	<200	NA	<10	NA	<10	NA	84.7 B	NA	<5	NA	0.85 B	NA	107000 J	NA	24.8	NA	1.2 B J	NA	<25	NA	<10	NA	130	NA	<3	NA	24900 J	NA
	11/11/2003	<200	NA	<10	NA	<10	NA	95.8 B J	NA	<5	NA	<2	NA	143000 J	NA	21.2	NA	<7	NA	<25	NA	<10	NA	76.4 B	NA	<3	NA	33500 J	NA
	4/6/2004	<200	NA	<10	NA	<10	NA	65.5 B J	NA	<5	NA	<2	NA	110000	NA	22.5	NA	<7	NA	<25	NA	<10	NA	62.5 B	NA	<3	NA	26300 J	NA
	11/6/2004	<200	NA	<10	NA	6.2 B	NA	363	NA	<5	NA	<2	NA	103000	NA	4 B	NA	<7	NA	6.7 B	NA	<10	NA	<100	NA	<3	NA	34200	NA
	11/9/2005	<200	NA	<10	NA	<10	NA	110 B	NA	0.42 B	NA	<2	NA	137000 J	NA	28.2	NA	<7	NA	<25	NA	NA	NA	118	NA	<3	NA	38200	NA
	11/3/2006	< 200	NA	< 10	NA	< 10	NA	64.6 B	NA	< 5	NA	< 2	NA	99000 J	NA	53.5	NA	< 7	NA	1.8 B J	NA	NA	NA	374	NA	< 3	NA	26300	NA
UAW09-60	5/5/2001	142 B	NA	<10	NA	<10	NA	249	NA	<5	NA	<2	NA	91900	99300	<5	NA	<7	NA	13.7 B	NA	<10	NA	132	<100	<3	NA	31500	35300
	11/9/2001	30.4 B	NA	<10	NA	<10	NA	268	NA	<5	NA	<2	NA	88100 J	97800 J	<5	NA	<7	NA	<25	NA	<10	NA	<100	<100	<3	NA	31500 J	34900 J
	10/16/2002	<200	NA	<10	NA	5.6 B	NA	330	NA	<5	NA	<2	NA	82200 J	NA	<5	NA	1.4 B J	NA	<25	NA	<10	NA	140	NA	<3	NA	28700 J	NA
	11/11/2003	<200	NA	<10	NA	5 B	NA	364 J	NA	<5	NA	<2	NA	104000 J	NA	2 B	NA	<7	NA	<25	NA	<10	NA	71.6 B	NA	<3	NA	34900 J	NA
	4/6/2004	<200	NA	<10	NA	9.7 B	NA	411 J	NA	<5	NA	<2	NA	112000	NA	<5	NA	<7	NA	<25	NA	<10	NA	149	NA	<3	NA	36700 J	NA
	11/6/2004	<200	NA	<10	NA	<10	NA	73.4 B	NA	<5	NA	<2	NA	110000	NA	8.5	NA	<7	NA	3.8 B	NA	<10	NA	<100	NA	<3	NA	30500	NA
	11/9/2005	<200	NA	<10	NA	<10	NA	361	NA	0.35 B	NA	<2	NA	104000 J	NA	5.2	NA	<7	NA	<25	NA	NA	NA	<100	NA	<3	NA	35900	NA
	11/3/2006	< 200	NA	< 10	NA	6 B	NA	370	NA	< 5	NA	< 2	NA	111000 J	NA	2.3 B	NA	< 7	NA	3.3 B J	NA	NA	NA	< 100	NA	< 3	NA	37300	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW10-50	10/12/2001	32800	NA	<10	NA	19.2	NA	281	NA	1.9 B	NA	0.97 B	NA	271000	193000	46.7	NA	23.9	NA	61.6	NA	3 B	NA	49200	<100	21.3	NA	73100	54600
	11/13/2001	318	NA	<10	NA	<10	NA	107 B	NA	<5	NA	<2	NA	185000 J	176000 J	<5	NA	2.2 B	NA	12.3 B	NA	<10	NA	346	<100	<3	NA	55000 J	52400 J
	10/19/2002	3070 J	NA	<10	NA	<10	NA	68.1 B	NA	<5	NA	<2	NA	176000 J	NA	12.1	NA	4.4 B	NA	15.3 B	NA	2.1 B	NA	4490	NA	2.2 B	NA	58500	NA
	11/10/2003	2350	NA	<10	NA	<10	NA	60.3 B J	NA	<5	NA	<2	NA	196000 J	NA	4.3 B	NA	3.2 B	NA	4.9 B	NA	<10	NA	2810	NA	<3	NA	65200 J	NA
	3/30/2004	2610 J	NA	<10	NA	3 B	NA	55.9 B	NA	<5	NA	<2	NA	209000	NA	5	NA	3.6 B	NA	10.1 B	NA	<10	NA	3600	NA	<3	NA	60400	NA
	11/5/2004	2020	NA	<10	NA	<10	NA	51.8 B	NA	<5	NA	<2	NA	193000	NA	4.6 B	NA	3.1 B	NA	10.3 B	NA	<10	NA	2760	NA	<3	NA	57200	NA
	11/11/2005	2930	NA	<10	NA	<10	NA	55.0 B	NA	0.30 B	NA	<2	NA	184000 J	NA	4.3 B	NA	3.2 B	NA	11.2 B	NA	NA	NA	4060	NA	<3	NA	58300	NA
	11/9/2006	5830	NA	< 10	NA	< 10	NA	83.2 B	NA	0.63 B	NA	< 2	NA	181000 J	NA	9.4	NA	5.8 B	NA	13.1 B	NA	NA	NA	8200	NA	4.2	NA	48800	NA
UAW10-80	10/12/2001	1670	NA	<10	NA	5.1 B	NA	131 B	NA	<5	NA	<2	NA	181000	191000	34.8	NA	6.3 B	NA	10.1 B	NA	2.6 B	NA	4990	5360	<3	NA	57700	61000
	11/13/2001	503	NA	<10	NA	6.1 B	NA	118 B	NA	<5	NA	0.58 B	NA	192000 J	196000 J	<5	NA	3.5 B	NA	5.8 B	NA	<10	NA	6130	190	<3	NA	59700 J	60900 J
	10/19/2002	4030 J	NA	<10	NA	13.3	NA	183 B	NA	<5	NA	0.36 B	NA	117000 J	NA	25.8	NA	5.5 B	NA	6.5 B	NA	<10	NA	13200	NA	4.8	NA	37100	NA
	11/13/2003	11000	NA	<10	NA	19.5	NA	279 J	NA	1.1 B	NA	<2	NA	142000 J	NA	171	NA	12	NA	16.5 B	NA	<10	NA	24100 J	NA	9.5	NA	43100	NA
	3/30/2004	988 J	NA	<10	NA	11.5	NA	193 B	NA	<5	NA	<2	NA	132000	NA	8.1	NA	3.3 B	NA	5.8 B	NA	<10	NA	5710	NA	<3	NA	40700	NA
	11/5/2004	4210	NA	<10	NA	13.6	NA	228	NA	<5	NA	<2	NA	145000	NA	16.2	NA	6.1 B	NA	10.4 B	NA	<10	NA	12500	NA	5.4	NA	43800 J	NA
	11/16/2005	300	NA	<10	NA	7.2 B	NA	280	NA	<5	NA	<2	NA	138000	NA	1.6B	NA	2.1 B	NA	<25	NA	NA	NA	1640	NA	<3	NA	45200	NA
	11/9/2006	453	NA	< 10	NA	11.4	NA	262	NA	0.35 B	NA	< 2	NA	129000 J	NA	< 5	NA	1.2 B	NA	< 25	NA	NA	NA	8380	NA	< 3	NA	40800	NA
UAW11-10	5/8/2001	<200	NA	1060	NA	176	NA	295	NA	<5	NA	<2	NA	224000	154000	249	NA	9.6	NA	<25	NA	8.1 B	NA	50000	34500	4.4	NA	41100	28400
	11/10/2001	47.3 B	NA	62.6	NA	62.9	NA	41.3 B	NA	<5	NA	<2	NA	110000 J	116000 J	11.3	NA	1.5 B	NA	<25	NA	5.6 B	NA	3900	3140	<3	NA	45500 J	49400 J
	10/18/2002	<200	NA	8 B	NA	65.2	NA	29 B	NA	<5	NA	<2	NA	181000 J	NA	2.7 B	NA	1.1 B	NA	<25	NA	<10	NA	404	NA	<3	NA	36600 J	NA
	11/16/2003	68.1 B J	NA	4.7 B	NA	32.6	NA	23.6 B J	NA	<5	NA	1.1 B J	NA	148000 J	NA	6.2 J	NA	1.8 B J	NA	2 B J	NA	<10	NA	270	NA	<3	NA	29100 J	NA
	4/6/2004	39.6 B J	NA	<10	NA	86.1	NA	26.8 B J	NA	<5	NA	1 B	NA	183000	NA	<5	NA	1.1 B	NA	2.5 B	NA	<10	NA	554	NA	<3	NA	36900 J	NA
	11/7/2004	78.7 B J	NA	<10	NA	80.3	NA	10.7 B	NA	<5	NA	<2	NA	61000	NA	<5	NA	1.2 B	NA	<25	NA	<10	NA	183	NA	<3	NA	13500	NA
	11/10/2005	<200	NA	<10	NA	29.2	NA	38.6 B	NA	0.37 B	NA	<2	NA	164000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	146	NA	<3	NA	32800	NA
	11/2/2006	< 200	NA	13	NA	65.9	NA	175 B	NA	< 5	NA	0.46 B	NA	226000 J	NA	3.6 B	NA	< 7	NA	2.3 B J	NA	NA	NA	977	NA	< 3	NA	81900	NA
UAW11-40	5/8/2001	355	NA	2.3 B	NA	<10	NA	31.4 B	NA	<5	NA	0.61 B	NA	361000	383000	6.7	NA	12.7	NA	13.7 B	NA	<10	NA	930	<100	<3	NA	81000	85100
	11/12/2001	62 B J	NA	<10	NA	<10	NA	24.4 B	NA	<5	NA	0.51 B	NA	347000	335000	13	NA	13.2	NA	11.6 B	NA	<10	NA	<100	<100	<3	NA	79100	76500
	10/18/2002	<200	NA	<10	NA	<10	NA	26.2 B	NA	<5	NA	0.34 B	NA	318000 J	NA	24	NA	11.6	NA	6.2 B	NA	<10	NA	245	NA	<3	NA	72800 J	NA
	11/16/2003	<200	NA	<10	NA	<10	NA	24.5 B J	NA	<5	NA	1.3 B J	NA	341000 J	NA	54.6 J	NA	10.4 J	NA	9.4 B J	NA	<10	NA	650	NA	<3	NA	73000 J	NA
	4/6/2004	65.4 B J	NA	<10	NA	<10	NA	26.5 B J	NA	<5	NA	0.31 B	NA	353000	NA	8.5	NA	9.3	NA	6 B	NA	<10	NA	100	NA	<3	NA	73300 J	NA
UAW11-40 (Dup)	4/6/2004	48.1 B J	NA	<10	NA	<10	NA	25.9 B J	NA	<5	NA	0.41 B	NA	346000	NA	7.7	NA	8.6	NA	4.9 B	NA	<10	NA	92.8 B	NA	<3	NA	71200 J	NA
	11/7/2004	91.1 B J	NA	<10	NA	<10	NA	28.8 B	NA	<5	NA	0.62 B	NA	340000	NA	2.3 B	NA	11.9	NA	8 B	NA	<10	NA	56.7 B	NA	<3	NA	78600	NA
	11/10/2005	<200	NA	<10	NA	<10	NA	27.7 B	NA	0.4 B	NA	0.49 B	NA	310000 J	NA	39.2	NA	9.8	NA	9.5 B J	NA	NA	NA	849	NA	<3	NA	72900	NA
	11/2/2006	< 200	NA	< 10	NA	< 10	NA	27.6 B	NA	< 5	NA	0.56 B	NA	296000 J	NA	124	NA	10.1	NA	13 B J	NA	NA	NA	1920	NA	< 3	NA	67700	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW12-20	5/6/2001	NA	NA	<10	NA	5.8 B	NA	75.7 B	NA	<5	NA	<2	NA	727000	679000	2.2 B	NA	<7	NA	<25	NA	<10	NA	3010	141	<3	NA	54800	51300
	11/15/2001	NA	NA	<10	NA	<10	NA	20.3 B	NA	<5	NA	<2	NA	NA	648000	<5	NA	<7	NA	19.7 B	NA	5 B	NA	NA	114	<3	NA	NA	55200
	10/20/2002	102 B J	NA	<10	NA	8.9 B	NA	18.1 B	NA	<5	NA	<2	NA	742000 J	NA	3.1 B	NA	<7	NA	1.8 B	NA	<10	NA	213	NA	<3	NA	55400	NA
	11/12/2003	63.1 B	NA	<10	NA	3.8 B	NA	21.1 B J	NA	<5	NA	<2	NA	660000 J	NA	2.8 B	NA	<7	NA	<25	NA	<10	NA	296 J	NA	<3	NA	46100	NA
	3/28/2004	70.8 B J	NA	<10	NA	<10	NA	26.2 B	NA	<5	NA	0.28 B	NA	856000	NA	<5	NA	<7	NA	4.7 B J	NA	<10	NA	456	NA	<3	NA	67900	NA
	11/4/2004	<200	NA	<10	NA	<10	NA	21 B	NA	<5	NA	<2	NA	538000	NA	2.5 B	NA	<7	NA	<25	NA	<10	NA	249	NA	<3	NA	42600 J	NA
	11/14/2005	<200	NA	<10	NA	<10	NA	28.8 B	NA	<5	NA	<2	NA	807000 J	NA	1.7 B	NA	<7	NA	<25	NA	NA	NA	752	NA	<3	NA	48200	NA
	11/6/2006	< 200	NA	< 10	NA	5.7 B	NA	33.5 B	NA	< 5	NA	0.66 B	NA	830000 J	NA	< 5	NA	< 7	NA	27.2 J	NA	NA	NA	2190	NA	5.7	NA	96900	NA
UAW13-20	5/6/2001	NA	NA	<10	NA	36.1	NA	21.2 B	NA	<5	NA	<2	NA	818000	764000	3.4 B	NA	<7	NA	<25	NA	<10	NA	90.4 B	<100	<3	NA	81900	87200
	11/15/2001	NA	NA	4.2 B	NA	83.1	NA	27.4 B	NA	<5	NA	0.28 B	NA	NA	916000	315	NA	<7	NA	597	NA	8.5 B	NA	NA	<100	<3	NA	NA	103000
	10/23/2002	<200	NA	<10	NA	59.1 J	NA	20.1 B	NA	<5	NA	<2	NA	1030000	NA	110	NA	<7	NA	4.2 B	NA	2.6 B	NA	143	NA	<3	NA	96600	NA
	11/12/2003	<200	NA	<10	NA	45.2	NA	13.8 B J	NA	<5	NA	<2	NA	897000 J	NA	49.4	NA	<7	NA	<25	NA	<10	NA	142 J	NA	<3	NA	98800	NA
	3/28/2004	65.8 B J	NA	<10	NA	39.6	NA	9.1 B	NA	<5	NA	<2	NA	875000	NA	56.3	NA	<7	NA	15.9 B J	NA	<10	NA	102	NA	<3	NA	108000	NA
	11/5/2004	55.9 B	NA	<10	NA	38.2	NA	12.9 B	NA	0.79 B	NA	<2	NA	567000	NA	10.8	NA	<7	NA	<25	NA	<10	NA	<100	NA	<3	NA	109000 J	NA
	11/16/2005	<200	NA	<10	NA	33.4	NA	10.7 B	NA	<5	NA	<2	NA	828000	NA	12.9	NA	<7	NA	2.0 B	NA	NA	NA	<100	NA	<3	NA	106000	NA
	10/31/2006	< 200	NA	< 10	NA	27.8	NA	10 B	NA	< 5	NA	< 2	NA	878000 J	NA	50.3	NA	< 7	NA	7.2 B J	NA	NA	NA	480	NA	< 3	NA	95700	NA
UAW14-10	5/5/2001	286	NA	<10	NA	<10	NA	82.6 B	NA	<5	NA	<2	NA	107000	108000	<5	NA	<7	NA	13.3 B	NA	<10	NA	294	<100	<3	NA	30600	32200
	11/9/2001	177 B	NA	<10	NA	<10	NA	69.1 B	NA	<5	NA	<2	NA	110000 J	109000 J	<5	NA	<7	NA	<25	NA	1.8 B	NA	453	387	<3	NA	31700 J	31400 J
	10/16/2002	359	NA	<10	NA	<10	NA	72 B	NA	<5	NA	0.41 B	NA	100000 J	NA	4.3 B	NA	1.4 B J	NA	<25	NA	<10	NA	881	NA	<3	NA	29300 J	NA
	11/16/2003	57 B J	NA	<10	NA	6 B	NA	73.7 B J	NA	<5	NA	1.3 B J	NA	111000 J	NA	5.5 J	NA	1.8 B J	NA	4 B J	NA	<10	NA	1850	NA	<3	NA	30100 J	NA
	4/5/2004	<200	NA	<10	NA	<10	NA	59.9 B J	NA	<5	NA	<2	NA	115000	NA	10.9	NA	<7	NA	<25	NA	<10	NA	2680	NA	<3	NA	33000 J	NA
	11/6/2004	<200	NA	<10	NA	<10	NA	71.5 B	NA	<5	NA	<2	NA	104000	NA	<5	NA	<7	NA	<25	NA	<10	NA	323	NA	<3	NA	27800	NA
	11/16/2005	<200	NA	<10	NA	4.5 B	NA	57 B	NA	<5	NA	<2	NA	104000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	1530 J	NA	<3	NA	31300	NA
	11/8/2006	< 200	NA	< 10	NA	< 10	NA	73.1 B	NA	< 5	NA	< 2	NA	104000 J	NA	< 5	NA	< 7	NA	1.9 B J	NA	NA	NA	1610	NA	< 3	NA	29200	NA
UAW15-20	5/6/2001	147 B	NA	<10	NA	<10	NA	221	NA	<5	NA	0.49 B	NA	237000	253000	2 B	NA	21.4	NA	26.4	NA	<10	NA	156	<100	<3	NA	61600	65300
	11/11/2001	271 J	NA	<10	NA	<10	NA	330	NA	<5	NA	0.48 B	NA	311000	297000	8.7	NA	14.6	NA	4.9 B	NA	<10	NA	398	<100	<3	NA	77100	73700
	10/18/2002	85.5 B J	NA	<10	NA	<10	NA	145 B	NA	<5	NA	0.5 B	NA	148000 J	NA	9.7	NA	15	NA	1.8 B	NA	<10	NA	273	NA	<3	NA	37400	NA
	11/17/2003	104 B J	NA	<10	NA	<10	NA	290 J	NA	<5	NA	1.2 B J	NA	214000 J	NA	24.6 J	NA	7.6 J	NA	5 B J	NA	4.9 B	NA	218	NA	<3	NA	51900 J	NA
	4/7/2004	214 J	NA	<10	NA	<10	NA	563 J	NA	<5	NA	<2	NA	485000	NA	40.6	NA	10.1	NA	3 B	NA	<10	NA	571	NA	<3	NA	115000 J	NA
	11/7/2004	167 B J	NA	<10	NA	<10	NA	335	NA	<5	NA	0.63 B	NA	229000	NA	13.6	NA	11.1	NA	3 B	NA	6.3 B	NA	160	NA	<3	NA	58900	NA
	11/15/2005	<200	NA	<10	NA	<10	NA	275	NA	0.46 U	NA	<2	NA	206000	NA	38.3	NA	9.6	NA	3.4 B	NA	NA	NA	865	NA	<3	NA	54200	NA
	11/2/2006	< 200	NA	< 10	NA	< 10	NA	422	NA	< 5	NA	0.43 B	NA	334000 J	NA	53.6	NA	13.5	NA	9.6 B J	NA	NA	NA	826	NA	< 3	NA	88300	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
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Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW15-50	5/6/2001	147 B	NA	14.4	NA	83.5	NA	1090	NA	<5	NA	<2	NA	257000	219000	3.1 B	NA	13.7	NA	<25	NA	<10	NA	15600	407	<3	NA	107000	89800
	11/11/2001	197 B J	NA	16	NA	83	NA	960	NA	<5	NA	0.29 B	NA	250000	230000	1.9 B	NA	11	NA	<25	NA	4.3 B	NA	16400	582	<3	NA	108000	99000
	10/18/2002	88.4 B J	NA	12.2	NA	91.6	NA	766	NA	<5	NA	<2	NA	206000 J	NA	1.6 B	NA	4.1 B	NA	<25	NA	<10	NA	13000	NA	<3	NA	88700	NA
	11/17/2003	60.6 B J	NA	8.5 B	NA	71.4	NA	648 J	NA	<5	NA	1.2 B J	NA	225000 J	NA	5.4 J	NA	4.2 B J	NA	2.9 B J	NA	<10	NA	10400	NA	<3	NA	90400 J	NA
	4/7/2004	62.3 B J	NA	11.1	NA	77.1	NA	664 J	NA	<5	NA	0.53 B	NA	196000	NA	2.5 B	NA	7.8	NA	<25	NA	<10	NA	13600	NA	<3	NA	75500 J	NA
	11/7/2004	65 B J	NA	8.7 B	NA	62.6	NA	566	NA	<5	NA	0.37 B	NA	173000	NA	<5	NA	5.4 B	NA	<25	NA	<10	NA	9630	NA	<3	NA	69300	NA
UAW15-50 (Dup)	11/7/2004	62.6 B J	NA	8.4 B	NA	60.7	NA	553	NA	<5	NA	0.46 B	NA	168000	NA	<5	NA	4.8 B	NA	<25	NA	<10	NA	9420	NA	<3	NA	67400	NA
	11/15/2005	<200	NA	6.4 B	NA	62.9	NA	486	NA	0.45 B J	NA	<2	NA	157000	NA	<5	NA	3.3 B	NA	<25	NA	NA	NA	7840	NA	<3	NA	66300	NA
	11/2/2006	< 200	NA	5.9 B	NA	64.6	NA	528	NA	< 5	NA	0.8 B	NA	171000 J	NA	< 5	NA	1.6 B	NA	3.4 B J	NA	NA	NA	8140	NA	< 3	NA	65700	NA
UAW16-10	10/12/2001	98.3 B	NA	<10	NA	24.9	NA	55.5 B	NA	<5	NA	<2	NA	223000	226000	7	NA	1.9 B	NA	<25	NA	<10	NA	1300	1570	<3	NA	38900	39900
UAW16-10 (Dup)	10/12/2001	98.6 B	NA	<10	NA	23.2	NA	55.1 B	NA	<5	NA	<2	NA	221000	226000	6.9	NA	1.8 B	NA	<25	NA	<10	NA	1250	1250	<3	NA	38200	39400
	11/13/2001	94.1 B	NA	3.6 B	NA	20.6	NA	49.6 B	NA	<5	NA	<2	NA	277000 J	243000 J	4.3 B	NA	<7	NA	6.8 B	NA	<10	NA	1150	418	<3	NA	45700 J	40200 J
	10/18/2002	<200	NA	<10	NA	8.9 B	NA	56.5 B	NA	<5	NA	<2	NA	410000 J	NA	2.7 B	NA	1.2 B	NA	<25	NA	<10	NA	721	NA	<3	NA	58300 J	NA
	11/16/2003	57.3 B J	NA	<10	NA	5.1 B	NA	38.4 B J	NA	<5	NA	1.1 B J	NA	369000 J	NA	5.7 J	NA	1.7 B J	NA	2.2 B J	NA	<10	NA	603	NA	<3	NA	43100 J	NA
UAW16-10 (Dup)	11/17/2003	62.9 B J	NA	3.1 B	NA	4.7 B	NA	40.4 B J	NA	<5	NA	0.97 B J	NA	382000 J	NA	5.8 J	NA	1.6 B J	NA	2.3 B J	NA	<10	NA	634	NA	<3	NA	45100 J	NA
	4/7/2004	<200	NA	<10	NA	<10	NA	33.5 B J	NA	<5	NA	<2	NA	329000	NA	<5	NA	<7	NA	<25	NA	<10	NA	529	NA	<3	NA	36200 J	NA
	11/7/2004	63.3 B J	NA	<10	NA	<10	NA	28 B	NA	<5	NA	<2	NA	261000	NA	<5	NA	<7	NA	<25	NA	<10	NA	340	NA	<3	NA	30100	NA
	11/15/2005	<200	NA	<10	NA	10.3	NA	35.6 B	NA	0.42 U	NA	<2	NA	308000	NA	<5	NA	<7	NA	<25	NA	NA	NA	70.7 B	NA	<3	NA	34300	NA
	11/6/2006	< 200	NA	< 10	NA	< 10	NA	32.5 B	NA	< 5	NA	< 2	NA	251000 J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	255	NA	< 3	NA	44100	NA
UAW17-40	5/5/2001	955	NA	<10	NA	7.6 B	NA	216	NA	<5	NA	<2	NA	102000	102000	2 B	NA	<7	NA	<25	NA	<10	NA	3720	<100	<3	NA	31400	33200
	11/9/2001	395	NA	<10	NA	16.2	NA	177 B	NA	<5	NA	<2	NA	116000 J	116000 J	2.5 B	NA	<7	NA	<25	NA	<10	NA	4700	4760	<3	NA	36900 J	36900 J
	10/16/2002	333	NA	<10	NA	17.9	NA	121 B	NA	<5	NA	<2	NA	108000 J	NA	1.6 B	NA	1.7 B	NA	<25	NA	<10	NA	3930	NA	<3	NA	33700 J	NA
	11/16/2003	63.3 B J	NA	<10	NA	19.1	NA	117 B J	NA	<5	NA	1 B J	NA	111000 J	NA	4.5 B J	NA	1.9 B J	NA	2.9 B J	NA	<10	NA	3450	NA	<3	NA	33000 J	NA
	3/31/2004	166 B	NA	<10	NA	10.9	NA	100 B	NA	<5	NA	<2	NA	102000 J	NA	4.6 B	NA	<7	NA	<25	NA	<10	NA	1510	NA	<3	NA	30900 J	NA
	11/6/2004	27.6 B	NA	<10	NA	14.2	NA	135 B	NA	<5	NA	<2	NA	110000	NA	<5	NA	<7	NA	2.5 B	NA	<10	NA	3030	NA	<3	NA	33000	NA
	11/14/2005	<200	NA	<10	NA	8.5 B	NA	134 B	NA	<5	NA	<2	NA	110000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	2580	NA	<3	NA	34500	NA
	10/31/2006	48.2 B	NA	< 10	NA	8.3 B	NA	134 B	NA	< 5	NA	< 2	NA	115000 J	NA	< 5	NA	< 7	NA	2 B J	NA	NA	NA	2450	NA	< 3	NA	34800	NA
UAW18-20	10/12/2001	97.9 B	NA	<10	NA	12	NA	169 B	NA	<5	NA	0.31 B	NA	73100	72200	1.5 B	NA	2 B	NA	<25	NA	4.7 B	NA	5340	5300	<3	NA	13900	13800
UAW18-20	11/13/2001	60.8 B	NA	<10	NA	11.7	NA	186 B	NA	<5	NA	<2	NA	89100 J	81900 J	<5	NA	1.8 B	NA	<25	NA	5.4 B	NA	4800	<100	<3	NA	16800 J	15600 J
	10/18/2002	<200	NA	<10	NA	13.1	NA	49.5 B	NA	<5	NA	<2	NA	23600 J	NA	2 B	NA	2.2 B	NA	<25	NA	<10	NA	1570	NA	<3	NA	6820 J	NA
	11/16/2003	70.5 B J	NA	<10	NA	17.8	NA	197 B J	NA	<5	NA	1 B J	NA	99800 J	NA	4.9 B J	NA	1.8 B J	NA	2.6 B J	NA	<10	NA	1710	NA	<3	NA	39900 J	NA
	4/7/2004	40.6 B J	NA	<10	NA	8.2 B	NA	299 J	NA	<5	NA	<2	NA	216000	NA	<5	NA	<7	NA	<25	NA	<10	NA	3300	NA	<3	NA	81500 J	NA
	11/7/2004	104 B J	NA	<10	NA	32.3	NA	759	NA	<5	NA	<2	NA	469000	NA	<5	NA	<7	NA	<25	NA	<10	NA	3370	NA	<3	NA	105000	NA
	11/15/2005	263	NA	<10	NA	<10	NA	65 B	NA	0.47 U	NA	<2	NA	75800	NA	<5	NA	2.3 B	NA	2.3 B	NA	NA	NA	1120	NA	<3	NA	12300	NA
	11/6/2006	118 B	NA	< 10	NA	26.9	NA	153 B	NA	< 5	NA	< 2	NA	108000 J	NA	< 5	NA	< 7	NA	4 B J	NA	NA	NA	1690	NA	< 3	NA	25000	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW19-80	5/6/2001	150 B	NA	<10	NA	<10	NA	112 B	NA	<5	NA	0.33 B	NA	194000	191000	1.4 B	NA	<7	NA	<25	NA	<10	NA	363	<100	<3	NA	58700	55400
	11/12/2001	1010 J	NA	<10	NA	<10	NA	113 B	NA	<5	NA	<2	NA	177000	186000	19.6	NA	1.4 B	NA	12.4 B	NA	<10	NA	1700	<100	<3	NA	52700	55400
UAW19-80 (Dup)	11/12/2001	65.4 B J	NA	<10	NA	<10	NA	25.4 B	NA	<5	NA	0.62 B	NA	358000	349000	11.8	NA	13.3	NA	12.1 B	NA	<10	NA	<100	<100	<3	NA	81600	79200
	10/17/2002	406	NA	<10	NA	<10	NA	107 B	NA	<5	NA	<2	NA	197000 J	NA	6.5	NA	0.84 B	NA	<25	NA	<10	NA	592	NA	<3	NA	57700 J	NA
UAW19-80 (Dup)	10/17/2002	345	NA	<10	NA	<10	NA	110 B	NA	<5	NA	<2	NA	194000 J	NA	6.3	NA	0.89 B	NA	<25	NA	<10	NA	544	NA	<3	NA	57100 J	NA
	11/13/2003	76.3 B	NA	<10	NA	<10	NA	88.9 B J	NA	0.72 B	NA	<2	NA	196000 J	NA	5.8	NA	<7	NA	<25	NA	<10	NA	138 J	NA	<3	NA	56600	NA
	3/30/2004	423	NA	<10	NA	<10	NA	95.7 B	NA	<5	NA	<2	NA	213000 J	NA	5.2	NA	<7	NA	<25	NA	<10	NA	549	NA	<3	NA	61100 J	NA
	11/5/2004	51.4 B	NA	<10	NA	<10	NA	83.4 B	NA	<5	NA	<2	NA	201000	NA	<5	NA	<7	NA	<25	NA	<10	NA	116	NA	<3	NA	59000 J	NA
UAW19-80N	11/11/2005	86.8 B	NA	<10	NA	<10	NA	81.5 B	NA	<5	NA	<2	NA	190000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	115	NA	<3	NA	58000	NA
UAW19-80FD(DUP)	11/11/2005	79.8 B	NA	<10	NA	<10	NA	79.7 B	NA	<5	NA	<2	NA	186000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	120	NA	<3	NA	57000	NA
	11/8/2006	1970	NA	< 10	NA	< 10	NA	108 B	NA	< 5	NA	< 2	NA	213000 J	NA	16.1	NA	< 7	NA	5.3 B J	NA	NA	NA	3230	NA	2.2 B	NA	63700	NA
UAW20-60	5/7/2001	200	NA	<10	NA	<10	NA	149 B	NA	<5	NA	<2	NA	390000	482000	4.1 B	NA	3 B	NA	16.8 B	NA	<10	NA	268	<100	<3	NA	97400	122000
	11/14/2001	<200	NA	<10	NA	<10	NA	26.5 B	NA	<5	NA	0.3 B	NA	446000	430000	<5	NA	2.3 B	NA	5.8 B	NA	2.9 B	NA	<100	<100	<3	NA	124000 J	120000 J
UAW20-60 (Dup)	11/14/2001	70.6 B J	NA	2.8 B	NA	<10	NA	26.1 B	NA	<5	NA	0.33 B	NA	436000	431000	<5	NA	2.2 B	NA	5.3 B	NA	1.9 B	NA	175	<100	<3	NA	123000 J	121000 J
	10/19/2002	76.5 B J	NA	<10	NA	<10	NA	20.8 B	NA	<5	NA	0.4 B	NA	373000 J	NA	6	NA	1.6 B	NA	<25	NA	<10	NA	50.3 B	NA	<3	NA	104000	NA
UAW20-60 (Dup)	10/19/2002	102 B J	NA	<10	NA	20.8	NA	69 B	NA	<5	NA	<2	NA	242000 J	NA	4.7 B	NA	0.81 B	NA	<25	NA	<10	NA	939	NA	<3	NA	36600	NA
	11/13/2003	<200	NA	<10	NA	<10	NA	19.9 B J	NA	0.6 B	NA	<2	NA	377000 J	NA	2.2 B	NA	1.2 B	NA	<25	NA	<10	NA	<100	NA	<3	NA	96900	NA
	3/30/2004	59.4 B J	NA	<10	NA	<10	NA	18.4 B	NA	<5	NA	0.57 B	NA	385000	NA	43.3	NA	2.1 B	NA	3.9 B	NA	<10	NA	333	NA	<3	NA	99400	NA
	11/5/2004	<200	NA	<10	NA	<10	NA	18.5 B	NA	<5	NA	<2	NA	422000	NA	1.9 B	NA	<7	NA	<25	NA	<10	NA	<100	NA	<3	NA	109000 J	NA
	11/11/2005	<200	NA	<10	NA	<10	NA	19.8 B	NA	<5	NA	<2	NA	423000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	148	NA	<3	NA	120000	NA
	11/7/2006	< 200	NA	< 10	NA	< 10	NA	21.5 B	NA	< 5	NA	0.87 B	NA	355000 J	NA	5.7	NA	< 7	NA	3.9 B J	NA	NA	NA	758	NA	< 3	NA	100000	NA
UAW21-30	5/5/2001	832	NA	<10	NA	<10	NA	125 B	NA	<5	NA	<2	NA	153000	191000	1.5 B	NA	1.3 B	NA	9.9 B	NA	<10	NA	923	<100	<3	NA	40200	50200
	11/11/2001	3170 J	NA	2.5 B	NA	<10	NA	55.4 B	NA	<5	NA	<2	NA	109000	107000	670	NA	6.5 B	NA	24.2 B	NA	3.4 B	NA	5520	<100	2.7 B	NA	27000	25400
	10/18/2002	1500	NA	<10	NA	<10	NA	51.6 B	NA	<5	NA	<2	NA	105000 J	NA	349	NA	18.7	NA	7.9 B	NA	<10	NA	4500	NA	2.1 B	NA	28200 J	NA
	11/11/2003	4660	NA	<10	NA	5.6 B	NA	60.1 B J	NA	<5	NA	<2	NA	121000 J	NA	348	NA	8.5	NA	15.3 B	NA	<10	NA	8000	NA	4.8	NA	32200 J	NA
	3/27/2004	1570 J	NA	<10	NA	3.1 B	NA	52 B	NA	<5	NA	<2	NA	115000	NA	209	NA	4.9 B	NA	15.8 B J	NA	<10	NA	3720	NA	<3	NA	30800	NA
	11/3/2004	1650	NA	<10	NA	<10	NA	51.6 B	NA	<5	NA	<2	NA	105000	NA	172	NA	6.8 B	NA	19.5 B	NA	<10	NA	4030	NA	4	NA	27500	NA
	11/9/2005	283	NA	<10	NA	<10	NA	53.8 B	NA	0.32 B	NA	<2	NA	114000 J	NA	63.6	NA	4.2 B	NA	3.0 B J	NA	NA	NA	829	NA	<3	NA	30300	NA
	11/9/2006	7270	NA	< 10	NA	7 B	NA	113 B	NA	0.75 B	NA	< 2	NA	140000 J	NA	7230	NA	91.4	NA	157	NA	NA	NA	56500	NA	11.4	NA	39700	NA
UAW21-80	5/5/2001	271	NA	<10	NA	24.2	NA	258	NA	<5	NA	<2	NA	135000	127000	<5	NA	<7	NA	<25	NA	<10	NA	2020	<100	<3	NA	42800	42200
	11/11/2001	282	NA	<10	NA	42.6	NA	231	NA	<5	NA	<2	NA	136000 J	142000 J	2.1 B	NA	<7	NA	<25	NA	<10	NA	2990	<100	<3	NA	44500	46300
	10/18/2002	486	NA	<10	NA	45.5	NA	232	NA	<5	NA	<2	NA	143000 J	NA	9.7	NA	2.2 B	NA	<25	NA	<10	NA	3780	NA	<3	NA	45400 J	NA
	11/11/2003	<200	NA	<10	NA	45.5	NA	230 J	NA	<5	NA	<2	NA	162000 J	NA	1.6 B	NA	<7	NA	<25	NA	<10	NA	2820	NA	<3	NA	50200 J	NA
	3/27/2004	69.5 B J	NA	<10	NA	44.2	NA	222	NA	<5	NA	<2	NA	147000	NA	<5	NA	1 B	NA	<25	NA	<10	NA	2610	NA	<3	NA	45800	NA
	11/3/2004	<200	NA	<10	NA	41.7	NA	215	NA	<5	NA	<2	NA	144000	NA	<5	NA	<7	NA	<25	NA	<10	NA	2460	NA	<3	NA	44700	NA
	11/3/2004	<200	NA	<10	NA	41.7	NA	215	NA	<5	NA	<2	NA	144000	NA	<5	NA	<7	NA	<25	NA	<10	NA	2460	NA	<3	NA	44700	NA
	11/8/2005	58.5 B	NA	<10	NA	38.8	NA	208	NA	<5	NA	<2	NA	132000 J	NA	<5	NA	<7	NA	<25	NA	<10	NA	2360	NA	1.8 B	NA	42500	NA
	11/8/2006	125 B	NA	< 10	NA	45.8	NA	223	NA	< 5	NA	< 2	NA	142000 J	NA	2.1 B	NA	< 7	NA	2.2 B J	NA	NA	NA	2800	NA	< 3	NA	45700	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW22-20	10/13/2001	12100	NA	<10	NA	14.3	NA	182 B	NA	0.9 B	NA	0.29 B	NA	283000	229000	22.2	NA	8.5	NA	29.2	NA	<10	NA	41400	169	12.2	NA	68000	46600
	11/13/2001	14700	NA	<10	NA	15.9	NA	174 B	NA	1.1 B	NA	0.47 B	NA	351000 J	244000 J	27.1	NA	10.6	NA	34.4	NA	2.5 B	NA	31600	253	15.4	NA	97200 J	50200 J
	10/20/2002	642 J	NA	<10	NA	22.3	NA	103 B	NA	<5	NA	<2	NA	156000 J	NA	1.8 B	NA	2.2 B	NA	<25	NA	<10	NA	5000	NA	<3	NA	36500	NA
	11/10/2003	478	NA	<10	NA	7.4 B	NA	189 B J	NA	<5	NA	0.41 B	NA	352000 J	NA	3.8 B	NA	1.7 B	NA	3 B	NA	<10	NA	12200	NA	<3	NA	69200 J	NA
	3/29/2004	1540 J	NA	<10	NA	5.3 B	NA	182 B	NA	<5	NA	0.38 B	NA	298000	NA	2.8 B	NA	1.6 B	NA	4.8 B J	NA	<10	NA	12900	NA	<3	NA	65400	NA
	11/4/2004	128 B J	NA	<10	NA	4.4 B	NA	145 B	NA	<5	NA	0.44 B J	NA	363000	NA	<5	NA	1.8 B J	NA	<25	NA	<10	NA	11600	NA	<3	NA	70000 J	NA
	11/15/2005	410	NA	4.6 B	NA	6.8 B	NA	233	NA	<5	NA	<2	NA	415000 J	NA	3.6 B	NA	<7	NA	3.4 B	NA	NA	NA	11400	NA	2.6 B	NA	75900	NA
	11/9/2006	4950	NA	< 10	NA	< 10	NA	136 B	NA	0.62 B	NA	3.4	NA	238000 J	NA	13.3	NA	5 B	NA	47.6	NA	NA	NA	15100	NA	8.6	NA	56100	NA
UAW23-20	10/12/2001	117 B	NA	<10	NA	<10	NA	29.6 B	NA	<5	NA	<2	NA	408000	403000	6.9	NA	<7	NA	<25	NA	<10	NA	154	109	<3	NA	97200	96200
	11/14/2001	<200	NA	<10	NA	<10	NA	25 B	NA	<5	NA	<2	NA	394000	390000	5.6	NA	6.2 B	NA	<25	NA	2.1 B	NA	1980	488	<3	NA	90900 J	90700 J
	10/19/2002	128 B J	NA	<10	NA	<10	NA	21.7 B	NA	<5	NA	0.56 B	NA	305000 J	NA	54.2	NA	6.7 B	NA	2.5 B	NA	<10	NA	2860	NA	<3	NA	68000	NA
	11/13/2003	<200	NA	<10	NA	3 B	NA	19.9 B J	NA	<5	NA	<2	NA	309000 J	NA	32.4	NA	12.1	NA	<25	NA	<10	NA	3750 J	NA	<3	NA	66900	NA
	3/28/2004	771 J	NA	<10	NA	<10	NA	36.9 B	NA	<5	NA	0.79 B	NA	322000	NA	932	NA	3.6 B	NA	25.4 J	NA	<10	NA	8010	NA	<3	NA	71000	NA
	11/5/2004	<200	NA	<10	NA	<10	NA	25.8 B	NA	<5	NA	<2	NA	358000	NA	35.7	NA	1.3 B	NA	<25	NA	<10	NA	562	NA	<3	NA	75900 J	NA
	11/14/2005	<200	NA	<10	NA	<10	NA	38.2 B	NA	<5	NA	<2	NA	347000 J	NA	154	NA	6.3 B	NA	2.5 B	NA	NA	NA	3390	NA	<3	NA	78300	NA
	11/6/2006	< 200	NA	< 10	NA	< 10	NA	35.4 B	NA	< 5	NA	< 2	NA	361000 J	NA	209	NA	1.9 B	NA	2.6 B J	NA	NA	NA	3420	NA	< 3	NA	80600	NA
UAW24-70	10/13/2001	251	NA	<10	NA	<10	NA	213	NA	<5	NA	<2	NA	128000	129000	2.1 B	NA	<7	NA	<25	NA	<10	NA	355	482	<3	NA	39900	40500
	11/15/2001	358 J	NA	<10	NA	<10	NA	145 B J	NA	<5	NA	<2	NA	71500 J	76500 J	4 B	NA	<7	NA	<25	NA	3.2 B	NA	1030	<100	<3	NA	31500	31500
	10/17/2002	365	NA	<10	NA	6.7 B	NA	227	NA	<5	NA	<2	NA	83100 J	NA	8.3	NA	1.6 B	NA	<25	NA	<10	NA	1270	NA	<3	NA	37300 J	NA
	11/16/2003	<200	NA	<10	NA	12	NA	167 B J	NA	<5	NA	1.2 B J	NA	63300 J	NA	6.5 J	NA	2.2 B J	NA	2.2 B J	NA	<10	NA	843	NA	<3	NA	27400 J	NA
	4/5/2004	<200	NA	<10	NA	11.4	NA	249 J	NA	<5	NA	<2	NA	86300	NA	2.1 B	NA	<7	NA	<25	NA	<10	NA	1310	NA	<3	NA	33600 J	NA
	11/6/2004	<200	NA	<10	NA	4.5 B	NA	260	NA	<5	NA	<2	NA	106000	NA	<5	NA	<7	NA	<25	NA	<10	NA	998	NA	<3	NA	36100	NA
	11/16/2005	74.3 B	NA	<10	NA	15.4	NA	233	NA	<5	NA	<2	NA	83300	NA	<5	NA	<7	NA	<25	NA	NA	NA	1120	NA	<3	NA	33900	NA
	10/31/2006	574	NA	< 10	NA	14.4	NA	280	NA	< 5	NA	< 2	NA	102000 J	NA	3.2 B	NA	< 7	NA	3.2 B J	NA	NA	NA	2260	NA	< 3	NA	37000	NA
UAW25-20	10/13/2001	383	NA	<10	NA	26.1	NA	171 B	NA	<5	NA	0.38 B	NA	239000	239000	2.6 B	NA	3 B	NA	11.4 B	NA	<10	NA	3550	3530	<3	NA	43200	43300
	11/13/2001	60.2 B	NA	<10	NA	32.4	NA	162 B	NA	<5	NA	<2	NA	223000 J	200000 J	10.5	NA	2.6 B	NA	9 B	NA	<10	NA	6370	327	<3	NA	41800 J	37300 J
	10/18/2002	<200	NA	<10	NA	21.7	NA	186 B	NA	<5	NA	<2	NA	232000 J	NA	7.5	NA	1.5 B	NA	<25	NA	2.8 B	NA	5760	NA	<3	NA	49000 J	NA
	11/12/2003	<200	NA	<10	NA	28.4	NA	250 J	NA	<5	NA	<2	NA	277000 J	NA	43	NA	<7	NA	5.2 B	NA	<10	NA	11100	NA	<3	NA	55000 J	NA
	3/27/2004	246 J	NA	<10	NA	26.6	NA	176 B	NA	<5	NA	<2	NA	199000	NA	505	NA	1.9 B	NA	14.4 B J	NA	<10	NA	10400	NA	<3	NA	40600	NA
	11/3/2004	<200	NA	<10	NA	14.3	NA	228	NA	<5	NA	<2	NA	277000	NA	6.2	NA	1.4 B	NA	4.8 B	NA	<10	NA	7380	NA	<3	NA	58500	NA
	11/9/2005	<200	NA	<10	NA	16.3	NA	330	NA	0.34 B	NA	<2	NA	291000 J	NA	5.5	NA	<7	NA	<25	NA	NA	NA	10000	NA	<3	NA	62900	NA
	11/8/2006	< 200	NA	< 10	NA	57.1	NA	387	NA	< 5	NA	0.87 B	NA	219000 J	NA	281	NA	1.5 B	NA	J	NA	NA	NA	30300	NA	< 3	NA	44700	NA
UAW26-70	4/6/2004	379 J	NA	<10	NA	5.1 B	NA	443 J	NA	<5	NA	<2	NA	163000	NA	2.8 B	NA	1.4 B	NA	<25	NA	<10	NA	3290	NA	1.7 B	NA	49900 J	NA
	11/6/2004	<200	NA	<10	NA	8.6 B	NA	266	NA	<5	NA	<2	NA	140000	NA	<5	NA	<7	NA	<25	NA	<10	NA	3180	NA	<3	NA	44300	NA
	11/9/2005	87.5 B	NA	<10	NA	13.2	NA	295	NA	0.34 B	NA	<2	NA	136000 J	NA	1.7 B	NA	<7	NA	<25	NA	NA	NA	2650	NA	<3	NA	43200	NA
	11/7/2006	< 200	NA	< 10	NA	9.5 B	NA	265	NA	< 5	NA	< 2	NA	146000 J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	3180	NA	< 3	NA	47600	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS
Groundwater																													
UAW27-50	3/31/2004	40.7 B	NA	<10	NA	<10	NA	138 B	NA	<5	NA	<2	NA	236000 J	NA	5.5	NA	1.5 B	NA	<25	NA	<10	NA	291	NA	<3	NA	67800 J	NA
	11/5/2004	169 B	NA	<10	NA	<10	NA	104 B	NA	<5	NA	<2	NA	199000	NA	4.8 B	NA	<7	NA	2.8 B	NA	<10	NA	85.3 B	NA	<3	NA	56900	NA
	11/11/2005	<200	NA	<10	NA	<10	NA	93.6 B	NA	<5	NA	<2	NA	187000 J	NA	<5	NA	<7	NA	<25	NA	NA	NA	<100	NA	<3	NA	57200	NA
	11/1/2006	< 200	NA	< 10	NA	< 10	NA	99 B	NA	< 5	NA	< 2	NA	160000 J	NA	2.4 B	NA	< 7	NA	2.6 B J	NA	NA	NA	98.3 B	NA	< 3	NA	44800	NA
LAW05-60	3/16/2002	NA	NA	<10	NA	<10	NA	87.5 B	NA	<5	NA	<2	NA	NA	NA	1.6 B	NA	3.2 B	NA	<25	NA	<10	NA	NA	NA	<3	NA	NA	NA
LAW05-150	3/16/2002	NA	NA	<10	NA	6.2 B	NA	94.3 B	NA	0.55 B	NA	<2	NA	NA	NA	<5	NA	<7	NA	<25	NA	<10	NA	NA	NA	<3	NA	NA	NA
LAW05-150 (Dup)	3/16/2002	NA	NA	<10	NA	4.6 B	NA	94.7 B	NA	<5	NA	<2	NA	NA	NA	<5	NA	<7	NA	<25	NA	<10	NA	NA	NA	<3	NA	NA	NA
LAW12-60	10/13/2001	NA	NA	<10	NA	<10	NA	113 B	NA	<5	NA	<2	NA	133000	128000	6.9	NA	2.5 B	NA	<25	NA	<10	NA	888	621	<3	NA	41200	39800
LAW12-60	11/16/2001	NA	NA	<10	NA	<10	NA	127 B J	NA	<5	NA	<2	NA	120000 J	104000 J	4.1 B	NA	<7	NA	10.7 B	NA	<10	NA	374	<100	<3	NA	46200	41000
20061102CINEB-1	11/2/2006	< 200	NA	< 10	NA	< 10	NA	< 200	NA	< 5	NA	< 2	NA	132 B J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	< 100	NA	< 3	NA	< 5000	NA
20061106CINEB-1	11/6/2006	< 200	NA	< 10	NA	< 10	NA	< 200	NA	< 5	NA	< 2	NA	222 B J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	< 100	NA	< 3	NA	< 5000	NA
20061106CINFB-1	11/6/2006	< 200	NA	< 10	NA	< 10	NA	< 200	NA	< 5	NA	< 2	NA	< 5000	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	< 100	NA	< 3	NA	< 5000	NA
20061108CINFB-1	11/8/2006	< 200	NA	< 10	NA	< 10	NA	< 200	NA	< 5	NA	< 2	NA	83.4 B J	NA	< 5	NA	< 7	NA	< 25	NA	NA	NA	< 100	NA	< 3	NA	< 5000	NA
French Drain Sump @ 46 hr	10/19/2002	87.2 B J	NA	3.9 B	NA	14.2	NA	256	NA	<5	NA	<2	NA	240000 J	NA	5.5	NA	2.5 B	NA	9.1 B	NA	<10	NA	1940	NA	<3	NA	39800	NA
French Drain Sump @ 72 hr	10/20/2002	191 B J	NA	3.5 B	NA	15.9	NA	261	NA	<5	NA	<2	NA	243000 J	NA	4.1 B	NA	1.9 B	NA	16.8 B	NA	<10	NA	1800	NA	<3	NA	40700	NA
Surface Water																													
WS-1A	3/25/2004	NA	NA	NA	<10	NA	<10	NA	56.6 B J	NA	0.78 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	6.7 B J	<10	NA	NA	NA	NA	<3	NA	NA
WS-2A	3/26/2004	NA	NA	<10	NA	<10	NA	57.2 B J	NA	0.7 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	6.3 B J	NA	<10	NA	NA	NA	<3	NA	NA	NA
WS-3A	3/26/2004	NA	NA	<10	NA	<10	NA	59.2 B J	NA	0.66 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	5.4 B J	NA	<10	NA	NA	NA	<3	NA	NA	NA
WS-4A	3/26/2004	NA	NA	<10	NA	<10	NA	61.8 B J	NA	0.67 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	6.2 B J	NA	<10	NA	NA	NA	<3	NA	NA	NA
WS-5A	3/25/2004	NA	NA	NA	<10	NA	<10	NA	54.6 B J	NA	0.74 B J	NA	<2	NA	NA	NA	<5	NA	1.1 B	NA	6.6 B J	<10	NA	NA	NA	NA	<3	NA	NA
WS-6A	3/25/2004	NA	NA	NA	<10	NA	<10	NA	53 B J	NA	0.76 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	5.9 B J	<10	<20	NA	NA	NA	<3	NA	NA
WS-6A (Dup)	3/25/2004	NA	NA	NA	<10	NA	3.6 B	NA	56 B J	NA	0.69 B J	NA	<2	NA	NA	NA	<5	NA	1.2 B	NA	6.5 B J	<10	<20	NA	NA	NA	<3	NA	NA
Seeps																													
SS-1 (Seep)	10/11/2001	48300	47.8 B	<10	<10	25.7	<10	494	73.8 B	3.1 B	<5	1.7 B	<2	430000	361000	174	<5	43.8	<7	104	<25	<10	NA	90100	<100	126	<3	90100	45100
SS-5 (Seep)	10/11/2001	14300	112 B	<10	<10	6.1 B	4.7 B	143 B	233	1.2 B	<5	0.28 B	<2	417000	257000	36.7	<5	10.4	12.4	31.9	<25	<10	NA	23800	734	24.2	<3	67100	39000

Notes:
B = Estimated result; result is less than reporting limit
E = Matrix interference
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
L = Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.
MBB = This analyte is present at a reportable level in the associated method blank but is less than 5% of the sample amount.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
MBE = This analyte is present in the associated method blank.
NA indicates chemical was not on the target analyte list for that sample.
<5 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more FI samples.

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
DP53-12.5'	3/11/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2550	NA	NA	NA	NA	NA	NA
MW-EPA-1	5/8/2001	330	NA	<0.2	NA	112	NA	12000	12000	<5	NA	<5	NA	472000	474000	7.6 B	NA	NA	NA	2600	4.6 B	NA	<20	NA
	11/15/2001	520	NA	<0.2	NA	32.1 B	NA	17600 J	15700 J	<5	NA	<5	NA	642000	584000	5.6 B	NA	NA	NA	7500	5.8 B	NA	<20	NA
	10/20/2002	219	NA	<0.2	NA	20.5 B	NA	15500 J	NA	<5	NA	NA	NA	643000	NA	5.3 B	NA	2280	NA	17000	4.9 B	NA	16.5 B	NA
	11/12/2003	323 J	NA	<0.2	NA	19.3 B	NA	16000 J	NA	<5	NA	<5	NA	754000	NA	8 B	NA	3390	NA	51000	5.5 B	NA	20.2 J	NA
	3/28/2004	479 J	NA	<0.2	NA	19.7 B	NA	16000 J	NA	<5	NA	<5	NA	767000	NA	<10	NA	3380	NA	29000	6.4 B	NA	27.9	NA
	11/4/2004	338 J	NA	<0.2	NA	7.6 B	NA	13200 J	NA	<5	NA	<5	NA	577000	NA	6.4 B	NA	1340	NA	21000	3.1 B	NA	<20	NA
	11/15/2005	475	NA	<0.2	NA	13.9 B	NA	13100 J	NA	<5	NA	<5	NA	621000	NA	<10	NA	2430	NA	NA	7.2	NA	41.1	NA
	11/8/2006	281 J	NA	<0.2	NA	12.8 B	NA	11500 J	NA	<5	NA	<5	NA	591000	NA	< 10	NA	1310	NA	NA	5.1 B	NA	20 J	NA
MW-EPA-2	5/8/2001	1610	NA	<0.2	NA	271	NA	15900 L	3860 B	5	NA	<5	NA	480000	486000	10.4	NA	NA	NA	4500	85.2	NA	193	NA
	11/14/2001	1640	NA	0.15 B	NA	369	NA	13300	2190 B	<5	NA	<5	NA	336000	340000	10.8	NA	NA	NA	1100	91.7	NA	280	NA
	10/20/2002	317	NA	<0.2	NA	121	NA	2560 B J	NA	<5	NA	NA	NA	231000	NA	6.4 B	NA	<100	NA	620 B	2.7 B	NA	<20	NA
	11/11/2003	288 J	NA	<0.2	NA	132	NA	2770 B J	NA	<5	NA	<5	NA	248000	NA	6 B	NA	11.9 B	NA	<1000	4.9 B	NA	20.6 J	NA
	3/29/2004	350 J	NA	<0.2	NA	225	NA	3090 B J	NA	5.1	NA	<5	NA	316000	NA	4.6 B J	NA	9.5 B	NA	730 B	4.1 B	NA	14.3 B	NA
	11/4/2004	202 J	NA	<0.2	NA	231	NA	3920 B J	NA	<5	NA	<5	NA	427000	NA	5.3 B	NA	<100	NA	<1000	<7	NA	<20	NA
	11/11/2005	241 J	NA	<0.2	NA	225	NA	5330	NA	<5	NA	<5	NA	591000	NA	<10	NA	<100	NA	NA	2.5 B	NA	14.3 U	NA
	11/9/2006	77.2 J	NA	<0.2	NA	22.1 B	NA	2090 B J	NA	< 5	NA	< 5	NA	64000	NA	< 10	NA	89.1 B	NA	NA	< 7	NA	84.9 J	NA
MW-EPA-3	5/6/2001	357	NA	<0.2	NA	34.4 B	NA	1770 B	1500 B	<5	NA	<5	NA	26300	31700	9.4 B	NA	NA	NA	<1000	2.4 B	NA	71.3	NA
	11/13/2001	1440 J	NA	<0.2	NA	80.3	NA	6910 J	1700 B J	<5	NA	<5	NA	48000 J	40400 J	<10	NA	NA	NA	1800	32.1	NA	163 J	NA
	10/17/2002	1820 J	NA	<0.2	NA	113	NA	8530 J	NA	<5	NA	NA	NA	36300	NA	<10	NA	<100	NA	300 B	45.3 J	NA	148	NA
	11/13/2003	1350 J	NA	<0.2	NA	72.2	NA	3490 B J	NA	<5	NA	<5	NA	38000	NA	<10	NA	<100	NA	<1000	10.4	NA	39.3 J	NA
	3/30/2004	1720 J	NA	<0.2	NA	159	NA	6430 J	NA	<5	NA	<5	NA	42800	NA	4.9 B	NA	<100	NA	<1000	40.3	NA	147	NA
	11/4/2004	1120 J	NA	<0.2	NA	94.3	NA	3310 B J	NA	<5	NA	<5	NA	40300	NA	7 B	NA	<100	NA	120000	7.9	NA	54.3	NA
	11/11/2005	672 J	NA	<0.2	NA	50.7	NA	2160 B	NA	<5	NA	<5	NA	52900	NA	5.0 B	NA	<100	NA	NA	<7	NA	44.9 U	NA
	11/7/2006	794 J	NA	<0.2	NA	28.6 B	NA	2360 B J	NA	< 5	NA	< 5	NA	60600	NA	< 10	NA	< 100	NA	NA	< 7	NA	26.7 J	NA
MW-EPA-4	5/8/2001	352	NA	<0.2	NA	140	NA	4830 B	4740 B	<5	NA	<5	NA	704000	684000	8.5 B	NA	NA	NA	<1000	<7	NA	<20	NA
	11/13/2001	284 J	NA	0.16 B	NA	910	NA	2430 B J	2170 B J	<5	NA	<5	NA	104000 J	106000 J	<10	NA	NA	NA	1300	<7	NA	<20	NA
	10/18/2002	157 J	NA	<0.2	NA	256	NA	3200 B J	NA	<5	NA	NA	NA	79300	NA	<10	NA	<100	NA	940 B	1.1 B J	NA	<20	NA
	11/16/2003	185 J	NA	<0.2	NA	424 J	NA	5540 J	NA	<5	NA	<5	NA	250000	NA	7.7 B J	NA	<100	NA	<1000	<7	NA	<20	NA
	4/6/2004	193	NA	<0.2	NA	198	NA	3980 B J	NA	<5	NA	<5	NA	178000	NA	4.5 B	NA	<100	NA	5900	<7	NA	<20	NA
	11/6/2004	153 J	NA	<0.2	NA	206	NA	5150 J	NA	<5	NA	<5	NA	249000	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/9/2005	353 J	NA	<0.2	NA	173 J	NA	5620 J	NA	4.3 B	NA	<5	NA	261000	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/7/2006	129 J	NA	<0.2	NA	102	NA	5830 J	NA	< 5	NA	< 5	NA	592000	NA	< 10	NA	6.5 B	NA	NA	< 7	NA	< 20	NA
Recovery Well	7/29/2001	NA	NA	<0.2	NA	311	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	1650	NA	2700	76	NA	1100	NA
RWV20	4/6/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW01-30	5/4/2001	1240	NA	<0.2	NA	109	NA	13000	15900	<5	NA	<5	NA	315000	335000	<10	NA	NA	NA	<1000	<7	NA	<20	NA
	11/8/2001	569	NA	0.093 B	NA	802	NA	13900 J	13500 J L	<5	NA	<5	NA	243000	236000	7.1 B	NA	NA	NA	2900 J	<7	NA	<20	NA
	10/17/2002	902 J	NA	<0.2	NA	237	NA	6750 J	NA	<5	NA	NA	NA	68000	NA	<10	NA	23.5 B	NA	<1000	<7	NA	<20	NA
	11/11/2003	180 J	NA	<0.2	NA	31.1 B	NA	8590 J	NA	<5	NA	<5	NA	166000	NA	<10	NA	30.8 B	NA	<1000	<7	NA	<20	NA
	3/24/2004	276 J	NA	0.082 B J	NA	36.6 B	NA	7090 J	NA	<5	NA	<5	NA	115000	NA	<10	NA	14.9 B	NA	900 B	<7	NA	<20	NA
	11/3/2004	777	NA	0.082 B	NA	181	NA	13300 J	NA	<5	NA	<5	NA	493000	NA	<10	NA	22.4 B	NA	<1000	<7	NA	<20	NA
	11/8/2005	843 J	NA	<0.2	NA	310	NA	14300 J	NA	<5	NA	<5	NA	576000	NA	<10	NA	17.7	NA	NA	<7	NA	7.5 B	NA
	11/1/2006	531 J	NA	<0.2	NA	108	NA	12900 J	NA	< 5	NA	< 5	NA	495000	NA	< 10	NA	22.3 B	NA	NA	< 7	NA	< 20	NA
UAW01-80	5/4/2001	563	NA	<0.2	NA	4.1 B	NA	2140 B	2390 B	<5	NA	<5	NA	51900	53100	<10	NA	NA	NA	<1000	<7	NA	<20	NA
	11/12/2001	527	NA	<0.2	NA	<40	NA	2630 B	2530 B	<5	NA	<5	NA	50300	51300	10.1 J	NA	NA	NA	<1000	<7	NA	<20	NA
	10/17/2002	527 J	NA	<0.2	NA	3.4 B	NA	2340 B J	NA	<5	NA	NA	NA	51000	NA	<10	NA	<100	NA	460 B	<7	NA	<20	NA
	11/11/2003	508 J	NA	<0.2	NA	3.7 B	NA	2370 B J	NA	<5	NA	<5	NA	55300	NA	6.3 B	NA	<100	NA	<1000	<7	NA	<20	NA
	3/24/2004	527 J	NA	0.046 B J	NA	<40	NA	2530 B J	NA	<5	NA	<5	NA	58900	NA	<10	NA	<100	NA	580 B	<7	NA	<20	NA
	11/2/2004	499	NA	0.082 B	NA	<40	NA	2020 B J	NA	<5	NA	<5	NA	55300	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/8/2005	492 J	NA	<0.2	NA	<40	NA	2130 B J	NA	<5	NA	<5	NA	58700	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/1/2006	514 J	NA	<0.2	NA	<40	NA	2240 B J	NA	<5	NA	<5	NA	62500	NA	< 10	NA	< 100	NA	NA	< 7	NA	< 20	NA
UAW02-20	5/7/2001	892	NA	<0.2	NA	27.1 B	NA	6670	6130	<5	NA	<5	NA	496000	446000	7.2 B	NA	NA	NA	<1000	37.3	NA	<20	NA
UAW02-20 (Dup)	5/7/2001	869	NA	<0.2	NA	47.2	NA	6600 L	6280 L	<5	NA	<5	NA	475000	452000	8.5 B	NA	NA	NA	1800	39.2	NA	<20	NA
	11/10/2001	686 J	NA	<0.2	NA	35.9 B	NA	2990 B	2650 B	<5	NA	<5	NA	140000 J	124000 J	<10	NA	NA	NA	<1000	16.6	NA	<20	NA
	10/17/2002	975 J	NA	<0.2	NA	94	NA	6600 J	NA	<5	NA	NA	NA	235000	NA	5.9 B	NA	277	NA	940 B	19.7 J	NA	14.6 B	NA
	11/12/2003	555 J	NA	<0.2	NA	23 B	NA	2410 B J	NA	<5	NA	<5	NA	180000	NA	<10	NA	95 B	NA	<1000	5.1 B	NA	<20	NA
	3/26/2004	878 J	NA	<0.2	NA	22.5 B	NA	4360 B J	NA	<5	NA	<5	NA	337000	NA	9.8 B J	NA	85.2 B	NA	<1000	3.3 B	NA	<20	NA
	11/3/2004	322	NA	0.047 B	NA	4.3 B	NA	2190 B J	NA	<5	NA	<5	NA	199000	NA	<10	NA	50.1 B	NA	<1000	<7	NA	<20	NA
	11/9/2005	363 J	NA	<0.2	NA	7.4 B J	NA	2050 B J	NA	<5	NA	<5	NA	297000	NA	<10	NA	62.7 B	NA	NA	<7	NA	18.9 B	NA
	11/3/2006	407 J	NA	<0.2	NA	7.8 B	NA	3110 B J	NA	< 5	NA	< 5	NA	268000	NA	< 10	NA	46.8 B	NA	NA	< 7	NA	10.6 B J	NA
UAW02-40	5/7/2001	500	NA	<0.2	NA	18.9 B	NA	2420 B	2340 B	<5	NA	<5	NA	99900	99400	<10	NA	NA	NA	<1000	<7	NA	<20	NA
	11/10/2001	652 J	NA	<0.2	NA	31.3 B	NA	2900 B	2860 B	<5	NA	<5	NA	149000 J	145000 J	5.3 B	NA	NA	NA	<1000	<7	NA	<20	NA
	10/17/2002	513 J	NA	<0.2	NA	13.3 B	NA	2530 B J	NA	<5	NA	NA	NA	78400	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/12/2003	531 J	NA	<0.2	NA	6.1 B	NA	2150 B J	NA	<5	NA	<5	NA	46200	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	3/26/2004	600 J	NA	<0.2	NA	3.5 B	NA	2550 B J	NA	<5	NA	<5	NA	45000	NA	8.1 B J	NA	<100	NA	420 B	<7	NA	<20	NA
	11/3/2004	612	NA	0.03 B	NA	4.4 B	NA	2060 B J	NA	<5	NA	<5	NA	43000	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/9/2005	629 J	NA	<0.2	NA	11.5 B J	NA	2740 B J	NA	<5	NA	<5	NA	183000	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/3/2006	563 J	NA	<0.2	NA	2.4 B	NA	2280 B J	NA	< 5	NA	< 5	NA	85100	NA	< 10	NA	< 100	NA	NA	< 7	NA	< 20	NA
UAW02-40 (dup)	11/3/2006	563 J	NA	<0.2	NA	2.8 B	NA	2270 B J E	NA	< 5	NA	< 5	NA	85400	NA	< 10	NA	< 100	NA	NA	< 7	NA	< 20	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW03-20	5/7/2001	2860	NA	<0.2	NA	39.4 B	NA	8740	8150	<5	NA	<5	NA	308000	289000	10	NA	NA	NA	4000	148	NA	54.7	NA
	11/11/2001	1500	NA	0.3	NA	39.5 B	NA	6010	5920	<5	NA	<5	NA	165000	161000	9.2 B J	NA	NA	NA	3700	36.4	NA	<20	NA
	10/23/2002	1170	NA	<0.2	NA	59.6	NA	4200 B J	NA	<5	NA	NA	NA	187000	NA	6 B	NA	1180	NA	3600	54.7	NA	<20	NA
	11/12/2003	1040 J	NA	<0.2	NA	15.4 B	NA	4230 B J	NA	<5	NA	<5	NA	291000	NA	<10	NA	2400	NA	15000	29.4	NA	<20	NA
	3/28/2004	1230 J	NA	<0.2	NA	8.4 B	NA	5550 J	NA	<5	NA	<5	NA	604000	NA	5.5 B J	NA	2350	NA	11000	25.7	NA	<20	NA
	11/4/2004	567 J	NA	<0.2	NA	5.2 B	NA	2930 B J	NA	<5	NA	<5	NA	143000	NA	8 B	NA	296	NA	6100	7.6	NA	<20	NA
UAW03-20 (Dup)	11/4/2004	557 J	NA	<0.2	NA	5.3 B	NA	2870 B J	NA	<5	NA	<5	NA	140000	NA	5.6 B	NA	291	NA	5400	7.1	NA	<20	NA
	11/9/2005	692 J	NA	<0.2	NA	6.0 B J	NA	3590 B J	NA	<5	NA	<5	NA	233000	NA	<10	NA	180	NA	NA	8.3	NA	29.7	NA
	11/6/2006	900 J	NA	0.12 B	NA	16.5 B	NA	2920 B J	NA	< 5	NA	< 5	NA	81200	NA	< 10	NA	67.9 B	NA	NA	13.6	NA	244 J	NA
UAW04-20	5/7/2001	3170	NA	<0.2	NA	28.9 B	NA	7590	7380	<5	NA	<5	NA	291000	285000	11.7	NA	NA	NA	1100	110	NA	14.8 B MBE	NA
	11/11/2001	2000	NA	<0.2	NA	35.3 B	NA	5790	5350	<5	NA	<5	NA	183000	171000	6.1 B J	NA	NA	NA	1200	65.6	NA	<20	NA
	10/20/2002	1350	NA	<0.2	NA	38.2 B	NA	6210 J	NA	<5	NA	NA	NA	252000	NA	<10	NA	2270	NA	1300	91.5	NA	<20	NA
	11/12/2003	1020 J	NA	<0.2	NA	12.4 B	NA	4380 B J	NA	<5	NA	<5	NA	238000	NA	<10	NA	1280	NA	260 B	20.4	NA	<20	NA
	3/28/2004	5050 J	NA	<0.2	NA	6.2 B	NA	2850 B J	NA	<5	NA	<5	NA	137000	NA	<10	NA	591	NA	1000	7.9	NA	17.9 B	NA
	11/3/2004	1720 J	NA	<0.2	NA	<40	NA	1880 B J	NA	<5	NA	<5	NA	124000	NA	6 B	NA	901	NA	1100	5.7 B	NA	<20	NA
	11/9/2005	1380 J	NA	<0.2	NA	5.1 B J	NA	3170 B J	NA	<5	NA	<5	NA	221000	NA	<10	NA	365	NA	NA	5.0 B	NA	15.9 B	NA
	11/6/2006	4080 J	NA	<0.2	NA	3.7 B	NA	1850 B J	NA	< 5	NA	< 5	NA	143000	NA	8.8 B	NA	285	NA	NA	4.4 B	NA	10.5 B J	NA
UAW04-20 (dup)	11/6/2006	3990 J	NA	<0.2	NA	3.3 B	NA	1830 B J	NA	< 5	NA	< 5	NA	141000	NA	5.2 B	NA	283	NA	NA	4.2 B	NA	10.5 B J	NA
UAW05-20	5/6/2001	938	NA	<0.2	NA	15 B	NA	7020	7400	<5	NA	<5	NA	353000	395000	5.4 B	NA	NA	NA	<1000	6.6 B	NA	108 MBD	NA
	10/10/2001	901	NA	<0.2	NA	57.3	NA	3900 B J	4290 B J	<5	NA	<5	NA	219000	245000	8.1 B	NA	425	NA	4300	3 B	NA	<20	NA
	11/12/2001	802	NA	<0.2	NA	24.9 B	NA	4480 B L	4270 B	<5	NA	<5	NA	254000	236000	11.8 J	NA	NA	NA	5000	3.1 B	NA	<20	NA
	10/20/2002	732	NA	<0.2	NA	39.5 B	NA	5230 J	NA	<5	NA	NA	NA	244000	NA	<10	NA	569	NA	10000	5.8 B	NA	<20	NA
	11/10/2003	772 J	NA	<0.2	NA	92	NA	3010 B J	NA	<5	NA	<5	NA	106000	NA	<10	NA	223	NA	<1000	5.8 B	NA	<20	NA
	3/28/2004	820 J	NA	<0.2	NA	4.3 B	NA	2640 B J	NA	<5	NA	<5	NA	149000	NA	<10	NA	99.9 B	NA	5000	0.81 B	NA	<20	NA
UAW05-20 (Dup)	3/28/2004	873 J	NA	<0.2	NA	7.6 B	NA	2870 B J	NA	<5	NA	<5	NA	162000	NA	5.2 B J	NA	107	NA	2200	0.92 B	NA	<20	NA
	11/4/2004	843 J	NA	<0.2	NA	26.1 B	NA	3670 B J	NA	<5	NA	<5	NA	249000	NA	<10	NA	257	NA	12000	2.2 B	NA	<20	NA
	11/14/2005	929 J	NA	<0.2	NA	300	NA	6410	NA	<5	NA	<5	NA	471000	NA	<10	NA	455	NA	NA	10.9	NA	7.3 U	NA
	11/9/2006	636 J	NA	0.091 B	NA	662	NA	5110 J	NA	< 5	NA	< 5	NA	190000	NA	< 10	NA	204	NA	NA	17.8	NA	48.5 J	NA
UAW06-20	5/6/2001	1580	NA	<0.2	NA	29.6 B	NA	7400	8270	<5	NA	<5	NA	218000	245000	<10	NA	NA	NA	<1000	127	NA	15.7 B MBE	NA
	10/10/2001	2590	NA	<0.2	NA	25 B	NA	6430 J	5480 J	<5	NA	<5	NA	309000	264000	5.6 B	NA	NA	NA	2300	106	NA	22.8	NA
	11/13/2001	3000 J	NA	<0.2	NA	24.5 B	NA	6820 J	6190 J	<5	NA	<5	NA	368000 J	335000 J	<10	NA	NA	NA	7200	119	NA	21.9 J	NA
	10/20/2002	1410	NA	<0.2	NA	28.3 B	NA	5610 J	NA	<5	NA	NA	NA	407000	NA	<10	NA	11100	NA	7800	76.4	NA	19 B	NA
	11/12/2003	1040 J	NA	<0.2	NA	12.6 B	NA	4920 B J	NA	<5	NA	<5	NA	391000	NA	<10	NA	6040	NA	11000	35.8	NA	<20	NA
	3/29/2004	1160 J	NA	<0.2	NA	7.4 B	NA	3870 B J	NA	<5	NA	<5	NA	460000	NA	<10	NA	3700	NA	6300	32.2	NA	<20	NA
	11/4/2004	1480 J	NA	<0.2	NA	7 B	NA	4900 B J	NA	<5	NA	<5	NA	332000	NA	12.2	NA	2460	NA	6100	20.2	NA	<20	NA
	11/15/2005	1550	NA	<0.2	NA	15.0 B	NA	5210 J	NA	<5	NA	<5	NA	341000	NA	<10	NA	2010	NA	NA	26.9	NA	20	NA
	11/9/2006	1370 J	NA	<0.2	NA	11.8 B	NA	4420 B J	NA	< 5	NA	< 5	NA	220000	NA	< 10	NA	1440	NA	NA	13.3	NA	22.8 J	NA

Table B-4
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Cincinnati, Ohio
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Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW07-20	5/8/2001	NA	NA	<0.2	NA	2.5 B	NA	11500	10800	<5	NA	<5	NA	413000	397000	10.6	NA	866	NA	5800	3.2 B	NA	12.4 B	NA
UAW07-20 (Dup)	5/8/2001	NA	NA	<0.2	NA	2.3 B	NA	12100	11600	<5	NA	<5	NA	432000	417000	8.3 B	NA	1010	NA	7500	3.9 B	NA	<20	NA
	11/15/2001	NA	NA	<0.2	NA	2.3 B	NA	NA	10800	<5	NA	<5	NA	NA	395000	9.6 B J	NA	706 L	NA	1600	3.1 B	NA	<20	NA
	10/20/2002	729	NA	<0.2	NA	<40	NA	11800 J	NA	<5	NA	NA	NA	374000	NA	<10	NA	778	NA	14000	3.8 B	NA	<20	NA
	11/12/2003	885 J	NA	<0.2	NA	4.2 B	NA	11600 J	NA	<5	NA	<5	NA	406000	NA	<10	NA	591	NA	21000	2.5 B	NA	31.3 J	NA
UAW07-20 (Dup)	11/12/2003	781 J	NA	<0.2	NA	2.4 B	NA	10100 J	NA	<5	NA	<5	NA	362000	NA	<10	NA	526	NA	25000	2.1 B	NA	<20	NA
	4/5/2004	1410	NA	<0.2	NA	2.5 B	NA	5750 J	NA	<5	NA	<5	NA	228000	NA	6.8 B	NA	180	NA	11000	2.2 B	NA	<20	NA
	11/4/2004	852 J	NA	<0.2	NA	<40	NA	11100	NA	<5	NA	<5	NA	468000	NA	4.8 B	NA	574	NA	22000	2.7 B	NA	<20	NA
	11/15/2005	1000	NA	<0.2	NA	3.6 B	NA	11700 J	NA	<5	NA	<5	NA	514000	NA	<10	NA	819	NA	NA	3.1 B	NA	<20	NA
	11/6/2006	813 J	NA	<0.2	NA	9.8 B	NA	5190 J	NA	< 5	NA	< 5	NA	191000	NA	< 10	NA	237	NA	NA	2.7 B	NA	25.6 J	NA
UAW08-20	5/6/2001	NA	NA	<0.2	NA	30.5 B	NA	17700	20200	<5	NA	<5	NA	523000	596000	9.8 B	NA	3420	NA	3100	11.2	NA	45.1 MBD	NA
	11/13/2001	NA	NA	<0.2	NA	53.4	NA	21300 J	18900 J L	<5	NA	<5	NA	401000 J	400000 J	<10	NA	6090	NA	7900	27.1	NA	132 J	NA
	10/20/2002	596	NA	<0.2	NA	11.5 B	NA	17400 J	NA	<5	NA	NA	NA	407000	NA	7.1 B	NA	6110	NA	22000	13	NA	21.8	NA
	11/10/2003	2310 J	NA	<0.2	NA	118	NA	20900 J	NA	<5	NA	<5	NA	539000	NA	5.9 B	NA	4500	NA	69000	74.7	NA	352 J	NA
	3/29/2004	550 J	NA	<0.2	NA	8.5 B	NA	18100 J	NA	<5	NA	<5	NA	691000	NA	<10	NA	6410	NA	16000	10	NA	20.5	NA
	11/4/2004	632 J	NA	<0.2	NA	7.9 B	NA	17700 J	NA	<5	NA	<5	NA	493000	NA	8.4 B	NA	5740	NA	<1000	12	NA	14.3 B	NA
	11/15/2005	679	NA	<0.2	NA	10.8 B	NA	18600 J	NA	3.8 B	NA	<5	NA	550000	NA	<10	NA	6070	NA	NA	11.7	NA	19.5 B	NA
	11/9/2006	613 J	NA	<0.2	NA	17.9 B	NA	18200 J	NA	< 5	NA	< 5	NA	529000	NA	< 10	NA	4950	NA	NA	19.5	NA	49.4 J	NA
UAW09-20	5/5/2001	12.4 B	NA	<0.2	NA	<40	NA	1720 B	1850 B	<5	NA	<5	NA	63200	62400	<10	NA	NA	NA	<1000	<7	NA	<20	NA
	11/9/2001	17.1 J	NA	<0.2	NA	81.9	NA	2420 B	2220 B	<5	NA	<5	NA	92500 J	84300 J	<10	NA	NA	NA	1800	<7	NA	<20	NA
	10/16/2002	3.6 B J	NA	<0.2	NA	10.8 B	NA	2880 B J	NA	<5	NA	NA	NA	59500	NA	8.8 B	NA	<100	NA	970 B J	0.82 B	NA	<20	NA
	11/11/2003	1.1 B J	NA	<0.2	NA	10.4 B	NA	2130 B J	NA	<5	NA	<5	NA	83800	NA	<10	NA	<100	NA	<1000	<7	NA	16.8 B J	NA
	4/6/2004	1.4 B	NA	<0.2	NA	6.6 B	NA	1760 B J	NA	<5	NA	<5	NA	65000	NA	5.7 B	NA	18.5 B	NA	960 B	<7	NA	<20	NA
	11/6/2004	121 J	NA	<0.2	NA	6.4 B	NA	1370 B J	NA	<5	NA	<5	NA	17900	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/9/2005	3 B J	NA	<0.2	NA	15.3 B J	NA	2000 B J	NA	3.7 B	NA	<5	NA	117000	NA	7.3 B J	NA	<100	NA	NA	<7	NA	<20	NA
	11/3/2006	23.8 J	NA	<0.2	NA	78.9	NA	1500 B J	NA	< 5	NA	< 5	NA	63900	NA	< 10	NA	5.4 B	NA	NA	< 7	NA	< 20	NA
UAW09-60	5/5/2001	348	NA	<0.2	NA	5.5 B	NA	1400 B	1610 B	<5	NA	<5	NA	17600	14700	<10	NA	NA	NA	<1000	<7	NA	<20	NA
	11/9/2001	226 J	NA	<0.2	NA	<40	NA	1740 B	1930 B	<5	NA	<5	NA	22800 J	24500 J	6 B	NA	NA	NA	1500	<7	NA	<20	NA
	10/16/2002	298 J	NA	<0.2	NA	22.7 B	NA	2020 B J E	NA	<5	NA	NA	NA	23900	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/11/2003	236 J	NA	<0.2	NA	19.5 B	NA	1970 B J	NA	<5	NA	<5	NA	20600	NA	<10	NA	<100	NA	260 B	<7	NA	<20	NA
	4/6/2004	311	NA	<0.2	NA	9.4 B	NA	1540 B J	NA	<5	NA	<5	NA	16800	NA	5 B	NA	<100	NA	1100	<7	NA	<20	NA
	11/6/2004	<15	NA	<0.2	NA	6.1 B	NA	1770 B J	NA	<5	NA	<5	NA	56700	NA	<10	NA	<100	NA	<1000	<7	NA	39.1	NA
	11/9/2005	12.3 B J	NA	<0.2	NA	6 B J	NA	1370 B J	NA	<5	NA	<5	NA	16100	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/3/2006	121 J	NA	<0.2	NA	2.2 B	NA	1350 B J	NA	< 5	NA	< 5	NA	15900	NA	5.3 B	NA	< 100	NA	NA	< 7	NA	< 20	NA

Table B-4
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Cincinnati, Ohio
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Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW10-50	10/12/2001	1210	NA	<0.2	NA	61.8	NA	13400 J	4270 B J	<5	NA	2.5 B	NA	67800	69300	7.9 B J	NA	NA	NA	<1000	65.2	NA	164	NA
	11/13/2001	469 J	NA	0.095 B	NA	15.3 B	NA	4260 B J	3900 B J	<5	NA	<5	NA	60400 J	54500 J	<10	NA	NA	NA	1500	<7	NA	25.3 J	NA
	10/19/2002	559	NA	<0.2	NA	14.4 B	NA	3740 B J	NA	<5	NA	NA	NA	47000	NA	5.5 B	NA	<100	NA	780 B	5.8 B	NA	28.1	NA
	11/10/2003	490 J	NA	<0.2	NA	9.7 B	NA	3350 B J	NA	<5	NA	<5	NA	45700	NA	<10	NA	7.9 B	NA	<1000	4.4 B	NA	19.6 B J	NA
	3/30/2004	356 J	NA	<0.2	NA	12.8 B	NA	3160 B J	NA	<5	NA	<5	NA	55100	NA	6 B	NA	<100	NA	<1000	4.4 B	NA	20.6	NA
	11/5/2004	403 J	NA	<0.2	NA	10.9 B	NA	2900 B J	NA	<5	NA	1.1 B	NA	50000	NA	<10	NA	<100	NA	<1000	3.7 B	NA	18.3 B	NA
	11/11/2005	404 J	NA	<0.2	NA	9.8 B	NA	3460 B	NA	<5	NA	<5	NA	47600	NA	<10	NA	<100	NA	NA	6.1 B	NA	31.3 J	NA
	11/9/2006	354 J	NA	<0.2	NA	23.2 B	NA	5210 J	NA	< 5	NA	9.9	NA	46400	NA	< 10	NA	20.2 B	NA	NA	11.6	NA	40.2 J	NA
UAW10-80	10/12/2001	3360	NA	<0.2	NA	75.3	NA	5680 J	5970 J	<5	NA	<5	NA	40800	44300	7.5 B J	NA	NA	NA	<1000	2.9 B	NA	30.3	NA
	11/13/2001	3560 J	NA	0.091 B	NA	9.7 B	NA	7990 J	8200 J	<5	NA	<5	NA	41000 J	45600 J	<10	NA	NA	NA	2200	<7	NA	38 J	NA
	10/19/2002	972	NA	<0.2	NA	36 B	NA	3320 B J	NA	<5	NA	NA	NA	12700	NA	6.3 B	NA	<100	NA	620 B	8.1	NA	29.2	NA
	11/13/2003	1040 J	NA	<0.2	NA	129	NA	4990 B J	NA	<5	NA	<5	NA	14800	NA	<10	NA	<100	NA	260 B	22	NA	55.9 J	NA
	3/30/2004	691 J	NA	<0.2	NA	16.4 B	NA	2140 B J	NA	<5	NA	<5	NA	14300	NA	<10	NA	<100	NA	890 B	1.4 B	NA	<20	NA
	11/5/2004	789 J	NA	<0.2	NA	19.2 B	NA	2900 B	NA	<5	NA	<5	NA	13800	NA	9.2 B	NA	<100	NA	800 B	9.1	NA	31.6	NA
	11/16/2005	440	NA	<0.2	NA	8.3 B	NA	1980 B J	NA	<5	NA	<5	NA	14800	NA	<10	NA	15.5 B	NA	NA	<7	NA	<20	NA
	11/9/2006	386 J	NA	<0.2	NA	2.6 B	NA	1800 B J	NA	< 5	NA	< 5	NA	12800	NA	< 10	NA	10.2 B	NA	NA	< 7	NA	6.9 B J	NA
UAW11-10	5/8/2001	8440	NA	0.21	NA	240	NA	8730	5660	<5	NA	<5	NA	2230000	1500000	<10	NA	NA	NA	2700	113	NA	310	NA
	11/10/2001	470 J	NA	0.13 B	NA	39.3 B	NA	7700	8050	<5	NA	<5	NA	440000 J	454000 J	7 B	NA	NA	NA	1300	15.6	NA	22.4 J	NA
	10/18/2002	2630 J	NA	<0.2	NA	12.2 B	NA	5310 J	NA	<5	NA	NA	NA	201000	NA	<10	NA	4060	NA	9200	12.6 J	NA	<20	NA
	11/16/2003	2800 J	NA	<0.2	NA	7.9 B J	NA	5510 J	NA	<5	NA	<5	NA	293000	NA	8.6 B J	NA	1450	NA	2900	5.9 B	NA	<20	NA
	4/6/2004	4230	NA	<0.2	NA	8.9 B	NA	6450 J	NA	<5	NA	<5	NA	484000	NA	5.9 B	NA	1950	NA	9000	16	NA	<20	NA
	11/7/2004	1190	NA	<0.2	NA	<40	NA	2690 B J	NA	<5	NA	<5	NA	198000	NA	5.3 B	NA	1660	NA	14000	4.1 B	NA	<20	NA
	11/10/2005	2700 J	NA	<0.2	NA	4.2 B J	NA	29800 J	NA	<5	NA	<5	NA	286000	NA	<10	NA	3560	NA	NA	4.7 B	NA	13.4 B	NA
	11/2/2006	2180 J	NA	<0.2	NA	4.9 B	NA	9230 J	NA	< 5	NA	< 5	NA	514000	NA	5.3 B	NA	3050	NA	NA	22.3	NA	25.4 J	NA
UAW11-40	5/8/2001	1130	NA	<0.2	NA	49.4	NA	5680	5780	<5	NA	<5	NA	239000	248000	8.2 B	NA	NA	NA	960 B	0.91 B	NA	<20	NA
	11/12/2001	1150	NA	<0.2	NA	66.5	NA	5770	5530	<5	NA	<5	NA	253000	244000	7.8 B J	NA	NA	NA	<1000	<7	NA	<20	NA
	10/18/2002	1040 J	NA	<0.2	NA	73.2	NA	6200 J	NA	<5	NA	NA	NA	258000	NA	9.5 B	NA	70.7 B	NA	<1000	<7	NA	<20	NA
	11/16/2003	904 J	NA	<0.2	NA	86 J	NA	6410 J	NA	<5	NA	<5	NA	273000	NA	10.9 J	NA	48.7 B	NA	<1000	<7	NA	<20	NA
	4/6/2004	966	NA	<0.2	NA	53.1	NA	6040 J	NA	<5	NA	<5	NA	285000	NA	7.3 B	NA	62.2 B	NA	640 B	<7	NA	<20	NA
UAW11-40 (Dup)	4/6/2004	903	NA	<0.2	NA	49.3	NA	5920 J	NA	<5	NA	<5	NA	278000	NA	7.3 B	NA	51.7 B	NA	800 B	<7	NA	<20	NA
	11/7/2004	1050	NA	<0.2	NA	55.7	NA	6820 J	NA	<5	NA	<5	NA	317000	NA	6.7 B	NA	47.2 B	NA	<1000	<7	NA	<20	NA
	11/10/2005	1010 J	NA	<0.2	NA	79.7 J	NA	5920 J	NA	<5	NA	<5	NA	297000	NA	<10	NA	73.1 B	NA	NA	<7	NA	7.0 B	NA
	11/2/2006	1520 J	NA	<0.2	NA	87	NA	6070 J	NA	< 5	NA	< 5	NA	269000	NA	< 10	NA	58.9 B	NA	NA	< 7	NA	22.1 J	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW12-20	5/6/2001	NA	NA	<0.2	NA	18.2 B	NA	10500	9700	<5	NA	<5	NA	485000	455000	14.4	NA	66.9 B	NA	<1000	2.8 B	NA	29.8 MBD	NA
	11/15/2001	NA	NA	<0.2	NA	5.3 B	NA	NA	8090	<5	NA	<5	NA	NA	348000	12.1 J	NA	82.9 B	NA	2000	6 B	NA	<20	NA
	10/20/2002	4940	NA	<0.2	NA	3.2 B	NA	10100 J	NA	<5	NA	NA	NA	356000	NA	8.1 B	NA	255	NA	4800	5.2 B	NA	<20	NA
	11/12/2003	5220 J	NA	<0.2	NA	5.4 B	NA	8310 J	NA	<5	NA	<5	NA	632000	NA	<10	NA	105	NA	7500	2.1 B	NA	13.7 B J	NA
	3/28/2004	9570 J	NA	<0.2	NA	<40	NA	8250 J	NA	<5	NA	<5	NA	765000	NA	<10	NA	101	NA	1000	2.7 B	NA	<20	NA
	11/4/2004	6000 J	NA	<0.2	NA	2.5 B	NA	9160	NA	<5	NA	<5	NA	589000	NA	<10	NA	78.8 B	NA	4200	2.5 B	NA	<20	NA
	11/14/2005	4920 J	NA	<0.2	NA	3.1 B	NA	11200	NA	<5	NA	<5	NA	844000	NA	<10	NA	33.3 B	NA	NA	2.2 B	NA	7.7 U	NA
	11/6/2006	4820 J	NA	<0.2	NA	3.9 B	NA	13700 J	NA	< 5	NA	< 5	NA	726000	NA	7.8 B	NA	71.2 B	NA	NA	2 B	NA	56.1 J	NA
UAW13-20	5/6/2001	NA	NA	<0.2	NA	12.4 B	NA	10400	9990	<5	NA	<5	NA	491000	488000	5 B	NA	1060	NA	5800	14.8	NA	22.1 MBD	NA
	11/15/2001	NA	NA	0.11 B	NA	23.2 B	NA	NA	13300	<5	NA	<5	NA	NA	948000	16.6 J	NA	1930	NA	2800	16.4	NA	23.7	NA
	10/23/2002	2750	NA	<0.2	NA	19.2 B	NA	12200 J	NA	<5	NA	NA	NA	947000	NA	5.5 B	NA	2330	NA	14000	13.1	NA	<20	NA
	11/12/2003	2760 J	NA	<0.2	NA	16.6 B	NA	12600 J	NA	<5	NA	<5	NA	757000	NA	<10	NA	1710	NA	150000	12.3	NA	<20	NA
	3/28/2004	3140 J	NA	<0.2	NA	12.2 B	NA	10800 J	NA	<5	NA	<5	NA	871000	NA	<10	NA	1780	NA	8900	12.7	NA	16.7 B	NA
	11/5/2004	2840 J	NA	<0.2	NA	16.5 B	NA	11700	NA	<5	NA	<5	NA	578000	NA	<10	NA	1870	NA	160000	13.9	NA	19.9 B	NA
	11/16/2005	2810	NA	<0.2	NA	11.8 B	NA	9670 J	NA	<5	NA	<5	NA	558000	NA	<10	NA	1880	NA	NA	11.8	NA	8.5 J	NA
	10/31/2006	3180 J	NA	<0.2	NA	10.8 B	NA	10600 J	NA	< 5	NA	< 5	NA	701000	NA	< 10	NA	1780	NA	NA	9.7	NA	11.7 B J	NA
UAW14-10	5/5/2001	53.8	NA	<0.2	NA	6.1 B	NA	1270 B	1300 B	<5	NA	<5	NA	36500	35800	<10	NA	NA	NA	1500	<7	NA	<20	NA
	11/9/2001	26.4 J	NA	<0.2	NA	3.4 B	NA	1530 B	1510 B	<5	NA	<5	NA	37900 J	37500 J	<10	NA	NA	NA	1200	<7	NA	<20	NA
	10/16/2002	100 J	NA	<0.2	NA	4 B	NA	1620 B J	NA	<5	NA	NA	NA	31400	NA	8.9 B	NA	<100	NA	<1000	1 B	NA	<20	NA
	11/16/2003	60.1 J	NA	<0.2	NA	6.8 B J	NA	1820 B J	NA	4.1 B	NA	1.3 B	NA	30900	NA	15.3 J	NA	4.7 B	NA	<1000	<7	NA	<20	NA
	4/5/2004	72.5	NA	<0.2	NA	20.5 B	NA	1120 B J	NA	<5	NA	<5	NA	22900	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/6/2004	31.2 J	NA	<0.2	NA	4.7 B	NA	1370 B J	NA	<5	NA	<5	NA	33000	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/16/2005	59.7	NA	<0.2	NA	1.8 B	NA	1080 B J	NA	2.4 B	NA	<5	NA	25200	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/8/2006	50.3 J	NA	<0.2	NA	1.8 B	NA	1280 B J	NA	< 5	NA	< 5	NA	30200	NA	< 10		< 100	NA	NA	< 7	NA	< 20	NA
UAW15-20	5/6/2001	397	NA	<0.2	NA	55.1	NA	2430 B	2490 B	<5	NA	<5	NA	421000	443000	6.2 B	NA	NA	NA	<1000	<7	NA	23 MBD	NA
	11/11/2001	231	NA	<0.2	NA	102	NA	3060 B	2840 B	<5	NA	<5	NA	506000	480000	14 J	NA	NA	NA	<1000	<7	NA	<20	NA
	10/18/2002	16.1	NA	<0.2	NA	57.5	NA	1930 B J	NA	<5	NA	NA	NA	281000	NA	7.4 B	NA	261	NA	<1000	<7	NA	<20	NA
	11/17/2003	60.3 J	NA	<0.2	NA	66.3 J	NA	4610 B J	NA	<5	NA	<5	NA	990000	NA	11.7 J	NA	131	NA	<1000	<7	NA	<20	NA
	4/7/2004	102	NA	<0.2	NA	374	NA	7100 J	NA	<5	NA	<5	NA	1480000	NA	5.6 B	NA	80.7 B	NA	640 B	<7	NA	22.8	NA
	11/7/2004	104	NA	<0.2	NA	155	NA	6590 J	NA	<5	NA	<5	NA	1290000	NA	<10	NA	104	NA	<1000	<7	NA	<20	NA
	11/15/2005	85.3	NA	<0.2	NA	166	NA	5900 J E	NA	2.9 B	NA	<5	NA	1180000	NA	<10	NA	216 E	NA	NA	<7	NA	<20	NA
	11/2/2006	114 J	NA	<0.2	NA	415	NA	6680 J	NA	< 5	NA	< 5	NA	1400000	NA	< 10	NA	110	NA	NA	< 7	NA	6.9 B J	NA

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Cincinnati, Ohio
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Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW15-50	5/6/2001	735	NA	<0.2	NA	130	NA	9520	7590	<5	NA	<5	NA	261000	218000	6.1 B	NA	NA	NA	<1000	<7	NA	24.6	NA
	11/11/2001	653	NA	0.18 B	NA	102	NA	8780	7910	<5	NA	<5	NA	253000	234000	16.7 J	NA	NA	NA	<1000	<7	NA	<20	NA
	10/18/2002	588	NA	<0.2	NA	76.4	NA	7280 J	NA	<5	NA	NA	NA	210000	NA	6.6 B	NA	2400	NA	460 B	<7	NA	<20	NA
	11/17/2003	682 J	NA	<0.2	NA	84.7 J	NA	7320 J	NA	<5	NA	<5	NA	202000	NA	9.4 B J	NA	2050	NA	1600	<7	NA	<20	NA
	4/7/2004	543	NA	<0.2	NA	85.8	NA	6400 J	NA	<5	NA	<5	NA	182000	NA	8.7 B	NA	2110	NA	1100	<7	NA	15.8 B	NA
	11/7/2004	665	NA	<0.2	NA	74.9	NA	6090 J	NA	<5	NA	<5	NA	165000	NA	7.5 B	NA	1950	NA	8400	<7	NA	18.7 B	NA
UAW15-50 (Dup)	11/7/2004	644	NA	<0.2	NA	72.6	NA	5940 J	NA	<5	NA	<5	NA	160000	NA	<10	NA	2010	NA	2000	<7	NA	<20	NA
	11/15/2005	630	NA	<0.2	NA	73.7	NA	5380 J	NA	<5	NA	<5	NA	142000	NA	<10	NA	2140	NA	NA	<7	NA	9.6 B	NA
	11/2/2006	592 J	NA	<0.2	NA	58.6	NA	6360 J	NA	< 5	NA	< 5	NA	150000	NA	6.9 B	NA	1830	NA	NA	< 7	NA	12.7 B J	NA
UAW16-10	10/12/2001	2760	NA	<0.2	NA	17.1 B	NA	7420 J	7400 J	<5	NA	<5	NA	277000	276000	5.5 B J	NA	NA	NA	3900	59.3	NA	<20	NA
UAW16-10 (Dup)	10/12/2001	2740	NA	<0.2	NA	17.5 B	NA	7310 J	7360 J	<5	NA	<5	NA	275000	278000	8.6 B J	NA	NA	NA	6300	59.1	NA	<20	NA
	11/13/2001	2390 J	NA	<0.2	NA	12.7 B	NA	9650 J	8630 J	<5	NA	<5	NA	281000 J	244000 J	<10	NA	NA	NA	2500	29.1	NA	<20	NA
	10/18/2002	4460 J	NA	<0.2	NA	24.3 B	NA	10500 J	NA	<5	NA	NA	NA	367000	NA	8.9 B	NA	741	NA	7800	5.7 B J	NA	<20	NA
	11/16/2003	3180 J	NA	<0.2	NA	17.1 B J	NA	7040 J	NA	<5	NA	1.3 B	NA	242000	NA	8.5 B J	NA	665	NA	1800	4.1 B	NA	<20	NA
UAW16-10 (Dup)	11/17/2003	3300 J	NA	<0.2	NA	18.3 B J	NA	7290 J	NA	<5	NA	1.3 B	NA	250000	NA	11.9 J	NA	694	NA	1800	4.3 B	NA	<20	NA
	4/7/2004	3130	NA	<0.2	NA	15.3 B	NA	6380 J	NA	<5	NA	<5	NA	200000	NA	6.8 B	NA	602	NA	1100	1.6 B	NA	<20	NA
	11/7/2004	2520	NA	<0.2	NA	<40	NA	5150 J	NA	<5	NA	<5	NA	127000	NA	<10	NA	623	NA	4400	0.8 B	NA	<20	NA
	11/15/2005	2260	NA	<0.2	NA	7.2 B	NA	4950 B J	NA	<5	NA	<5	NA	166000	NA	<10	NA	2000	NA	NA	2.0 B	NA	<20	NA
	11/6/2006	1690 J	NA	<0.2	NA	6.8 B	NA	6580 J	NA	< 5	NA	< 5	NA	211000	NA	< 10	NA	1060	NA	NA	2.1 B	NA	< 20	NA
UAW17-40	5/5/2001	242	NA	<0.2	NA	12.5 B	NA	1900 B	2020 B	<5	NA	<5	NA	17400	18300	<10	NA	NA	NA	<1000	1.5 B	NA	<20	NA
	11/9/2001	301 J	NA	<0.2	NA	5 B	NA	1720 B	1750 B	<5	NA	<5	NA	13100 J	13300 J	<10	NA	NA	NA	<1000	0.92 B	NA	<20	NA
	10/16/2002	268 J	NA	<0.2	NA	5.3 B	NA	1480 B J	NA	<5	NA	NA	NA	11100	NA	<10	NA	<100	NA	5400	1.2 B J	NA	<20	NA
	11/16/2003	241 J	NA	<0.2	NA	6.9 B J	NA	1330 B J E	NA	<5	NA	<5	NA	10700	NA	12.7 J	NA	<100	NA	<1000	<7	NA	<20	NA
	3/31/2004	148 J	NA	<0.2	NA	3.9 B	NA	1390 B J E	NA	<5	NA	<5	NA	11300	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/6/2004	250 J	NA	<0.2	NA	<40	NA	948 B J	NA	<5	NA	<5	NA	10500	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/14/2005	266 J	NA	<0.2	NA	1.4 B	NA	817 B	NA	<5	NA	<5	NA	9590	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	10/31/2006	309 J	NA	<0.2	NA	< 40	NA	966 B J	NA	< 5	NA	< 5	NA	10300	NA	< 10	NA	< 100	NA	NA	< 7	NA	< 20	NA
UAW18-20	10/12/2001	1220	NA	<0.2	NA	28.8 B	NA	6060 J	6200 J	<5	NA	<5	NA	1520000	1490000	5.8 B J	NA	NA	NA	3100	1.7 B	NA	<20	NA
UAW18-20	11/13/2001	1130 J	NA	<0.2	NA	28.6 B	NA	6120 J	5510 J	<5	NA	<5	NA	1720000 J	1610000 J	<10	NA	NA	NA	2200	<7	NA	<20	NA
	10/18/2002	282 J	NA	<0.2	NA	16.3 B	NA	1830 B J	NA	<5	NA	NA	NA	487000	NA	<10	NA	1670	NA	3000	1.8 B J	NA	<20	NA
	11/16/2003	685 J	NA	<0.2	NA	37.6 B J	NA	6240 J	NA	<5	NA	1.2 B	NA	1040000	NA	12.5 J	NA	2000	NA	800 B	1.5 B	NA	<20	NA
	4/7/2004	1900	NA	<0.2	NA	33.4 B	NA	6950 J	NA	<5	NA	<5	NA	905000	NA	8.4 B	NA	1710	NA	960 B	1.2 B	NA	<20	NA
	11/7/2004	5390	NA	<0.2	NA	62.8	NA	7970 J	NA	<5	NA	<5	NA	1200000	NA	5 B	NA	2040	NA	4600	3.5 B	NA	<20	NA
	11/15/2005	460	NA	<0.2	NA	6.3 B	NA	1620 B J	NA	4.6 B	NA	<5	NA	111000	NA	<10	NA	152	NA	NA	<7	NA	53.8	NA
	11/6/2006	1050 J	NA	<0.2	NA	13.4 B	NA	2340 B J	NA	< 5	NA	< 5	NA	537000	NA	< 10	NA	3660	NA	NA	< 7	NA	12.2 B J	NA

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Cincinnati, Ohio
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Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW19-80	5/6/2001	117	NA	<0.2	NA	11.7 B	NA	1970 B	1780 B	<5	NA	<5	NA	53000	51200	<10	NA	NA	NA	990 B	<7	NA	18.4 B	NA
	11/12/2001	60.9	NA	<0.2	NA	14.1 B	NA	2020 B	1850 B	<5	NA	<5	NA	58700	59400	10.3 J	NA	NA	NA	<1000	1 B	NA	<20	NA
UAW19-80 (Dup)	11/12/2001	1190	NA	<0.2	NA	66.3	NA	5960	5750	<5	NA	<5	NA	261000	254000	8.2 B J	NA	NA	NA	<1000	<7	NA	<20	NA
	10/17/2002	27.8 J	NA	<0.2	NA	6.2 B	NA	2130 B J	NA	<5	NA	NA	NA	60100	NA	7.6 B	NA	<100	NA	300 B	1 B J	NA	<20	NA
UAW19-80 (Dup)	10/17/2002	26.9 J	NA	<0.2	NA	5.8 B	NA	2090 B J	NA	<5	NA	NA	NA	59700	NA	5.9 B	NA	<100	NA	620 B	1.1 B J	NA	<20	NA
	11/13/2003	17.5 J	NA	<0.2	NA	10.8 B	NA	1870 B J	NA	<5	NA	<5	NA	59600	NA	<10	NA	<100	NA	420 B	<7	NA	<20	NA
	3/30/2004	28.4 J	NA	<0.2	NA	<40	NA	1830 B J	NA	<5	NA	<5	NA	62400	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/5/2004	12.8 B J	NA	<0.2	NA	3.4 B	NA	1880 B	NA	<5	NA	<5	NA	63900	NA	<10	NA	<100	NA	640 B	<7	NA	<20	NA
UAW19-80N	11/11/2005	17.8 J	NA	<0.2	NA	2.0 B	NA	1890 B	NA	<5	NA	<5	NA	69200	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
UAW19-80FD(DUP)	11/11/2005	17.0 J	NA	<0.2	NA	1.7 B	NA	1870 B	NA	<5	NA	<5	NA	67900	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/8/2006	80.2 J	NA	<0.2	NA	4.4 B	NA	2280 B J	NA	< 5	NA	< 5	NA	68800	NA	< 10	NA	< 100	NA	NA	3.1 B	NA	10 B J	NA
UAW20-60	5/7/2001	366	NA	<0.2	NA	18.4 B	NA	4060 B	3640 B	<5	NA	<5	NA	128000	162000	7.4 B	NA	NA	NA	960 B	<7	NA	14.4 B MBE	NA
	11/14/2001	303	NA	<0.2	NA	8.7 B	NA	3640 B	3530 B	<5	NA	<5	NA	139000	134000	13.8	NA	NA	NA	1600	<7	NA	<20	NA
UAW20-60 (Dup)	11/14/2001	303	NA	<0.2	NA	8.9 B	NA	3550 B L	3610 B	<5	NA	<5	NA	137000	137000	10.3	NA	NA	NA	1800	<7	NA	<20	NA
	10/19/2002	179	NA	<0.2	NA	7.1 B	NA	2350 B J	NA	<5	NA	NA	NA	114000	NA	5.5 B	NA	15 B	NA	<1000	<7	NA	<20	NA
UAW20-60 (Dup)	10/19/2002	696	NA	<0.2	NA	38.2 B	NA	4970 B J	NA	<5	NA	NA	NA	234000	NA	6.6 B	NA	547	NA	<1000	5.2 B	NA	<20	NA
	11/13/2003	111 J	NA	<0.2	NA	7.1 B	NA	2240 B J	NA	<5	NA	<5	NA	99100	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	3/30/2004	96.3 J	NA	<0.2	NA	21.6 B	NA	2080 B J	NA	<5	NA	<5	NA	103000	NA	<10	NA	9 B	NA	1400	<7	NA	<20	NA
	11/5/2004	95.3 J	NA	<0.2	NA	6.5 B	NA	2250 B	NA	<5	NA	<5	NA	104000	NA	7.9 B	NA	<100	NA	<1000	<7	NA	<20	NA
	11/11/2005	127 J	NA	<0.2	NA	7.0 B	NA	2460 B	NA	<5	NA	<5	NA	109000	NA	<10	NA	<100	NA	NA	<7	NA	9.5 U	NA
	11/7/2006	94.7 J	NA	<0.2	NA	8.2 B	NA	1960 B J	NA	< 5	NA	< 5	NA	85200	NA	5.3 B	NA	9.8 B	NA	NA	< 7	NA	8.3 B J	NA
UAW21-30	5/5/2001	82.8	NA	<0.2	NA	17.7 B	NA	5210	6420	<5	NA	<5	NA	284000	347000	<10	NA	NA	NA	<1000	0.95 B	NA	<20	NA
	11/11/2001	152	NA	<0.2	NA	170	NA	3610 B	2820 B	<5	NA	<5	NA	53500	54100	6.7 B J	NA	NA	NA	<1000	6.4 B	NA	30	NA
	10/18/2002	340 J	NA	<0.2	NA	623	NA	3410 B J	NA	<5	NA	NA	NA	47800	NA	6.4 B	NA	<100	NA	460 B	4.9 B J	NA	<20	NA
	11/11/2003	174 J	NA	<0.2	NA	103	NA	4350 B J	NA	<5	NA	<5	NA	48100	NA	9 B	NA	<100	NA	<1000	9	NA	29.8 J	NA
	3/27/2004	108 J	NA	<0.2	NA	171	NA	3560 B J	NA	8.7	NA	<5	NA	37800	NA	7.3 B J	NA	<100	NA	1000	3 B	NA	<20	NA
	11/3/2004	126	NA	<0.2	NA	518	NA	3460 B J	NA	4.3 B	NA	<5	NA	46200	NA	<10	NA	19.4 B	NA	<1000	3.1 B	NA	14.3 B	NA
	11/9/2005	67.3 J	NA	<0.2	NA	600 J	NA	3570 B J	NA	3.6 B	NA	<5	NA	78800	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/9/2006	1200 J	NA	<0.2	NA	1950	NA	5410 J	NA	< 5	NA	< 5	NA	77600	NA	< 10	NA	6.8 B	NA	NA	39.3	NA	35.9 J	NA
UAW21-80	5/5/2001	609	NA	<0.2	NA	7.6 B	NA	1190 B	1210 B	<5	NA	<5	NA	28600	26900	<10	NA	NA	NA	<1000	<7	NA	13.8 B	NA
	11/11/2001	728	NA	<0.2	NA	7.5 B	NA	1350 B	1310 B	<5	NA	<5	NA	30700	31900	9.2 B	NA	NA	NA	<1000	<7	NA	<20	NA
	10/18/2002	787 J	NA	<0.2	NA	12.7 B	NA	1380 B J	NA	<5	NA	NA	NA	31900	NA	<10	NA	<100	NA	<1000	1.6 B J	NA	<20	NA
	11/11/2003	791 J	NA	<0.2	NA	9.5 B	NA	1300 B J	NA	<5	NA	<5	NA	39800	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	3/27/2004	798 J	NA	<0.2	NA	6.6 B	NA	1040 B J	NA	4.6 B	NA	<5	NA	38700	NA	<10	NA	<100	NA	410 B	<7	NA	<20	NA
	11/3/2004	760	NA	<0.2	NA	6.2 B	NA	1130 B J	NA	<5	NA	<5	NA	41700	NA	5.2 B	NA	<100	NA	<1000	<7	NA	<20	NA
	11/3/2004	760	NA	<0.2	NA	6.2 B	NA	1130 B J	NA	<5	NA	<5	NA	41700	NA	5.2 B	NA	<100	NA	<1000	<7	NA	<20	NA
	11/8/2005	739 J	NA	<0.2	NA	7.1 B	NA	1180 B J	NA	<5	NA	<5	NA	48400	NA	<10	NA	<100	NA	<1000	<7	NA	13.4 B	NA
	11/8/2006	789 J	NA	<0.2	NA	6.2 B	NA	1110 B J	NA	< 5	NA	< 5	NA	50900	NA	< 10	NA	< 100	NA	NA	< 7	NA	< 20	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW22-20	10/13/2001	8260	NA	<0.2	NA	56.4	NA	18400 J	15500 J	<5	NA	<5	NA	661000	673000	<10	NA	NA	NA	<1000	24	NA	86.8	NA
	11/13/2001	6960 J	NA	<0.2	NA	57.3	NA	16600 J	12400 J	<5	NA	<5	NA	706000 J	676000 J	<10	NA	NA	NA	1800	29.6	NA	132 J	NA
	10/20/2002	3350	NA	<0.2	NA	28 B	NA	6330 J E	NA	<5	NA	NA	NA	381000	NA	<10	NA	979	NA	1400	7.2	NA	<20	NA
	11/10/2003	10800 J	NA	<0.2	NA	20.8 B	NA	8380 J	NA	<5	NA	<5	NA	996000	NA	<10	NA	529	NA	<1000	2.7 B	NA	59.3 J	NA
	3/29/2004	9640 J	NA	<0.2	NA	11.4 B	NA	9510 J	NA	<5	NA	<5	NA	921000	NA	<10	NA	203	NA	410 B	3.6 B	NA	<20	NA
	11/4/2004	11800 J	NA	<0.2	NA	15.4 B	NA	7910 J	NA	<5	NA	<5	NA	726000	NA	6.3 B	NA	460	NA	<1000	1 B	NA	<20	NA
	11/15/2005	13000 J	NA	<0.2	NA	22.6 B	NA	13300	NA	<5	NA	<5	NA	1260000	NA	<10	NA	266	NA	NA	3.7 B	NA	8.5 U	NA
	11/9/2006	7620 J	NA	<0.2	NA	78.1	NA	11600 J	NA	< 5	NA	< 5	NA	1020000	NA	11.9	NA	117	NA	NA	11.3	NA	65.6 J	NA
UAW23-20	10/12/2001	31.5	NA	<0.2	NA	12.8 B	NA	26900 J	26800 J	6.1	NA	<5	NA	167000	166000	8.9 B J	NA	NA	NA	2000	<7	NA	<20	NA
	11/14/2001	227	NA	<0.2	NA	296	NA	23200	23500	9.5	NA	<5	NA	169000	169000	11.3	NA	NA	NA	<1000	<7	NA	<20	NA
	10/19/2002	88.1	NA	<0.2	NA	400	NA	19400 J	NA	20.2	NA	NA	NA	126000	NA	<10	NA	<100	NA	300 B	<7	NA	<20	NA
	11/13/2003	155 J	NA	<0.2	NA	789	NA	21000 J	NA	12.7	NA	<5	NA	99500	NA	<10	NA	<100	NA	420 B	<7	NA	<20	NA
	3/28/2004	89.4 J	NA	<0.2	NA	214	NA	19900 J	NA	18.2	NA	<5	NA	105000	NA	<10	NA	<100	NA	730 B	3.7 B	NA	<20	NA
	11/5/2004	24.4 J	NA	<0.2	NA	81.4	NA	22400	NA	15.1	NA	<5	NA	116000	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/14/2005	106 J	NA	<0.2	NA	447	NA	21800	NA	16.9	NA	<5	NA	159000	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/6/2006	36.3 J	NA	<0.2	NA	86.3	NA	23900 J	NA	18.5	NA	< 5	NA	125000	NA	< 10	NA	11.2 B	NA	NA	< 7	NA	< 20	NA
UAW24-70	10/13/2001	115	NA	<0.2	NA	5.5 B	NA	2150 B J	2050 B J	<5	NA	<5	NA	50500	55500	<10	NA	NA	NA	2800	<7	NA	<20	NA
	11/15/2001	154	NA	<0.2	NA	3.8 B	NA	4220 B J	3380 B J	<5	NA	<5	NA	57200	79300	5 B	NA	NA	NA	1100	<7	NA	<20	NA
	10/17/2002	245 J	NA	<0.2	NA	16.9 B	NA	4950 B J	NA	<5	NA	NA	NA	51100	NA	8.6 B	NA	<100	NA	460 B	1.1 B J	NA	<20	NA
	11/16/2003	162 J	NA	<0.2	NA	13.7 B J	NA	9890 J	NA	<5	NA	2 B	NA	54200	NA	14.7 J	NA	7.8 B	NA	<1000	<7	NA	<20	NA
	4/5/2004	231	NA	<0.2	NA	5.9 B	NA	3100 B J	NA	<5	NA	<5	NA	37400	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/6/2004	204 J	NA	<0.2	NA	<40	NA	3180 B J	NA	<5	NA	<5	NA	46600	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/16/2005	159	NA	<0.2	NA	2.5 B	NA	2410 B J	NA	<5	NA	<5	NA	39100	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	10/31/2006	216 J	NA	<0.2	NA	4.7 B	NA	2190 B J	NA	< 5	NA	< 5	NA	34500	NA	5 B	NA	< 100	NA	NA	< 7	NA	< 20	NA
UAW25-20	10/13/2001	1000	NA	<0.2	NA	27.7 B	NA	3530 B J	3540 B J	<5	NA	<5	NA	338000	340000	<10	NA	NA	NA	1500	1.2 B	NA	99.2	NA
	11/13/2001	914 J	NA	<0.2	NA	97.5	NA	3480 B J	3160 B J	<5	NA	<5	NA	328000 J	296000 J	<10	NA	NA	NA	2200	5.2 B	NA	<20	NA
	10/18/2002	1100 J	NA	<0.2	NA	48.3	NA	11800 J	NA	<5	NA	NA	NA	395000	NA	<10	NA	188	NA	<1000	<7	NA	<20	NA
	11/12/2003	1500 J	NA	<0.2	NA	64.1	NA	6870 J	NA	<5	NA	<5	NA	429000	NA	<10	NA	150	NA	<1000	<7	NA	<20	NA
	3/27/2004	1140 J	NA	<0.2	NA	128	NA	6970 J	NA	<5	NA	<5	NA	320000	NA	<10	NA	130	NA	1200	1.4 B	NA	<20	NA
	11/3/2004	1670	NA	0.06 B	NA	80.8	NA	9500 J	NA	<5	NA	<5	NA	406000	NA	<10	NA	134	NA	<1000	<7	NA	<20	NA
	11/9/2005	1880 J	NA	<0.2	NA	38.7 B J	NA	11200 J	NA	<5	NA	<5	NA	484000	NA	<10	NA	140	NA	NA	<7	NA	<20	NA
	11/8/2006	1400 J	NA	<0.2	NA	77.4	NA	3380 B J	NA	< 5	NA	< 5	NA	391000	NA	< 10	NA	136	NA	NA	< 7	NA	< 20	NA
UAW26-70	4/6/2004	363	NA	<0.2	NA	4.1 B	NA	2290 B J	NA	<5	NA	<5	NA	40600	NA	<10	NA	<100	NA	1100	<7	NA	<20	NA
	11/6/2004	282 J	NA	<0.2	NA	<40	NA	1610 B J E	NA	<5	NA	<5	NA	35700	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/9/2005	315 J	NA	<0.2	NA	32.2 B J	NA	2570 B J	NA	4.3 B	NA	<5	NA	33800	NA	<10	NA	<100	NA	NA	<7	NA	22.3	NA
	11/7/2006	308 J	NA	<0.2	NA	< 40	NA	1490 B J	NA	< 5	NA	< 5	NA	36700	NA	< 10	NA	< 100	NA	NA	< 7	NA	15.3 B J	NA

Table B-4
Summary of Inorganic Detections in Groundwater,
Seep, and Surface Water Samples
Rohm and Haas Chemicals LLC
Cincinnati, Ohio
Units: mg/l

Sample Location	Sample Date	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Groundwater																								
UAW27-50	3/31/2004	124 J	NA	<0.2	NA	33.2 B	NA	2120 B J	NA	<5	NA	<5	NA	37600	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/5/2004	25.9 J	NA	<0.2	NA	8.4 B	NA	2220 B J	NA	<5	NA	<5	NA	32800	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
	11/11/2005	16.2 J	NA	<0.2	NA	6.0 B	NA	1960 B	NA	<5	NA	<5	NA	31600	NA	<10	NA	<100	NA	NA	<7	NA	<20	NA
	11/1/2006	17.8 J	NA	<0.2	NA	38.2 B	NA	1880 B J	NA	< 5	NA	< 5	NA	27900	NA	< 10	NA	9.7 B	NA	NA	< 7	NA	10.3 B J	NA
LAW05-60	3/16/2002	NA	NA	<0.2	NA	18.7 B	NA	NA	NA	5.3	NA	<5	NA	NA	NA	<10	NA	<100	NA	<1000	2 B	NA	41.2	NA
LAW05-150	3/16/2002	NA	NA	0.35	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
LAW05-150 (Dup)	3/16/2002	NA	NA	0.16 B	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	<1000	<7	NA	59.6	NA
LAW12-60	10/13/2001	NA	NA	<0.2	NA	14.2 B	NA	10000 J	9590 J	<5	NA	<5	NA	61300	59200	5.5 B	NA	<100	NA	1500	2 B	NA	<20	NA
LAW12-60	11/16/2001	NA	NA	<0.2	NA	5.8 B	NA	11100 J	9780 J	<5	NA	<5	NA	54900	49500	<10	NA	<100	NA	<1000	<7	NA	<20	NA
20061102CINEB-1	11/2/2006	0.28 B J	NA	<0.2	NA	< 40	NA	158 B J	NA	< 5	NA	< 5	NA	< 5000	NA	< 10	NA	7.3 B	NA	NA	< 7	NA	< 20	NA
20061106CINEB-1	11/6/2006	< 15	NA	<0.2	NA	< 40	NA	162 B J	NA	< 5	NA	< 5	NA	< 5000	NA	< 10	NA	5.3 B	NA	NA	< 7	NA	< 20	NA
20061106CINFB-1	11/6/2006	0.53 B J	NA	<0.2	NA	< 40	NA	157 B J	NA	< 5	NA	< 5	NA	< 5000	NA	< 10	NA	< 100	NA	NA	< 7	NA	< 20	NA
20061108CINFB-1	11/8/2006	< 15	NA	<0.2	NA	< 40	NA	157 B J	NA	< 5	NA	< 5	NA	< 5000	NA	5.1 B	NA	< 100	NA	NA	< 7	NA	< 20	NA
French Drain Sump @ 46 hr	10/19/2002	1550	NA	<0.2	NA	46.8	NA	5880 J	NA	<5	NA	NA	NA	304000	NA	6.3 B	NA	2930	NA	8600	73.8	NA	22.4	NA
French Drain Sump @ 72 hr	10/20/2002	1580	NA	<0.2	NA	47	NA	5950 J	NA	<5	NA	NA	NA	307000	NA	<10	NA	3070	NA	9600	74.2	NA	67.9	NA
Surface Water																								
WS-1A	3/25/2004	NA	NA	NA	<0.2	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	900 B	NA	<7	NA	16.4 B
WS-2A	3/26/2004	NA	NA	0.094 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	<1000	<7	NA	16.2 B	NA
WS-3A	3/26/2004	NA	NA	0.077 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	<1000	<7	NA	14.5 B	NA
WS-4A	3/26/2004	NA	NA	0.079 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	740 B	<7	NA	17.4 B	NA
WS-5A	3/25/2004	NA	NA	NA	0.064 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	NA	<10	NA	<100	<1000	NA	<7	NA	16 B
WS-6A	3/25/2004	NA	NA	NA	<0.2	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	NA	<10	NA	<100	<1000	NA	<7	NA	15.3 B
WS-6A (Dup)	3/25/2004	NA	NA	NA	0.04 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	NA	6.8 B	NA	<100	1400	NA	<7	NA	23.1
Seeps																								
SS-1 (Seep)	10/11/2001	2150	2070	<0.2	<0.2	214	22.3 B	14200 J	9600 J L	<5	<5	NA	NA	149000	361000	<10	<10	782	121	<1000	124	1.6 B	411	12.6 B
SS-5 (Seep)	10/11/2001	2730	947	0.18 B	<0.2	57.7	85.9	14100 J	7180 J	<5	<5	NA	NA	375000	159000	<10	<10	1340	348	<1000	33.2	11.6	219	19.4 B

* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level.
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds. Please refer to Appendix D for excerpts from the Quality Assurance Review (Envionmental Standards, 2004) and to review data qualification of "non-detect" results.

APPENDIX C

DATA SUMMARY FOR CHEMICALS DETECTED

IN SURFACE WATER SAMPLES

Table C-1
Summary of Volatile Organic Detections in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cyclohexane	Dibromochloromethane	1,2-Dibromo-3-chloro-propane	1,2-Dibromoethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Ethylbenzene
Surface Water																														
WS-1A	3/25/2004	6.3 J	<1	<1	<1	<1	<10	<1	<1	<1	<1	0.23 J	<2		<1	<2	<1	<10	<10	<10		<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1
WS-2A	3/26/2004	<10	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<2		<1	<2	<1	<10	<10	<10		<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1
WS-3A	3/26/2004	<10	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<2		0.86 J	<2	<1	<10	<10	<10		<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1
WS-4A	3/26/2004	1.2 J	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<2		0.82 J	<2	<1	<10	<10	<10		<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1
WS-5A	3/25/2004	5.4 J	<1	<1	<1	<1	<10	<1	<1	<1	<1	0.24 J	<2		<1	<2	<1	<10	<10	<10		<1	<1	<1	0.26 J	<0.5	<1	<1	<1	<1
WS-6A	3/25/2004	5.4 J	<1	<1	<1	<1	<10	<1	<1	<1	<1	0.26 J	<2		<1	<2	<1	<10	<10	<10		<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1
WS-6A (Dup)	3/25/2004	5.8 J	<1	<1	<1	<1	<10	<1	<1	<1	<1	0.23 J	<2		<1	<2	<1	<10	<10	<10		<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1
Seeps																														
SS-1 (Seep)	10/11/2001	2.1 J B	1.1	<1	NA		NA	0.97 J	NA	11	<2	<1		NA	NA			21	NA	2.6 J	<1	1	<1	NA	NA	NA				0.39 J
SS-5 (Seep)	10/11/2001	3.1 J B	0.92 J	<1.8	NA		NA	1.1 J	NA	24	<3.6	<1.8		NA	NA			14	NA	1.7 J	<1.8	0.55 J	<1.8	NA	NA	NA				<1.8

Notes:
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
NA indicates chemical was not on the target analyte list for that sample.
<5 = Indicates constituent not detected at or above indicated detection limit.

Table C-1
Summary of Volatile Organic Detections in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	2-Hexanone	Isopropylbenzene	Methyl Acetate	Methylene chloride	Methylcyclohexane	4-Methyl-2-pentanone	Methyl tert-butyl ether	Styrene	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane	Vinyl chloride	Xylenes (total)	1,2-Dichloroethene (total)
Surface Water																					
WS-1A	3/25/2004						<5		<1		<1		<10	0.26 J	<1	<1			<2		
WS-2A	3/26/2004						<5		<1		<1		<10	0.19 J	<1	0.33 J			<2		
WS-3A	3/26/2004						<5		<1		<1		<10	0.24 J	<1	0.33 J			<2		
WS-4A	3/26/2004						<5		<1		<1		<10	0.23 J	<1	0.33 J			<2		
WS-5A	3/25/2004						<5		<1		<1		<10	0.39 J	<1	0.24 J			<2		
WS-6A	3/25/2004						<5		<1		<1		<10	0.4 J	<1	0.24 J			<2		
WS-6A (Dup)	3/25/2004						<5		<1		<1		<10	0.4 J	<1	0.25 J			<2		
Seeps																					
SS-1 (Seep)	10/11/2001		NA		<1	0.49 J	NA	NA			NA	0.45 J		NA	NA	NA		NA	NA	1.7	NA
SS-5 (Seep)	10/11/2001		NA		<1.8	0.3 J	NA	NA			NA	0.55 J		NA	NA	NA		NA	NA	<1.8	NA

Notes:
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
NA indicates chemical was not on the target analyte list for that sample.
<5 = Indicates constituent not detected at or above indicated detection limit.

Table C-2
Summary of Semivolatile Organic Detections in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	Aniline	Acenaphthene	Acenaphthylene	Acetophenone	Anthracene	Atrazine	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzaldehyde	1,1'-Biphenyl	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	bis(2-Ethylhexyl) phthalate	4-Bromophenyl phenl ether	Butyl benzyl phthalate	Caprolactam	Carbazole	4-Chloroaniline	4-Chloro-3-methylphenol	2-Chloronaphthalene	2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran
Surface Water																													
WS-1A	3/25/2004	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10			<10	<10	0.67 J		<10			<10		<10	<10			<10	<10
WS-2A	3/26/2004	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10			<10	<10	<10		<10			<10		<10	<10			<10	<10
WS-3A	3/26/2004	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10			<10	<10	1.4 J		<10			<10		<10	<10			<10	<10
WS-4A	3/26/2004	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10			<10	<10	0.55 J		<10			<10		<10	<10			<10	<10
WS-5A	3/25/2004	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10			<10	<10	0.94 J		<10			<10		<10	<10			<10	<10
WS-6A	3/25/2004	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10			<10	<10	0.78 J		<10			<10		<10	<10			<10	<10
WS-6A (Dup)	3/25/2004	<10	<10	<10	<10	<10		<10	<10	<10	<10	<10			<10	<10	0.58 J		<10			<10		<10	<10			<10	<10
Seeps																													
SS-1 (Seep)	10/11/2001	<10	NA										<10	NA			NA		NA	NA	NA				NA				
SS-5 (Seep)	10/11/2001	<10	NA										<10	NA			NA		NA	NA	NA				NA				

Notes:
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
NA indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.

Table C-2
Summary of Semivolatile Organic Detections in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	4,6-Dinitro-2-methylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-n-octyl phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(123-cd)pyrene	Isophorone	2-Methylnaphthalene	2-Methylphenol	4-Methylphenol	Naphthalene	2-Nitroaniline	3-Nitroaniline	4-Nitroaniline	Nitrobenzene	2-Nitrophenol
Surface Water																													
WS-1A	3/25/2004	<50	<10	<10	<10	<10	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<50	<10	<10		<10	<10	<10	<10	<50	<50		<10	<10
WS-2A	3/26/2004	<50	<10	<10	<10	<10	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<50	<10	<10		<10	<10	<10	<10	<50	<50		<10	<10
WS-3A	3/26/2004	<50	<10	<10	<10	<10	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<50	<10	<10		<10	<10	<10	<10	<50	<50		<10	<10
WS-4A	3/26/2004	<50	<10	<10	<10	<10	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<50	<10	<10		<10	<10	<10	<10	<50	<50		<10	<10
WS-5A	3/25/2004	<50	<10	<10	<10	<10	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<50	<10	<10		<10	<10	<10	<10	<50	<50		<10	<10
WS-6A	3/25/2004	<50	<10	<10	<10	<10	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<50	<10	<10		<10	<10	<10	<10	<50	<50		<10	<10
WS-6A (Dup)	3/25/2004	<50	<10	<10	<10	<10	<10	<50	<50	<10	<10	<10	<10	<10	<10	<10	<50	<10	<10		<10	<10	<10	<10	<50	<50		<10	<10
Seeps																													
SS-1 (Seep)	10/11/2001		NA		NA	NA								NA							NA	<10	<10	NA					
SS-5 (Seep)	10/11/2001		NA		NA	NA								NA							NA	<10	<10	NA					

Notes:
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
NA indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.

Table C-2
Summary of Semivolatile Organic Detections in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4-Nitrophenol	N-Nitrosodi-n-propyl-amine	N-Nitrosodiphenylamine	2,2'-oxybis(1-Chloropropane	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane
Surface Water																
WS-1A	3/25/2004	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
WS-2A	3/26/2004	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
WS-3A	3/26/2004	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
WS-4A	3/26/2004	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1.1 J
WS-5A	3/25/2004	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
WS-6A	3/25/2004	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
WS-6A (Dup)	3/25/2004	<10	<10	<10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Seeps																
SS-1 (Seep)	10/11/2001							NA				NA	21	NA	2.6 J	NA
SS-5 (Seep)	10/11/2001							NA				NA	14	NA	1.7 J	NA

Notes:
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
NA indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.

Table C-3
Summary of Pesticide and Polychlorinated Biphenyl Detections
in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: ug/l

SAMPLE LOCATION	SAMPLE DATE	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Toxaphene	Aroclor 1242
Surface Water																								
WS-1A	3/25/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.1			<1
WS-2A	3/26/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.1			<1
WS-3A	3/26/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.1			<1
WS-4A	3/26/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.1			<1
WS-5A	3/25/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.1			<1
WS-6A	3/25/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.1			<1
WS-6A (Dup)	3/25/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.1			<1
Seeps																								
SS-1 (Seep)	10/11/2001	<0.05	<0.05	0.028 J	<0.05	<0.05	<0.05	0.042 J	<0.05	0.053 PG	<0.05	0.046 J	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	0.033 J	0.005 J	NA	NA	NA
SS-5 (Seep)	10/11/2001	<0.05	0.025 J	<0.05	<0.05	<0.05	0.02 J	0.056	<0.05	<0.05	0.03 J	<0.05	NA	<0.05	<0.05	<0.05	NA	NA	<0.05	<0.05	<0.1	NA	NA	NA

Notes:
J = Estimated result; result is less than reporting limit
PG = The percentage difference between the original and confirmation analyses is greater than 40%
NA indicates chemical was not on the target analyte list for that sample.
<0.05 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more Facility Investigation samples.

Table C-4
Summary of Inorganic Detections in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: µg/l

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS	Manganese	Manganese-DISS
Surface Water																															
WS-1A	3/25/2004	NA	NA	NA	<10	NA	<10	NA	56.6 B J	NA	0.78 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	6.7 B J	<10	NA	NA	NA	NA	<3	NA	NA	NA	NA
WS-2A	3/26/2004	NA	NA	<10	NA	<10	NA	57.2 B J	NA	0.7 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	6.3 B J	NA	<10	NA	NA	NA	<3	NA	NA	NA	NA	NA
WS-3A	3/26/2004	NA	NA	<10	NA	<10	NA	59.2 B J	NA	0.66 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	5.4 B J	NA	<10	NA	NA	NA	<3	NA	NA	NA	NA	NA
WS-4A	3/26/2004	NA	NA	<10	NA	<10	NA	61.8 B J	NA	0.67 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	6.2 B J	NA	<10	NA	NA	NA	<3	NA	NA	NA	NA	NA
WS-5A	3/25/2004	NA	NA	NA	<10	NA	<10	NA	54.6 B J	NA	0.74 B J	NA	<2	NA	NA	NA	<5	NA	1.1 B	NA	6.6 B J	<10	NA	NA	NA	NA	<3	NA	NA	NA	NA
WS-6A	3/25/2004	NA	NA	NA	<10	NA	<10	NA	53 B J	NA	0.76 B J	NA	<2	NA	NA	NA	<5	NA	<7	NA	5.9 B J	<10	<20	NA	NA	NA	<3	NA	NA	NA	NA
WS-6A (Dup)	3/25/2004	NA	NA	NA	<10	NA	3.6 B	NA	56 B J	NA	0.69 B J	NA	<2	NA	NA	NA	<5	NA	1.2 B	NA	6.5 B J	<10	<20	NA	NA	NA	<3	NA	NA	NA	NA
Seeps																															
SS-1 (Seep)	10/11/2001	48300	47.8 B	<10	<10	25.7	<10	494	73.8 B	3.1 B	<5	1.7 B	<2	430000	361000	174	<5	43.8	<7	104	<25	<10	NA	90100	<100	126	<3	90100	45100	2150	2070
SS-5 (Seep)	10/11/2001	14300	112 B	<10	<10	6.1 B	4.7 B	143 B	233	1.2 B	<5	0.28 B	<2	417000	257000	36.7	<5	10.4	12.4	31.9	<25	<10	NA	23800	734	24.2	<3	67100	39000	2730	947

Notes:
B = Estimated result; result is less than reporting limit
E = Matrix interference
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
L = Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.
MBB = This analyte is present at a reportable level in the associated method blank but is less than 5% of the sample amount.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
MBE = This analyte is present in the associated method blank.
NA indicates chemical was not on the target analyte list for that sample.
<5 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more Facility Investigation samples.

* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level.
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds. Please refer to Appendix D for excerpts from the Quality Assurance Review (Envionmental Standards, 2004) and to review data qualification of "non-detect" results.

Table C-4
Summary of Inorganic Detections in Surface Water and Seep Samples
Rohm and Haas Chemicals LLC
Cincinnati Plant
Units: µg/l

Sample Location	Sample Date	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Potassium-DISS	Selenium	Selenium-DISS	Silver	Silver-DISS	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
Surface Water																						
WS-1A	3/25/2004	NA	<0.2	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	900 B	NA	<7	NA	16.4 B
WS-2A	3/26/2004	0.094 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	<1000	<7	NA	16.2 B	NA
WS-3A	3/26/2004	0.077 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	<1000	<7	NA	14.5 B	NA
WS-4A	3/26/2004	0.079 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	NA	740 B	<7	NA	17.4 B	NA
WS-5A	3/25/2004	NA	0.064 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	<1000	NA	<7	NA	16 B
WS-6A	3/25/2004	NA	<0.2	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	<10	NA	<100	<1000	NA	<7	NA	15.3 B
WS-6A (Dup)	3/25/2004	NA	0.04 B J	NA	<40	NA	NA	NA	<5	NA	<5	NA	NA	NA	6.8 B	NA	<100	1400	NA	<7	NA	23.1
Seeps																						
SS-1 (Seep)	10/11/2001	<0.2	<0.2	214	22.3 B	14200 J	9600 J L	<5	<5	NA	NA	149000	361000	<10	<10	782	121	<1000	124	1.6 B	411	12.6 B
SS-5 (Seep)	10/11/2001	0.18 B	<0.2	57.7	85.9	14100 J	7180 J	<5	<5	NA	NA	375000	159000	<10	<10	1340	348	<1000	33.2	11.6	219	19.4 B

Notes:
B = Estimated result; result is less than reporting limit
E = Matrix interference
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
L = Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.
MBB = This analyte is present at a reportable level in the associated method blank but is less than 5% of the sample amount.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
MBE = This analyte is present in the associated method blank.
NA indicates chemical was not on the target analyte list for that sample.
<5 = Indicates constituent not detected at or above indicated detection limit.
This table only includes target analytes detected in one or more Facility Investigation samples.

* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level.
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds. Please refer to Appendix D for excerpts from the Quality Assurance Review (Envionmental Standards, 2004) and to review data qualification of "non-detect" results.

APPENDIX D

SUMMARY OF GEOTECHNICAL RESULTS

APPENDIX D
Table D-1
Summary of Geotechnical Results
Rohm and Haas Chemicals LLC
Reading, Ohio

Sample Identification	Date	pH (solid)	Total Organic Carbon (mg/kg)	Cation Exchange Capacity meq/100g	Percent Solids by Weight	Percent Moisture	Atterberg			Particle Size Analysis		Soil Description
							LL	PL	PI	Maximum Particle Size (mm)	Percentage (%) < 0.075 mm (silts and clays)	
STR01-15'	3/8/2001	8.8	590	19.2	96.0	4.17	U	U	N	19	8.6	Poorly Graded Sand (SP): brown (10YR5/2), dry, ~ 90% medium to fine sand, ~5% fine gravel, ~5% fines
STR01-29'	3/8/2001	7.8	2500	10.5	88.7	12.71	31	13	18	9.5	72.2	Sandy Lean Clay (CL): dark greenish gray (5GY3/1) dry, ~90% high to medium plasticity fines, ~10% medium sand, abundant medium and fine gravel (mafic angular to subrounded), few iron-colored mottles, very hard
STR01-47'	3/9/2001	9.6	290	8.5	88.0	13.61	U	U	N	25	1.4	Poorly Graded Sand (SP): dark grayish brown (10 YR 4/2), moist to wet, ~100% medium grained sand, trace fines, with some gravel
STR01-58'	3/9/2001	9.1	8100	36.1	79.1	26.48	U	U	N	2	61.6	Silt (ML): greenish gray (10Y5/1) wet, ~100% low plasticity fines with organic silt (OH) laminations, black (2.5Y2.5/1)
STR01-77'	3/9/2001	7.9	9200	8.2	76.8	30.17	46	22	24	0.15	99.6	Clay (CL): dark greenish gray (10Y4/1), wet, 100% medium plasticity fines, soft, homogeneous some white shell (?) fragments.
STR01-92.5'	3/9/2001	9.2	5200	8.9	82.8	20.74	34	17	17	0.425	97.7	Lean Clay (CL): dark greenish gray (10Y3/1), moist, ~95% high to medium plasticity fines, ~5% medium sand, hard, blocky, massive
STR01-114'	3/9/2001	9.4	630	25.8	80.6	24.05	U	U	N	4.75	24.4	Silty Sand (SM): light olive brown (2.5Y5/6), wet, fine laminations, dark organic odor
STR02-22'	3/13/2001	7.6	3900	7.3	88.4	13.08	28	15	14	9.5	64.7	Sandy Lean Clay (CL): dark olive gray (5Y3/2), wet, 90% medium plasticity fines, 10% medium sand, moist, hard, trace gravel

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Reading, Ohio

Sample Identification	Date	pH (solid)	Total Organic Carbon (mg/kg)	Cation Exchange Capacity meq/100g	Percent Solids by Weight	Percent Moisture	Atterberg			Particle Size Analysis		Soil Description
							LL	PL	PI	Maximum Particle Size (mm)	Percentage (%) < 0.075 mm (silts and clays)	
STR02-55'	3/13/2001	9.4	480	29.7	85.0	17.65	U	U	N	2	9.8	Poorly Graded Sand (SP): light olive brown (2.5Y5/4), wet, 90% fine to medium sand, 10% fines
STR03-16'	3/14/2001	9.4	3000	10.5	88.6	12.88	23	15	9	9.5	71.5	Sandy Lean Clay (CL): [till], ~80% medium to high plasticity fines, ~ 20% medium sand and fine gravel, some black staining, very hard
STR03-37'	3/19/2001	8.2	970	10.6	89.3	12.00	27	16	11	19	68.7	Sandy Lean Clay (CL): [till], dark grayish brown (2.5Y4/2), ~80% medium to high plasticity fines, ~ 20% medium sand and fine gravel, few gray mottles, increasing sand content, very hard, blocky
STR03-58.5'	3/19/2001	8.3	630	16.5	86.9	15.07	U	U	N	9.5	6.0	Poorly Graded Sand (SP): yellowish brown (10Y4/4) wet, 95% fine medium sand, 5% low plasticity fines, trace gravel (sandstone)
STR04-22.5'	3/19/2001	7.7	3300	9.5	88.5	12.99	27	15	13	25	57.1	Sandy Lean Clay (CL): [till], dark greenish gray (10Y4/1), moist, ~70% fines, ~30% sand and gravel, hard
STR04-53.5'	3/20/2001	7.8	7600	20.4	80.8	23.72	U	U	N	4.75	99.2	Silt (ML): dark greenish gray (10Y4/1), moist, ~100% low plasticity fines, weak bedding, homogeneous, firm to hard (loess?)
STR04-88'	3/20/2001	8.5	2500	15.6	91.4	9.45	21	13	8	19	60.4	Sandy Lean Clay (CL) to Lean Clay (CL): [till], dark greenish gray (10Y3/1), ~70% medium plasticity fines, ~30% sand and gravel, very hard, no structure
STR05-7'	3/10/2001	5.9	1500	16.5	84.8	17.95	24	U	24	2	53.5	Silty Sand (SM): olive brown (2.5Y4/4), moist, 60% fine sand, 40% fines, massive, some mottling of dark organics

APPENDIX D
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Summary of Geotechnical Results
Rohm and Haas Chemicals LLC
Reading, Ohio

Sample Identification	Date	pH (solid)	Total Organic Carbon (mg/kg)	Cation Exchange Capacity meq/100g	Percent Solids by Weight	Percent Moisture	Atterberg			Particle Size Analysis		Soil Description
							LL	PL	PI	Maximum Particle Size (mm)	Percentage (%) < 0.075 mm (silts and clays)	
STR05-17.5'	3/10/2001	8	4400	6.6	88.7	12.73	28	16	12	9.5	70.5	Sandy Lean Clay (CL): [till] olive brown (2.5Y4/3), dry, hard, ~80% high to medium plasticity fines, ~10% medium sand, ~10% fine gravel
STR05-35.5'	3/10/2001	9.5	3400	5.3	91.1	9.79	17	13	4	9.5	63.9	Silty Clay (CL): dark greenish gray (10Y4/1), moist, with sand and 1/2"-1" gravel [till?], hard
STR06-7.5'	3/11/2001	9.3	2200	11.1	87.3	14.56	25	15	10	9.5	71.2	Sandy Clay (CL): light olive brown (2.5YR5/4), light gray mottling, moist to wet, 70% fines, 25% fine sand, 5% gravel (1"-2"), hard
STR06-45.5'	3/11/2001	8.7	13000	5.4	76.1	31.37	45	24	21	silt/clay	100.0	Silt (ML): dark greenish gray (10Y4/1) wet, 100% low plasticity fines,soft, massive
STR06-76'	3/11/2001	9.6	640	26.2	87.0	14.98	U	U	N	19	22.7	Poorly Graded Sand (SP): yellowish brown (10Y5/4), 80% fine sand, 20% medium sand, trace fines, 6" interbeds of silty clay
STR06-87.5'	3/11/2001	9.4	3300	17.5	90.0	11.06	21	13	8	19	60.6	Sandy Clay (CL); [till], dark gray (5Y4/1) moist, 90% low plasticity fines, 10% fine sand, trace gravel 1"-2" subangular, hard
STR08-17.5'	3/26/2001	8	4000	6.2	89.5	11.70	24	14	11	9.5	71.5	Sandy Lean Clay (CL): [till], dark greenish gray (10Y4/1), moist, ~85% high plasticity fines, ~15% fine sand and gravel, hard
STR08-44'	3/26/2001	7.9	3600	6.3	80.3	24.49	U	U	N	9.5	97.3	Silt (ML): dark greenish gray (10Y3/1), moist, ~100% low to medium plasticity fines, homogeneous
STR11-6'	8/20/2001	7.9	2000	15.1	81.1	23.29	U	U	N	4.75	38.7	Clayey Sand (SC): dark brown, wet, ~85 poorly graded fine to medium sand, ~10% clay, ~5% calcareous pebbles, loose to slightly firm
STR11-9'	8/20/2001	8.1	4300	5.5	80.9	23.56	44	21	23	19	91.1	Clay (CH): grayish brown, damp, still, plastic, slightly mottled with dark gray clay

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Summary of Geotechnical Results
Rohm and Haas Chemicals LLC
Reading, Ohio

Sample Identification	Date	pH (solid)	Total Organic Carbon (mg/kg)	Cation Exchange Capacity meq/100g	Percent Solids by Weight	Percent Moisture	Atterberg			Particle Size Analysis		Soil Description
							LL	PL	PI	Maximum Particle Size (mm)	Percentage (%) < 0.075 mm (silts and clays)	
STR11-53'	8/20/2001	8.3	420	4.2	90.8	10.14	U	U	N	37.5	10.0	Gravelly Sand (SW): brown to dark brown, saturated,~90% fine to medium grained sand, ~10% fine to very coarse gravel (up to ~4" diameter), loose
STR11-63'	8/20/2001	8.1	4100	7.3	90.5	10.49	22	13	10	19	44.5	Sandy Gravelly Clay (CL): greenish gray to dark green, dry to damp, ~70% clay, ~20% very fine to coard grained sand, ~10% gravel, very stiff, nonplastic to slightly plastic, very hard, locally <1/4" diameter (granitic), glacial till
STR11-77'	8/21/2001	7.3	7200	8.3	78.2	27.87	U	U	N	0.425	99.3	Silty Clay (CL): dark gray, wet to saturated, ~70% - 60% clay, ~30% - 40% silt, locally stiff to locally friable, slightly plastic
STR11-83'	8/21/2001	7.8	960	5.9	83.1	20.33	U	U	N	9.5	37.2	Sand (SP): brown, saturated, very fine to medium grained, loose to moderately compact, well-bedded with silt laminae locally
STR11-102'	8/21/2001	7.7	1200	7.8	81.4	22.89	U	U	N	2	43.6	Sand (SP): brown, fine to medium grained, saturated, loose to slightly compact
SS-1	10/11/2001	7.9	3900	--	85.5	16.31	25	15	11	9.5	67.2	No Descriptions Provided

Notes:
Analytical Methods: American Society for Testing and Materials (ASTM) Soil and Rock (1), ASTM Volumes 04.08 and 04.09 and SW-846 9081.
LL = Liquid Limit in percent
PL = Plastic Limit in percent
PI = Plasticity Index
U = unable to be determined
N = non-plastic

APPENDIX E

SURROGATE COMPOUND LIST

APPENDIX E

SURROGATE COMPOUND LIST

There are several compounds detected in various media at the Rohm and Haas Cincinnati Plant for which toxicity values are lacking. Per comments from the USEPA on a previous risk assessment conducted by Geomatrix in 2002, the USEPA has requested that surrogate compounds be used to estimate the toxicity for compounds for which information is lacking. This document summarizes the compounds in each media for which toxicological information is unavailable for either human health concerns or ecological receptors. The attached table summarizes available physical and chemical property information for each compound and the proposed surrogate. References for the information provided in Table 1 are from a variety of sources including ChemFinder.com, Hazardous Substance Data Bank (HSDB), Integrated Risk Assessment Information System (IRIS), Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles, and Material Safety Data Sheets (MSDS).

Delta-BHC – Delta-benzene hexachloride (BHC) was detected in the soils at the site. Benzene hexachloride is a synthetic chemical that exists in eight chemical forms according to the position of the hydrogen atoms in the structure of the chemical. Delta-BHC is one of the isomers. Human health screening values are unavailable for this particular isomer, but ecological screening values have been established for delta-BHC. Alpha-BHC will be used as a surrogate of delta-BHC for human health screening since alpha-BHC is the most toxic form of the isomer for which human health toxicity information is available. See page 1 of Table 1 for details.

Carbazole – Carbazole was detected in the soil and sediment samples collected at the site. Although human health screening values are available for this compound, ecological screening benchmarks are unavailable for carbazole in these media. Carbazole consists of two benzene rings linked by a nitrogen molecule. The molecular formula for carbazole is $C_{12}H_9N$. Based on structural similarities and similar toxicity (target organs are the liver and kidneys), an appropriate surrogate for ecological screening is diphenyl amine, which also consists of two benzene rings linked by a nitrogen molecule. The molecular formula for diphenyl amine is $C_{12}H_{11}N$. See page 2 of Table 1 for details.

alpha and gamma Chlordane – Alpha and gamma chlordane are two different isomers of chlordane, a once commonly used pesticide until it was banned in 1988. Alpha and gamma chlordane were detected in soil samples at the site. Human health screening values and ecological screening benchmarks are unavailable for these individual isomers; however, screening values and benchmarks are available for the generic form of chlordane, which is comprised of approximately ten different isomers. Therefore, chlordane will be used as a surrogate for the distinct chlordane isomers. See page 3 of Table 1 for details.

Dibenzofuran – Dibenzofuran was detected in site soil samples. Although human health screening values are available, ecological screening benchmarks have not been

established for soils. Dibenzofuran consists of two benzene rings connected by an oxygen molecule. The molecular formula for dibenzofuran is $C_{12}H_8O$. Although dibenzofuran is somewhat similar to various low-molecular weight polycylic aromatic hydrocarbons (PAHs), the presence of oxygen, makes the physical and toxicological properties of dibenzofuran somewhat unique. Thus, using a low-molecular weight PAH as a surrogate compound for dibenzofuran is probably not appropriate. Since there are no appropriate ecological benchmarks available for dibenzofuran, this compound will be discussed in the uncertainty section.

Diallate – Diallate was detected in sediment samples collected from the Mill Creek, which is adjacent to the site. Diallate is a carbamate herbicide with a molecular formula of $C_{10}H_{17}Cl_2NOS$. Ecological screening benchmarks are unavailable for sediment for this compound or for other carbamate herbicides (human health screening values are available for diallate). Therefore, the Region 5 soil ESL for diallate will be used as a surrogate ecological screening benchmark for the detections of this compound in sediments. The use of soil screening benchmarks for compounds detected in sediments will be discussed in the uncertainty section since toxicity may be different in soils and sediments (i.e., due to the reducing conditions in sediments versus soils).

Endosulfan II and Endosulfan sulfate – Endosulfan II and Endosulfan sulfate were detected in the soils at the site. Both are halogenated pesticides and Endosulfan II is a form of Endosulfan and Endosulfan sulfate is a metabolite of Endosulfan. Ecological screening values are available for these compounds; however, human health screening values are not. Based on their structural similarities, physical properties and toxic action, Endosulfan will be used as a surrogate for both Endosulfan II and Endosulfan sulfate. See page 4 of Table 1 for details.

Endrin Ketone – Endrin ketone was detected in site soils. Endrin ketone is both an impurity and metabolite of the pesticide endrin; however, human health and ecological screening benchmarks are unavailable for endrin ketone in soils. Endrin and endrin aldehyde (another metabolite of endrin) were also detected in soil samples collected from the site, and although ecological soil benchmarks are available for both of these compounds, human health values are only available for endrin, not endrin aldehyde. Due to its structural similarity, similar physical properties and toxic actions, endrin will be used as a surrogate for endrin ketone and endrin aldehyde. See page 5 of Table 1 for details.

Iodomethane – Iodomethane was detected in soils at the site. Iodomethane is an unclassified fungicide. Human health values are unavailable for iodomethane, but ecological soil screening values have been published. Bromomethane will be used as a surrogate of iodomethane for human health screening because both chemicals are unclassified fungicides with similar structure and toxic action. See page 6 of Table 1 for details.

Isodrin – Isodrin is a cyclodiene insecticide that was detected in site groundwater and seeps. Ecological soil screening values are available for this compound; however, human

health values have not been established. Another cyclodiene insecticide, aldrin will be used as a surrogate for isodrin because of the structural similarity and similar toxicity. In addition, the 5S, 8R isomer of isodrin has the International Organization for Standardization (ISO) common name aldrin. See page 7 of Table 1 for details.

Isopropylbenzene (cumene) – Isopropylbenzene was detected in soil samples at the site and although human health benchmarks are available for this compound, ecological soil benchmarks are unavailable for isopropylbenzene. Isopropylbenzene is a volatile organic compound (VOC) that is structurally similar to ethylbenzene with similar toxic action (both compounds affect the central nervous system and the kidneys). When available, toxicity values for ethylbenzene will be used as surrogates for isopropylbenzene; however, toxicity data for ethylbenzene are also somewhat lacking for ecological receptors, in which case toluene (preferred) or xylene will be used as alternate surrogates for isopropylbenzene since they also have similar structures, physical properties and toxic action. See page 8 of Table 1 for details.

Methyl acetate – Methyl acetate was detected in site soils; however, ecological screening benchmarks are unavailable for this compound (human health values are available for methyl acetate). Ecological benchmarks are available for vinyl acetate, a structurally similar compound with similar physical properties and both compounds affect the heart as a primary target organ. Therefore, vinyl acetate will be used as a surrogate of methyl acetate for ecological screening. See page 9 of Table 1 for details.

Methylcyclohexane – Methylcyclohexane was detected in soil, sediment and seep samples collected at the site. Ecological screening benchmarks are unavailable for methylcyclohexane in any of these media, but human health values are available. An appropriate surrogate might be cyclohexane; however, ecological toxicity information is also lacking for this compound. Thus, toluene will be used as a surrogate for methylcyclohexane based on their structural similarities and similar physical properties. See page 10 of Table 1 for details.

Polycylic aromatic hydrocarbons (PAHs) – The surrogates for several PAHs without human health screening values were selected based on the structural similarities and similar toxic mode of action (pages 11 and 12 of Table 1). Ecological screening values are available for each of these PAHs.

Acenaphthylene - Acenaphthene
Benzo(ghi)perylene – Fluoranthene
2-Methylnaphthalene – Naphthalene
Phenanthrene - Anthracene

Various Inorganic Chemicals in Sediments – Ecological screening benchmarks are unavailable for the following inorganic chemicals that have been detected in site sediments: barium, beryllium, thallium, tin and vanadium. Human health screening values are available for these compounds. For these five inorganics, the lowest available ecological soil screening benchmarks for invertebrates will be used to estimate the impacts to macroinvertebrates in sediments. Invertebrates are usually the most sensitive

populations to contaminants in sediments due to their direct contact with the sediments. If a soil invertebrate screening benchmark is not available for these inorganics, then the Region 4 Soil Screening Benchmark or other soil benchmark will be used in lieu of other information for sediments for comparison purposes. In addition, because the toxic action of these compounds may be significantly different in soils and sediments (i.e., due to the reducing conditions in sediments versus soils), each of these compounds will also be discussed in the uncertainty section of the revised BRA. Specifically, a discussion of the potential fate and transport of these inorganics in aquatic systems will be included.

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

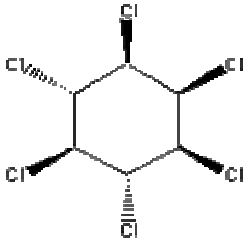
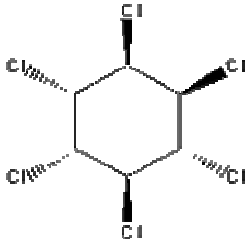
Parameter	delta-BHC	alpha-BHC
Formula	$C_6H_6Cl_6$	$C_6H_6Cl_6$
Density	Not Available	1.16
Refractive Index	Not Available	Not Available
Flash Point (^oC)	Not Available	152
Molecular Weight	290.8314	290.8314
Melting Point (^oC)	Not Available	158
Boiling Point (^oC)	60	288
Vapor Density	Not Available	Not Available
Vapor Pressure	Not Available	Not Available
Water Solubility	0.00213 g/100 ml	Insoluble. 0.0002 g/100 ml
Target Organ	Blood, liver and kidneys	Blood, liver and kidneys
LD 50	1000 mg/kg rat oral	177 mg/kg rat oral
Structure		
Rationale	Different isomers according to the position of the hydrogen atoms in the structure of the chemical. Alpha is the most toxic form with an available toxicity value.	
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.	

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

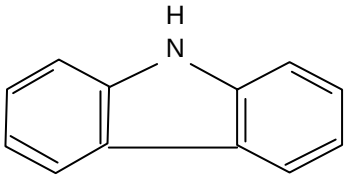
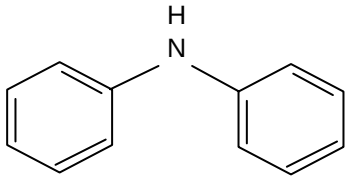
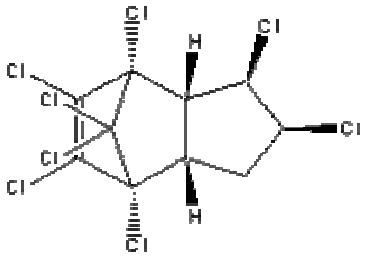
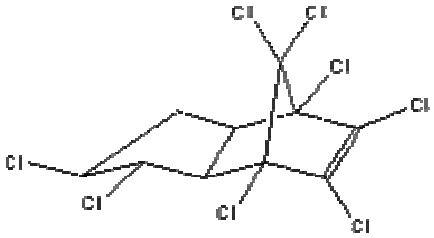
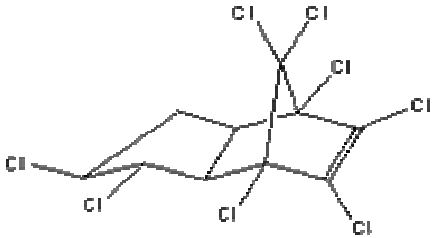
Parameter	Carbazole	Diphenyl amine
Formula	$C_{12}H_9N$	$C_{12}H_{11}N$
Density	1.1	1.16
Refractive Index	Not Available	Not Available
Flash Point (^oC)	220	152
Molecular Weight	167.2098	169.2256
Melting Point (^oC)	247	52
Boiling Point (^oC)	355	302
Vapor Density	Not Available	5.82
Vapor Pressure	Not Available	0.03
Water Solubility	<0.1 g/100 ml at 19^oC	0.03 g/100 mL
Target Organ	Liver and kidneys	Liver and Kidneys
LD50	>5000 mg/kg rat oral	500 mg/kg rat oral
Structure		
Rationale	These chemicals have similar structure and toxic action.	
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.	

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

Parameter	alpha-Chlordane	gamma-Chlordane	Chlordane
Formula	$C_{10}H_6Cl_8$	$C_{10}H_6Cl_8$	$C_{10}H_6Cl_8$
Density	Not Available	1.6	1.6
Refractive Index	Not Available	Not Available	Not Available
Flash Point (^oC)	Not Available	60	60
Molecular Weight	409.7814	409.7814	409.7814
Melting Point (^oC)	Not Available	106	106
Boiling Point (^oC)	Not Available	175	175
Vapor Density	Not Available	Not Available	Not Available
Vapor Pressure	Not Available	Not Available	Not Available
Water Solubility	Not Available	0.5 - 1.0 g / 100 mL at 19^oC	0.5-1.0 g/100 ml at 19^oC
Target Organ	Blood and Liver	Blood and Liver	Blood and Liver
LD 50	Not Available	Not Available	590 mg/kg rat oral
Structure			

Rationale: Chlordane is not a single chemical, but is a mixture of many related chemicals, of which about 10 are major components.

References: ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

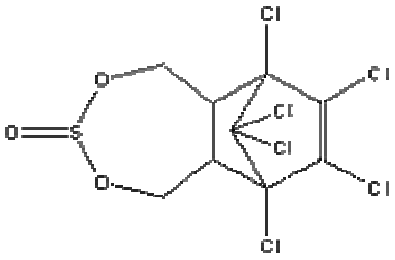
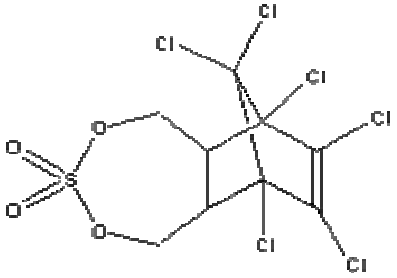
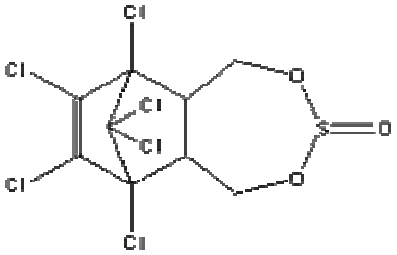
Parameter	Endosulfan II	Endosulfan sulfate	Endosulfan
Formula	$C_9H_6Cl_6O_3S$	$C_9H_6Cl_6O_4S$	$C_9H_6Cl_6O_3S$
Density	Not Available	Not Available	Not Available
Refractive Index	Not Available	Not Available	Not Available
Flash Point (^oC)	Not Available	Not Available	Not Available
Molecular Weight	406.9226	422.922	406.9226
Melting Point (^oC)	207	181	106
Boiling Point (^oC)	390	200	Not Available
Vapor Density	Not Available	Not Available	Not Available
Vapor Pressure	Not Available	Not Available	Not Available
Water Solubility	Insoluble. 0.000028 g/100 ml	0.0000117 g/100 ml	<0.1 g/100 ml at 23°C
Target Organ	Not Available	Not Available	CNS
		Not classifiable as a human carcinogen	Not classifiable as a human carcinogen
LD50	Not Available	Not Available	18 mg/kg rat oral
Structure			
Rationale	These chemicals have similar structures.		
	Endosulfan is a manufactured pesticide sold as a mixture of two different forms (I and II) of the same chemical.		
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.		

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

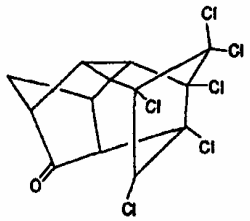
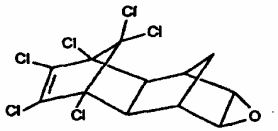
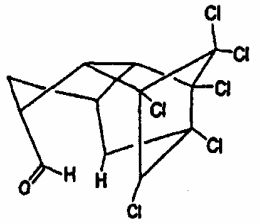
Parameter	Endrin Ketone	Endrin	Endrin Aldehyde
Formula	$C_{12}H_8Cl_6O$	$C_{12}H_8Cl_6O$	$C_{12}H_8Cl_6O$
Density	Not Available	Not Available	Not Available
Refractive Index	Not Available	Not Available	Not Available
Flash Point (^oC)	No Data	Non-flammable	Non-flammable
Molecular Weight	380.9	380.9	381.9
Melting Point (^oC)	No Data	235	235
Boiling Point (^oC)	No Data	200	No Data
Vapor Density	Not Available	Not Available	Not Available
Vapor Pressure	No Data	2.0×10^{-7} mm Hg	2.0×10^{-7} mm Hg
Water Solubility	No Data	200 ug/L	50 ug/L
Target Organ	CNS, Liver, Kidney	CNS, Liver, Kidney	CNS, Liver, Kidney
		Not classifiable as to carcinogenicity for humans.	
LD50	Not Available	3 mg/kg rat oral	>500 mg/kg mouse oral
Structure			
Rationale	These chemicals have similar structure and toxic action.		
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.		

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

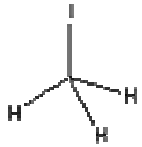
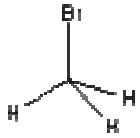
Parameter	Iodomethane	Methylbromide
Formula	CH_3I	CH_3Br
Density	2.279	1.732
Refractive Index	1.5308	Not Available
Flash Point (^oC)	Not Available	Not Available
Molecular Weight	141.9392	94.9387
Melting Point (^oC)	-66.45	-93.7
Boiling Point (^oC)	42.2	3.56
Vapor Density	4.9	3.36
Vapor Pressure	400	
Water Solubility	Slightly soluble. 2 g/100 ml	Very slightly soluble. 1.522 g/100 ml
Target Organ	CNS and kidney	CNS and Kidney
LD 50	76 mg/kg (oral-rat)	214 mg/kg (oral-rat)
Structure		
Rationale	Both chemicals are unclassified fungicides with similar structures and toxic actions.	
References:	ChemFinder.com; iodine.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.	

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

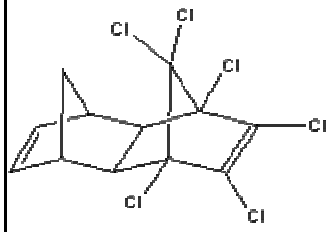
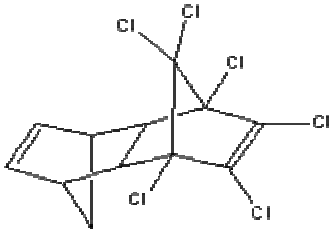
Parameter	Isodrin	Aldrin
Formula	$C_{12}H_8Cl_6$	$C_{12}H_8Cl_6$
Density	Not Available	Not Available
Refractive Index	Not Available	Not Available
Flash Point (^oC)	Not Available	Not Available
Molecular Weight	364.9132	364.9132
Melting Point (^oC)	Not Available	104
Boiling Point (^oC)	Not Available	145
Vapor Density	Not Available	
Vapor Pressure	Not Available	
Water Solubility	Not Available	insoluble. 0.000018 g/100 ml
Target Organ	Nerve system and carcinogenic	Carcinogenic potential
LD50	54 ug/fly /Conditions of bioassay not specified/	39-45 mg/kg rat oral
Structure		
Rationale	The 5S, 8R isomer has the ISO common name aldrin.	
	Both isodrin and aldrin are cyclodiene insecticides with similar structures and toxic actions.	
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.	

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

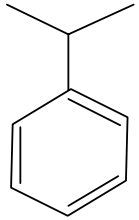
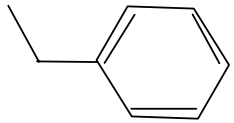
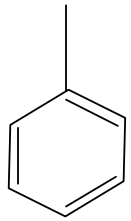
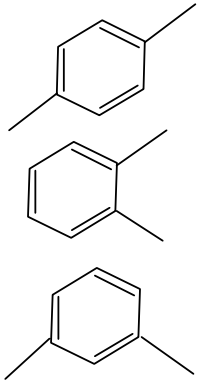
Parameter	Isopropylbenzene	Ethylbenzene	Toluene	Xylenes
Formula	C_9H_{12}	C_8H_{10}	C_7H_8	$C_{24}H_{30}$
Density	0.862	0.867	0.867	0.862
Refractive Index	1.4915	1.4959	1.4969	
Flash Point (^oC)	31	15	4	25
Molecular Weight	120.1938	106.167	92.1402	318.501
Melting Point (^oC)	-96	-94.9	-93	-50
Boiling Point (^oC)	151	136.2	110.6	140
Vapor Density	4.1	3.66	3.14	3.7
Vapor Pressure	3.5	9.6	22	5.1
Water Solubility	0.00499 g/100 ml insoluble	0.0206 g/100 ml	slightly soluble 0.0526 g/100 ml	insoluble 0.0175 g/100 ml
Target Organ	Kidneys; CNS depressant	Blood; kidneys; CNS	Blood; CNS	Liver; kidneys; CNS
LD50	980 mg/kg rat oral	3500 mg/kg rat oral	636 mg/kg rat oral	4300 mg/kg rat oral
Structure				
Rationale	These chemicals have similar structures and toxic actions.			
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.			

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

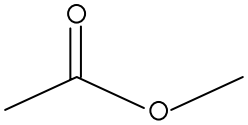
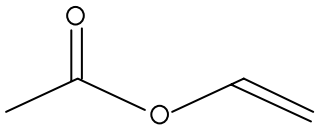
Parameter	Methyl Acetate	Vinyl Acetate
Formula	$C_3H_6O_2$	$C_4H_6O_2$
Density	0.932	0.934
Refractive Index	1.361	1.3954
Flash Point (^oC)	-10	-8
Molecular Weight	74.0792	86.0902
Melting Point (^oC)	-98	-93.2
Boiling Point (^oC)	56.9	72.3
Vapor Density	2.6	Not Available
Vapor Pressure	170	90.2
Water Solubility	24.50 g/100ml soluble	2 g/100ml insoluble
Target Organ	Cardiopulmonary System	Heart, CNS, Liver
LD50	6970 mg/kg rat oral	3500 mg/kg rat oral
Structure		
Rationale	These chemicals have similar structures and toxic actions.	
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.	

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

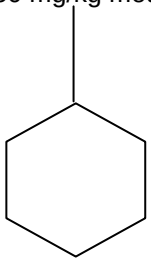
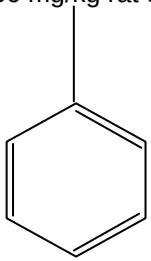
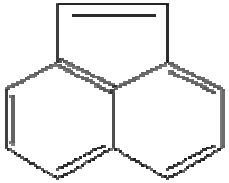
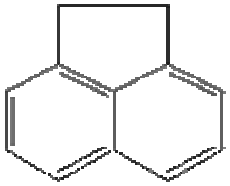
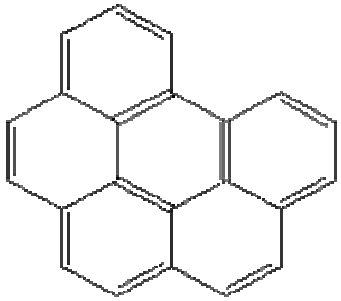
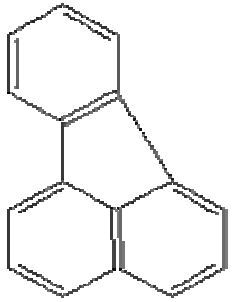
Parameter	Methyl Cyclohexane	Toluene
Formula	C_7H_{14}	C_7H_8
Density	0.769	0.867
Refractive Index	1.4231	1.4969
Flash Point (^oC)	-3	4
Molecular Weight	98.1876	92.1402
Melting Point (^oC)	-126.3	-93
Boiling Point (^oC)	101	110.6
Vapor Density	3.4	3.14
Vapor Pressure	37	22
Water Solubility	Insoluble	slightly soluble 0.0526 g/100 ml
Target Organ	Liver and Kidneys	Blood; CNS
LD50	2250 mg/kg mouse oral	636 mg/kg rat oral
Structure		
Rationale	These chemicals have similar structures.	
References:	ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.	

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

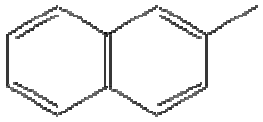
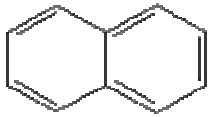
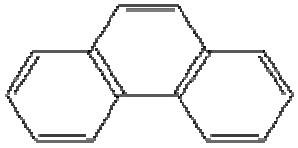
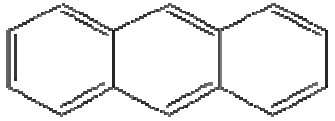
Parameter	Acenaphthylene	Acenaphthene	Benzo(ghi)perylene	Fluoranthene
Formula	$C_{12}H_8$	$C_{12}H_{10}$	$C_{22}H_{12}$	$C_{16}H_{10}$
Density	0.899	1.069	Not Available	Not Available
Refractive Index	Not Available	Not Available	Not Available	Not Available
Flash Point (^oC)	Not Available	Not Available	Not Available	Not Available
Molecular Weight	152.1952	154.211	276.3368	202.255
Melting Point (^oC)	93.5 - 94.5	95	278.3	110.8
Boiling Point (^oC)	265	279	500	375
Vapor Density	Not Available	5.32	Not Available	Not Available
Vapor Pressure	Not Available	Not Available	Not Available	Not Available
Water Solubility	0.000393 g/100 ml	0.000347 g/100 ml	0.000000026 g/100 ml	0.0000265 g/100 ml
Target Organ	Liver	Not Available	Not Available	Kidney, Liver
	Not classified as carcinogen.	Not classified as carcinogen.	Not classified as carcinogen.	Not classified as carcinogen.
LD50	1760 mg/kg mouse oral	2000 mg/kg rat oral	Not Available	2000 mg/kg rat oral
Structure				
Rationale	Both are polycyclic aromatic hydrocarbons with similar structures. Neither are classified as carcinogens.		Both are polycyclic aromatic hydrocarbons with similar structures. Neither are classified as carcinogens.	

References: ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; and ATSDR Tox Profiles.

Table 1

Rohm and Haas
Cincinnati Plant
Cincinnati, Hamilton County, Ohio

Surrogate Chemical Information

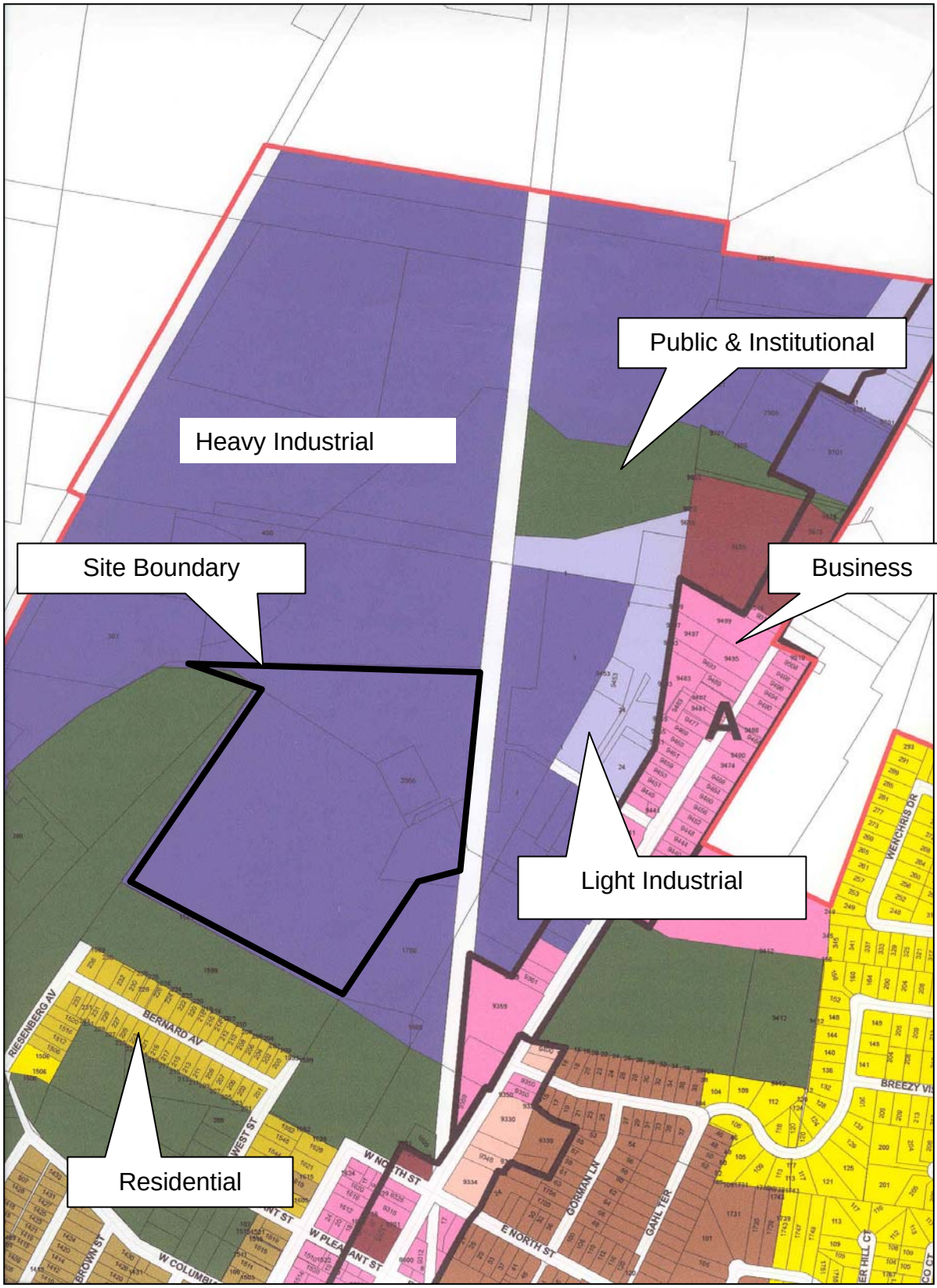
Parameter	2-Methylnaphthalene	Naphthalene	Phenanthrene	Anthracene
Formula	$C_{11}H_{10}$	$C_{10}H_8$	$C_{14}H_{10}$	$C_{14}H_{10}$
Density	1	0.997	1.063	1.28
Refractive Index	Not Available	Not Available	Not Available	Not Available
Flash Point (^oC)	97	78	Not Available	121
Molecular Weight	142.2	128.1732	178.233	178.233
Melting Point (^oC)	34.58	80.6	99.5	217.5
Boiling Point (^oC)	241	218	340	340
Vapor Density	Not Available	4.42	Not Available	6.2
Vapor Pressure	Not Available	0.05	Not Available	Not Available
Water Solubility	0.00246 g/100 ml	slightly solube. 0.0031 g/100 ml	0.000118 g/100 ml	Insoluble. 0.00000434 g/100 ml
Target Organ	Lung	Body weight, nasal	Not Available	Not Available
	Possible human carcinogen	Possible human carcinogen	Not classified as carcinogen	Not classified as carcinogen.
LD50	5135 mg/kg rat oral	533 mg/kg mouse oral	700 mg/kg mouse oral	490 mg/kg rat oral
Structure				
Rationale	Both are polycyclic aromatic hydrocarbons with relatively similar structures.		Both are polycyclic aromatic hydrocarbons with similar structures. Neither are classified as carcinogens.	

References: ChemFinder.com; Hazardous Substances Data Bank; Integrated Risk Information System; ATSDR Tox Profiles; and MSDS.

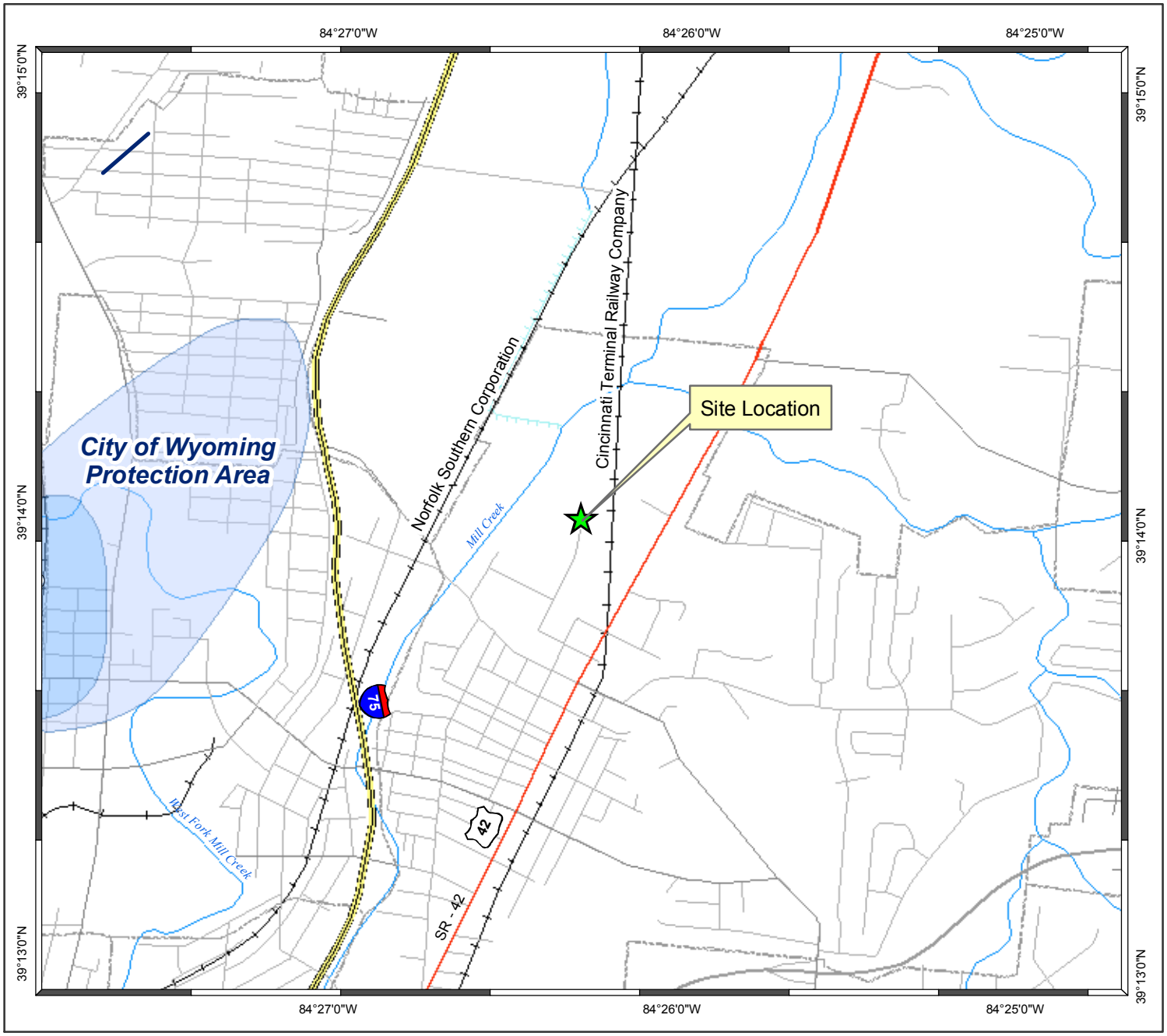
APPENDIX F

ZONING INFORMATION AND

OHIO EPA SOURCE DRINKING WATER PROTECTION MAP



City of Reading Zoning Map, 17 May 2002.



Legend

- Public Water System Wells
- Public Water System Surface Intakes

Source Water Protection Areas (ground water)

- Community Public Water Systems (inner and outer protection zones)
- Nontransient Noncommunity Public Water Systems
- Transient Noncommunity Public Water Systems

Source Water Protection Areas (surface water)

- Emergency Management Zone
- Corridor Management Zone
- Source Water Area
- Zone of Critical Concern - Ohio River
- Zone of High Concern - Ohio River
- Source Water Area - Ohio River
- Critical Area Zone - Lake Erie
- Potential Influence Zone - Lake Erie

- Sole Source Aquifer

Project Request

Drinking Water Source Protection Areas, Public Water System wells, and Sole Source Aquifers near 2000 West Street, Reading, Hamilton County, Ohio, for a human health and ecological risk assessment.

The Site Location was provided by Fan Wan Cahill, Parsons.

Requested by: Fan Wan Cahill, Parsons
Map completed by: Linda Slattery, Ohio EPA-DDAGW

Date: August 9, 2007

Disclaimer: Delineation of source water protection areas are ongoing. As a result, this map may not include all source water protection areas for public water systems in the area depicted.

0 0.25 0.5 1 Miles

OhioEPA
Division of Drinking and Ground Waters

Drinking Water Source Protection Areas

http://www.epa.state.oh.us/ddagw/pdu/swap.html

APPENDIX G

CALCULATION OF EXPOSURE POINT CONCENTRATIONS IN SOIL

Summary Statistics for VOCs

From File	C:\Documents and Settings\78495\My Documents\Rohm & Haas Cincinnati\Tables\95% UCL ready soil VOCs.xls										
Variable name		NumObs	Minimum	Maximum	Mean	Median	Sd	CV	Skewness	Variance	95% UCLs
Acetone		113	0.0019	95	2.29784	0.0125	9.966274	4.337236	7.688141	99.32662	11.62633
Benzene		114	0.0017	23.5	0.426455	0.002725	2.316108	5.431066	9.080675	5.364355	2.584816
Chlorobenzene		114	0.00053	42	0.789	0.002975	4.145364	5.253949	9.008209	17.18404	4.652027
Methylene chloride		113	0.0014	23.5	0.584534	0.0027	2.615538	4.474571	6.958582	6.84104	3.032692
Toluene		116	0.00052	240	7.088499	0.00275	32.29004	4.555272	5.395546	1042.647	36.91877

Data File	C:\Documents and Settings\78495\My Docum	Variable:	Acetone

Raw Statistics	
Number of Valid Samples	113
Number of Unique Samples	64
Minimum	0.0019
Maximum	95
Mean	2.29784
Median	0.0125
Standard Deviation	9.966274
Variance	99.32662
Coefficient of Variation	4.337236
Skewness	7.688141

Gamma Statistics	
k hat	0.19921
k star (bias corrected)	0.199821
Theta hat	11.53475
Theta star	11.49948
nu hat	45.02151
nu star	45.15959
Approx.Chi Square Value (.05)	30.7415
Adjusted Level of Significance	0.047876
Adjusted Chi Square Value	30.58809

Log-transformed Statistics	
Minimum of log data	-6.265901
Maximum of log data	4.553877
Mean of log data	-2.8645
Standard Deviation of log data	2.646006
Variance of log data	7.001347

RECOMMENDATION
Data are Non-parametric (0.05)
Use 99% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.423028
Lilliefors 5% Critical Value	0.083348
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	3.852831

Gamma Distribution Test	
A-D Test Statistic	14.80692
A-D 5% Critical Value	0.913487
K-S Test Statistic	0.30462
K-S 5% Critical Value	0.095397
Data do not follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	3.375551
Adjusted Gamma UCL	3.392481

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.273299
Lilliefors 5% Critical Value	0.083348
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	5.225589
95% Chebyshev (MVUE) UCL	4.920876
97.5% Chebyshev (MVUE) UCL	6.331593
99% Chebyshev (MVUE) UCL	9.102673

95% Non-parametric UCLs	
CLT UCL	3.839969
Adj-CLT UCL (Adjusted for skewness)	4.564499
Mod-t UCL (Adjusted for skewness)	3.965843
Jackknife UCL	3.852831
Standard Bootstrap UCL	3.837528
Bootstrap-t UCL	5.838175
Hall's Bootstrap UCL	9.050384
Percentile Bootstrap UCL	4.045983
BCA Bootstrap UCL	5.069611
95% Chebyshev (Mean, Sd) UCL	6.384518
97.5% Chebyshev (Mean, Sd) UCL	8.152826
99% Chebyshev (Mean, Sd) UCL	11.62633

Data File	C:\Documents and Settings\78495\My Docum	Variable:	Benzene

Raw Statistics	
Number of Valid Samples	114
Number of Unique Samples	49
Minimum	0.0017
Maximum	23.5
Mean	0.426455
Median	0.002725
Standard Deviation	2.316108
Variance	5.364355
Coefficient of Variation	5.431066
Skewness	9.080675

Gamma Statistics	
k hat	0.205828
k star (bias corrected)	0.20626
Theta hat	2.071898
Theta star	2.067564
nu hat	46.92889
nu star	47.02725
Approx.Chi Square Value (.05)	32.28759
Adjusted Level of Significance	0.047895
Adjusted Chi Square Value	32.13151

Log-transformed Statistics	
Minimum of log data	-6.377127
Maximum of log data	3.157
Mean of log data	-4.411628
Standard Deviation of log data	2.381093
Variance of log data	5.669605

RECOMMENDATION
Data are Non-parametric (0.05)
Use 99% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.427245
Lilliefors 5% Critical Value	0.082982
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	0.786212

Gamma Distribution Test	
A-D Test Statistic	19.19538
A-D 5% Critical Value	0.909968
K-S Test Statistic	0.376167
K-S 5% Critical Value	0.094967
Data do not follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	0.621137
Adjusted Gamma UCL	0.624154

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.372268
Lilliefors 5% Critical Value	0.082982
Data not lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	0.476677
95% Chebyshev (MVUE) UCL	0.506591
97.5% Chebyshev (MVUE) UCL	0.644037
99% Chebyshev (MVUE) UCL	0.914024

95% Non-parametric UCLs	
CLT UCL	0.783263
Adj-CLT UCL (Adjusted for skewness)	0.980393
Mod-t UCL (Adjusted for skewness)	0.81696
Jackknife UCL	0.786212
Standard Bootstrap UCL	0.777648
Bootstrap-t UCL	1.672333
Hall's Bootstrap UCL	1.924796
Percentile Bootstrap UCL	0.824785
BCA Bootstrap UCL	1.060007
95% Chebyshev (Mean, Sd) UCL	1.372003
97.5% Chebyshev (Mean, Sd) UCL	1.781141
99% Chebyshev (Mean, Sd) UCL	2.584816

Chlorobenzene

Data File	C:\Documents and Settings\78495\My Docum	Variable:	Chlorobenzene	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	114	Lilliefors Test Statisitic		0.424574
Number of Unique Samples	68	Lilliefors 5% Critical Value		0.082982
Minimum	0.00053	Data not normal at 5% significance level		
Maximum	42			
Mean	0.789	95% UCL (Assuming Normal Distribution)		
Median	0.002975	Student's-t UCL		1.432891
Standard Deviation	4.145364			
Variance	17.18404	Gamma Distribution Test		
Coefficient of Variation	5.253949	A-D Test Statistic		16.62737
Skewness	9.008209	A-D 5% Critical Value		0.921919
		K-S Test Statistic		0.288227
Gamma Statistics		K-S 5% Critical Value		0.095402
k hat	0.192119	Data do not follow gamma distribution		
k star (bias corrected)	0.192911	at 5% significance level		
Theta hat	4.106829			
Theta star	4.089964	95% UCLs (Assuming Gamma Distribution)		
nu hat	43.80312	Approximate Gamma UCL		1.165648
nu star	43.98374	Adjusted Gamma UCL		1.171529
Approx.Chi Square Value (.05)	29.77156			
Adjusted Level of Significance	0.047895	Lognormal Distribution Test		
Adjusted Chi Square Value	29.62209	Lilliefors Test Statisitic		0.29462
		Lilliefors 5% Critical Value		0.082982
Log-transformed Statistics		Data not lognormal at 5% significance level		
Minimum of log data	-7.542634			
Maximum of log data	3.73767	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	-4.091532	95% H-UCL		1.232009
Standard Deviation of log data	2.581662	95% Chebyshev (MVUE) UCL		1.202522
Variance of log data	6.664977	97.5% Chebyshev (MVUE) UCL		1.54278
		99% Chebyshev (MVUE) UCL		2.211152
		95% Non-parametric UCLs		
		CLT UCL		1.427612
		Adj-CLT UCL (Adjusted for skewness)		1.777619
		Mod-t UCL (Adjusted for skewness)		1.487485
		Jackknife UCL		1.432891
		Standard Bootstrap UCL		1.395424
		Bootstrap-t UCL		2.935202
RECOMMENDATION		Hall's Bootstrap UCL		3.472462
Data are Non-parametric (0.05)		Percentile Bootstrap UCL		1.53263
		BCA Bootstrap UCL		1.892415
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL		2.481337
		97.5% Chebyshev (Mean, Sd) UCL		3.213613
		99% Chebyshev (Mean, Sd) UCL		4.652027

Data File	C:\Documents and Settings\78495\My Docun	Variable:	Methylene chloride	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	113	Lilliefors Test Statisitic		0.433919
Number of Unique Samples	61	Lilliefors 5% Critical Value		0.083348
Minimum	0.0014	Data not normal at 5% significance level		
Maximum	23.5			
Mean	0.584534	95% UCL (Assuming Normal Distribution)		
Median	0.0027	Student's-t UCL		0.992624
Standard Deviation	2.615538			
Variance	6.84104	Gamma Distribution Test		
Coefficient of Variation	4.474571	A-D Test Statistic		18.42624
Skewness	6.958582	A-D 5% Critical Value		0.917778
		K-S Test Statistic		0.375694
Gamma Statistics		K-S 5% Critical Value		0.095546
k hat	0.195565	Data do not follow gamma distribution		
k star (bias corrected)	0.196273	at 5% significance level		
Theta hat	2.988948			
Theta star	2.978171	95% UCLs (Assuming Gamma Distribution)		
nu hat	44.19771	Approximate Gamma UCL		0.861995
nu star	44.35765	Adjusted Gamma UCL		0.866363
Approx.Chi Square Value (.05)	30.0797			
Adjusted Level of Significance	0.047876	Lognormal Distribution Test		
Adjusted Chi Square Value	29.92806	Lilliefors Test Statisitic		0.370396
		Lilliefors 5% Critical Value		0.083348
Log-transformed Statistics		Data not lognormal at 5% significance level		
Minimum of log data	-6.571283			
Maximum of log data	3.157	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	-4.313141	95% H-UCL		0.890935
Standard Deviation of log data	2.548521	95% Chebyshev (MVUE) UCL		0.879869
Variance of log data	6.49496	97.5% Chebyshev (MVUE) UCL		1.12752
		99% Chebyshev (MVUE) UCL		1.613981
		95% Non-parametric UCLs		
		CLT UCL		0.989249
		Adj-CLT UCL (Adjusted for skewness)		1.16135
		Mod-t UCL (Adjusted for skewness)		1.019468
		Jackknife UCL		0.992624
		Standard Bootstrap UCL		0.982168
		Bootstrap-t UCL		1.572119
RECOMMENDATION		Hall's Bootstrap UCL		2.368382
Data are Non-parametric (0.05)		Percentile Bootstrap UCL		1.022725
		BCA Bootstrap UCL		1.29089
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL		1.657037
		97.5% Chebyshev (Mean, Sd) UCL		2.12111
		99% Chebyshev (Mean, Sd) UCL		3.032692

Data File	C:\Documents and Settings\78495\My Docum	Variable:	Toluene

Raw Statistics	
Number of Valid Samples	116
Number of Unique Samples	66
Minimum	0.00052
Maximum	240
Mean	7.088499
Median	0.00275
Standard Deviation	32.29004
Variance	1042.647
Coefficient of Variation	4.555272
Skewness	5.395546

Gamma Statistics	
k hat	0.129545
k star (bias corrected)	0.131942
Theta hat	54.71832
Theta star	53.72433
nu hat	30.0545
nu star	30.61056
Approx.Chi Square Value (.05)	18.97142
Adjusted Level of Significance	0.047931
Adjusted Chi Square Value	18.85614

Log-transformed Statistics	
Minimum of log data	-7.561682
Maximum of log data	5.480639
Mean of log data	-4.099313
Standard Deviation of log data	3.185759
Variance of log data	10.14906

RECOMMENDATION
Data are Non-parametric (0.05)
Use 99% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.466674
Lilliefors 5% Critical Value	0.082263
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	12.05991
Gamma Distribution Test	
A-D Test Statistic	23.19686
A-D 5% Critical Value	0.99729
K-S Test Statistic	0.35404
K-S 5% Critical Value	0.097405
Data do not follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	11.43736
Adjusted Gamma UCL	11.50728
Lognormal Distribution Test	
Lilliefors Test Statisitic	0.345727
Lilliefors 5% Critical Value	0.082263
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	10.89167
95% Chebyshev (MVUE) UCL	7.31931
97.5% Chebyshev (MVUE) UCL	9.582806
99% Chebyshev (MVUE) UCL	14.02901
95% Non-parametric UCLs	
CLT UCL	12.01986
Adj-CLT UCL (Adjusted for skewness)	13.62468
Mod-t UCL (Adjusted for skewness)	12.31023
Jackknife UCL	12.05991
Standard Bootstrap UCL	12.15508
Bootstrap-t UCL	16.07936
Hall's Bootstrap UCL	12.56696
Percentile Bootstrap UCL	12.45289
BCA Bootstrap UCL	14.78723
95% Chebyshev (Mean, Sd) UCL	20.15672
97.5% Chebyshev (Mean, Sd) UCL	25.81135
99% Chebyshev (Mean, Sd) UCL	36.91877

Summary Statistics for SVOCs

From File	C:\Documents and Settings\78495\My Documents\Rohm & Haas Cincinnati\95% UCLs\Soil\95% UCL S-SVOCs.xls									
Variable name	NumObs	Minimum	Maximum	Mean	Median	Sd	CV	Skewness	Variance	UCLs
1,2-Dichlorobenzene	113	0.071	2800	27.44264	0.2	263.3216	9.595344	10.6092	69338.26	182.1388
1,4-Dichlorobenzene	113	0.062	170	3.999195	0.195	18.36853	4.593058	7.58166	337.4029	14.79034
Benzo(a)anthracene	113	0.07	85	2.751814	0.195	9.679296	3.517423	6.454189	93.68876	8.438207
Benzo(a)pyrene	113	0.085	85	2.759779	0.195	9.681296	3.507997	6.447923	93.72748	8.447346
Benzo(b)fluoranthene	113	0.07	85	2.766602	0.195	9.684213	3.5004	6.440292	93.78399	8.455883
bis(2-Ethylhexyl) phtha	113	0.033	150	4.108496	0.195	17.04935	4.14978	6.826728	290.6804	14.12465

Data File	C:\Documents and Settings\78495\My Docun	Variable:	1,2-Dichlorobenzene

Raw Statistics	
Number of Valid Samples	113
Number of Unique Samples	39
Minimum	0.071
Maximum	2800
Mean	27.44264
Median	0.2
Standard Deviation	263.3216
Variance	69338.26
Coefficient of Variation	9.595344
Skewness	10.6092

Gamma Statistics	
k hat	0.179633
k star (bias corrected)	0.180764
Theta hat	152.7706
Theta star	151.815
nu hat	40.59707
nu star	40.8526
Approx.Chi Square Value (.05)	27.20271
Adjusted Level of Significance	0.047876
Adjusted Chi Square Value	27.05899

Log-transformed Statistics	
Minimum of log data	-2.645075
Maximum of log data	7.937375
Mean of log data	-0.853131
Standard Deviation of log data	1.713871
Variance of log data	2.937354

RECOMMENDATION

Data are Non-parametric (0.05)

Use 97.5% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.483211
Lilliefors 5% Critical Value	0.083348
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	68.52749

Gamma Distribution Test	
A-D Test Statistic	31.57203
A-D 5% Critical Value	0.936535
K-S Test Statistic	0.412917
K-S 5% Critical Value	0.096197
Data do not follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	41.21293
Adjusted Gamma UCL	41.43182

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.38075
Lilliefors 5% Critical Value	0.083348
Data not lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	2.975419
95% Chebyshev (MVUE) UCL	3.659921
97.5% Chebyshev (MVUE) UCL	4.467222
99% Chebyshev (MVUE) UCL	6.05301

95% Non-parametric UCLs	
CLT UCL	68.18766
Adj-CLT UCL (Adjusted for skewness)	94.6039
Mod-t UCL (Adjusted for skewness)	72.64789
Jackknife UCL	68.52749
Standard Bootstrap UCL	67.63772
Bootstrap-t UCL	1382.625
Hall's Bootstrap UCL	770.909
Percentile Bootstrap UCL	77.30049
BCA Bootstrap UCL	126.7811
95% Chebyshev (Mean, Sd) UCL	135.4179
97.5% Chebyshev (Mean, Sd) UCL	182.1388
99% Chebyshev (Mean, Sd) UCL	273.9131

Data File	C:\Documents and Settings\78495\My Docun	Variable:	1,4-Dichlorobenzene

Raw Statistics	
Number of Valid Samples	113
Number of Unique Samples	35
Minimum	0.062
Maximum	170
Mean	3.999195
Median	0.195
Standard Deviation	18.36853
Variance	337.4029
Coefficient of Variation	4.593058
Skewness	7.58166

Gamma Statistics	
k hat	0.2962
k star (bias corrected)	0.294236
Theta hat	13.50165
Theta star	13.59177
nu hat	66.94129
nu star	66.49742
Approx.Chi Square Value (.05)	48.72816
Adjusted Level of Significance	0.047876
Adjusted Chi Square Value	48.53235

Log-transformed Statistics	
Minimum of log data	-2.780621
Maximum of log data	5.135798
Mean of log data	-0.94679
Standard Deviation of log data	1.56484
Variance of log data	2.448724

RECOMMENDATION

Data are Non-parametric (0.05)

Use 97.5% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.415139
Lilliefors 5% Critical Value	0.083348
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	6.865151

Gamma Distribution Test	
A-D Test Statistic	26.39975
A-D 5% Critical Value	0.869521
K-S Test Statistic	0.440041
K-S 5% Critical Value	0.093519
Data do not follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	5.457545
Adjusted Gamma UCL	5.479565

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.408066
Lilliefors 5% Critical Value	0.083348
Data not lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	1.986492
95% Chebyshev (MVUE) UCL	2.464144
97.5% Chebyshev (MVUE) UCL	2.972462
99% Chebyshev (MVUE) UCL	3.970956

95% Non-parametric UCLs	
CLT UCL	6.841446
Adj-CLT UCL (Adjusted for skewness)	8.158309
Mod-t UCL (Adjusted for skewness)	7.070555
Jackknife UCL	6.865151
Standard Bootstrap UCL	6.788584
Bootstrap-t UCL	13.06121
Hall's Bootstrap UCL	17.13447
Percentile Bootstrap UCL	7.085319
BCA Bootstrap UCL	8.819102
95% Chebyshev (Mean, Sd) UCL	11.53122
97.5% Chebyshev (Mean, Sd) UCL	14.79034
99% Chebyshev (Mean, Sd) UCL	21.19224

Data File	C:\Documents and Settings\78495\My Docun	Variable:	Benzo(a)anthracene	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	113	Lilliefors Test Statisitic		0.411763
Number of Unique Samples	39	Lilliefors 5% Critical Value		0.083348
Minimum	0.07	Data not normal at 5% significance level		
Maximum	85			
Mean	2.751814	95% UCL (Assuming Normal Distribution)		
Median	0.195	Student's-t UCL		4.26203
Standard Deviation	9.679296			
Variance	93.68876	Gamma Distribution Test		
Coefficient of Variation	3.517423	A-D Test Statistic		25.09828
Skewness	6.454189	A-D 5% Critical Value		0.857118
		K-S Test Statistic		0.434821
Gamma Statistics		K-S 5% Critical Value		0.092926
k hat	0.343621	Data do not follow gamma distribution		
k star (bias corrected)	0.340398	at 5% significance level		
Theta hat	8.008285			
Theta star	8.08411	95% UCLs (Assuming Gamma Distribution)		
nu hat	77.65832	Approximate Gamma UCL		3.667521
nu star	76.92993	Adjusted Gamma UCL		3.681172
Approx.Chi Square Value (.05)	57.72205			
Adjusted Level of Significance	0.047876	Lognormal Distribution Test		
Adjusted Chi Square Value	57.508	Lilliefors Test Statisitic		0.402383
		Lilliefors 5% Critical Value		0.083348
Log-transformed Statistics		Data not lognormal at 5% significance level		
Minimum of log data	-2.65926			
Maximum of log data	4.442651	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	-0.950529	95% H-UCL		1.814296
Standard Deviation of log data	1.520519	95% Chebyshev (MVUE) UCL		2.252825
Variance of log data	2.311977	97.5% Chebyshev (MVUE) UCL		2.707507
		99% Chebyshev (MVUE) UCL		3.600643
		95% Non-parametric UCLs		
		CLT UCL		4.249538
		Adj-CLT UCL (Adjusted for skewness)		4.840266
		Mod-t UCL (Adjusted for skewness)		4.354171
		Jackknife UCL		4.26203
		Standard Bootstrap UCL		4.243932
		Bootstrap-t UCL		6.097488
RECOMMENDATION		Hall's Bootstrap UCL		10.49207
Data are Non-parametric (0.05)		Percentile Bootstrap UCL		4.412058
		BCA Bootstrap UCL		5.084314
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL		6.720816
		97.5% Chebyshev (Mean, Sd) UCL		8.438207
		99% Chebyshev (Mean, Sd) UCL		11.81169

Data File	C:\Documents and Settings\78495\My Docum	Variable:	Benzo(a)pyrene

Raw Statistics	
Number of Valid Samples	113
Number of Unique Samples	37
Minimum	0.085
Maximum	85
Mean	2.759779
Median	0.195
Standard Deviation	9.681296
Variance	93.72748
Coefficient of Variation	3.507997
Skewness	6.447923

Gamma Statistics	
k hat	0.344557
k star (bias corrected)	0.341309
Theta hat	8.009638
Theta star	8.085856
nu hat	77.86993
nu star	77.13592
Approx.Chi Square Value (.05)	57.90066
Adjusted Level of Significance	0.047876
Adjusted Chi Square Value	57.68627

Log-transformed Statistics	
Minimum of log data	-2.465104
Maximum of log data	4.442651
Mean of log data	-0.941437
Standard Deviation of log data	1.516356
Variance of log data	2.299335

Normal Distribution Test	
Lilliefors Test Statisitic	0.412068
Lilliefors 5% Critical Value	0.083348
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	4.270306

Gamma Distribution Test	
A-D Test Statistic	25.44544
A-D 5% Critical Value	0.856888
K-S Test Statistic	0.442327
K-S 5% Critical Value	0.092915
Data do not follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	3.676609
Adjusted Gamma UCL	3.690273

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.406127
Lilliefors 5% Critical Value	0.083348
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	1.816207
95% Chebyshev (MVUE) UCL	2.255338
97.5% Chebyshev (MVUE) UCL	2.709572
99% Chebyshev (MVUE) UCL	3.601827

95% Non-parametric UCLs	
CLT UCL	4.257812
Adj-CLT UCL (Adjusted for skewness)	4.848088
Mod-t UCL (Adjusted for skewness)	4.362378
Jackknife UCL	4.270306
Standard Bootstrap UCL	4.312851
Bootstrap-t UCL	5.920305
Hall's Bootstrap UCL	10.44413
Percentile Bootstrap UCL	4.317035
BCA Bootstrap UCL	5.018872
95% Chebyshev (Mean, Sd) UCL	6.729601
97.5% Chebyshev (Mean, Sd) UCL	8.447346
99% Chebyshev (Mean, Sd) UCL	11.82152

RECOMMENDATION

Data are Non-parametric (0.05)

Use 97.5% Chebyshev (Mean, Sd) UCL

Data File	C:\Documents and Settings\78495\My Docun	Variable:	Benzo(b)fluoranthene

Raw Statistics	
Number of Valid Samples	113
Number of Unique Samples	39
Minimum	0.07
Maximum	85
Mean	2.766602
Median	0.195
Standard Deviation	9.684213
Variance	93.78399
Coefficient of Variation	3.5004
Skewness	6.440292

Gamma Statistics	
k hat	0.343457
k star (bias corrected)	0.340238
Theta hat	8.055161
Theta star	8.131362
nu hat	77.62129
nu star	76.89388
Approx.Chi Square Value (.05)	57.6908
Adjusted Level of Significance	0.047876
Adjusted Chi Square Value	57.47681

Log-transformed Statistics	
Minimum of log data	-2.65926
Maximum of log data	4.442651
Mean of log data	-0.946259
Standard Deviation of log data	1.52459
Variance of log data	2.324374

RECOMMENDATION

Data are Non-parametric (0.05)

Use 97.5% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.412319
Lilliefors 5% Critical Value	0.083348
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	4.277585

Gamma Distribution Test	
A-D Test Statistic	25.02206
A-D 5% Critical Value	0.857158
K-S Test Statistic	0.432386
K-S 5% Critical Value	0.092928
Data do not follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	3.687499
Adjusted Gamma UCL	3.701227

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.394189
Lilliefors 5% Critical Value	0.083348
Data not lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	1.83648
95% Chebyshev (MVUE) UCL	2.28022
97.5% Chebyshev (MVUE) UCL	2.741374
99% Chebyshev (MVUE) UCL	3.647223

95% Non-parametric UCLs	
CLT UCL	4.265087
Adj-CLT UCL (Adjusted for skewness)	4.854842
Mod-t UCL (Adjusted for skewness)	4.369575
Jackknife UCL	4.277585
Standard Bootstrap UCL	4.247801
Bootstrap-t UCL	5.775886
Hall's Bootstrap UCL	10.46924
Percentile Bootstrap UCL	4.406257
BCA Bootstrap UCL	5.054403
95% Chebyshev (Mean, Sd) UCL	6.73762
97.5% Chebyshev (Mean, Sd) UCL	8.455883
99% Chebyshev (Mean, Sd) UCL	11.83108

Data File	C:\Documents and Settings\78495\My Docun	Variable:	bis(2-Ethylhexyl) phthalate

Raw Statistics	
Number of Valid Samples	113
Number of Unique Samples	42
Minimum	0.033
Maximum	150
Mean	4.108496
Median	0.195
Standard Deviation	17.04935
Variance	290.6804
Coefficient of Variation	4.14978
Skewness	6.826728

Gamma Statistics	
k hat	0.29164
k star (bias corrected)	0.289797
Theta hat	14.08756
Theta star	14.17715
nu hat	65.91062
nu star	65.49411
Approx.Chi Square Value (.05)	47.86901
Adjusted Level of Significance	0.047876
Adjusted Chi Square Value	47.67502

Log-transformed Statistics	
Minimum of log data	-3.411248
Maximum of log data	5.010635
Mean of log data	-0.962309
Standard Deviation of log data	1.627104
Variance of log data	2.647467

Normal Distribution Test	
Lilliefors Test Statisitic	0.408436
Lilliefors 5% Critical Value	0.083348
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	6.768627

Gamma Distribution Test	
A-D Test Statistic	25.96118
A-D 5% Critical Value	0.871561
K-S Test Statistic	0.444905
K-S 5% Critical Value	0.093607
Data do not follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	5.62122
Adjusted Gamma UCL	5.644093

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.401173
Lilliefors 5% Critical Value	0.083348
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	2.219151
95% Chebyshev (MVUE) UCL	2.745738
97.5% Chebyshev (MVUE) UCL	3.328903
99% Chebyshev (MVUE) UCL	4.474416

95% Non-parametric UCLs	
CLT UCL	6.746624
Adj-CLT UCL (Adjusted for skewness)	7.847206
Mod-t UCL (Adjusted for skewness)	6.940296
Jackknife UCL	6.768627
Standard Bootstrap UCL	6.776064
Bootstrap-t UCL	11.14818
Hall's Bootstrap UCL	16.98311
Percentile Bootstrap UCL	6.984093
BCA Bootstrap UCL	8.289845
95% Chebyshev (Mean, Sd) UCL	11.09959
97.5% Chebyshev (Mean, Sd) UCL	14.12465
99% Chebyshev (Mean, Sd) UCL	20.06678

RECOMMENDATION

Data are Non-parametric (0.05)

Use 97.5% Chebyshev (Mean, Sd) UCL

Summary Statistics for PES

From File	C:\Documents and Settings\78495\My Documents\Rohm & Haas Cincinnati\95% UCLs\Soil\95% UCL S-PES.xls									
Variable name	NumObs	Minimum	Maximum	Mean	Median	Sd	CV	Skewness	Variance	UCLs
Endrin	113	0.00048	3.1	0.082064	0.00105	0.334475	4.075803	7.215703	0.111873	0.395134
Aroclor 1254	113	0.017	37.5	1.104438	0.0195	5.247801	4.751558	5.889357	27.53942	4.187416

Data File	C:\Documents and Settings\78495\My Docun	Variable:	Endrin		
Raw Statistics		Normal Distribution Test			
Number of Valid Samples	113	Lilliefors Test Statisitic			0.403648
Number of Unique Samples	40	Lilliefors 5% Critical Value			0.083348
Minimum	0.00048	Data not normal at 5% significance level			
Maximum	3.1				
Mean	0.082064	95% UCL (Assuming Normal Distribution)			
Median	0.00105	Student's-t UCL			0.13425
Standard Deviation	0.334475				
Variance	0.111873	Gamma Distribution Test			
Coefficient of Variation	4.075803	A-D Test Statistic			18.04217
Skewness	7.215703	A-D 5% Critical Value			0.894089
		K-S Test Statistic			0.332623
Gamma Statistics		K-S 5% Critical Value			0.094573
k hat	0.241284	Data do not follow gamma distribution			
k star (bias corrected)	0.240777	at 5% significance level			
Theta hat	0.340112				
Theta star	0.340827	95% UCLs (Assuming Gamma Distribution)			
nu hat	54.53007	Approximate Gamma UCL			0.1161
nu star	54.41571	Adjusted Gamma UCL			0.116624
Approx.Chi Square Value (.05)	38.46307				
Adjusted Level of Significance	0.047876	Lognormal Distribution Test			
Adjusted Chi Square Value	38.29026	Lilliefors Test Statisitic			0.310363
		Lilliefors 5% Critical Value			0.083348
Log-transformed Statistics		Data not lognormal at 5% significance level			
Minimum of log data	-7.641724				
Maximum of log data	1.131402	95% UCLs (Assuming Lognormal Distribution)			
Mean of log data	-5.460922	95% H-UCL			0.086526
Standard Deviation of log data	2.150607	95% Chebyshev (MVUE) UCL			0.098732
Variance of log data	4.62511	97.5% Chebyshev (MVUE) UCL			0.124037
		99% Chebyshev (MVUE) UCL			0.173745
		95% Non-parametric UCLs			
		CLT UCL			0.133818
		Adj-CLT UCL (Adjusted for skewness)			0.15664
		Mod-t UCL (Adjusted for skewness)			0.13781
		Jackknife UCL			0.13425
		Standard Bootstrap UCL			0.132569
		Bootstrap-t UCL			0.199006
RECOMMENDATION		Hall's Bootstrap UCL			0.307649
Data are Non-parametric (0.05)		Percentile Bootstrap UCL			0.136041
		BCA Bootstrap UCL			0.171027
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL			0.219215
		97.5% Chebyshev (Mean, Sd) UCL			0.278561
		99% Chebyshev (Mean, Sd) UCL			0.395134

Data File	C:\Documents and Settings\78495\My Docum	Variable:	Aroclor 1254

Raw Statistics	
Number of Valid Samples	113
Number of Unique Samples	33
Minimum	0.017
Maximum	37.5
Mean	1.104438
Median	0.0195
Standard Deviation	5.247801
Variance	27.53942
Coefficient of Variation	4.751558
Skewness	5.889357

Gamma Statistics	
k hat	0.217123
k star (bias corrected)	0.217259
Theta hat	5.086685
Theta star	5.083516
nu hat	49.06988
nu star	49.10047
Approx.Chi Square Value (.05)	34.0113
Adjusted Level of Significance	0.047876
Adjusted Chi Square Value	33.8494

Log-transformed Statistics	
Minimum of log data	-4.074542
Maximum of log data	3.624341
Mean of log data	-3.246603
Standard Deviation of log data	1.742938
Variance of log data	3.037832

RECOMMENDATION
Data are Non-parametric (0.05)
Use 97.5% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.449456
Lilliefors 5% Critical Value	0.083348
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	1.923228

Gamma Distribution Test	
A-D Test Statistic	32.65213
A-D 5% Critical Value	0.904897
K-S Test Statistic	0.478232
K-S 5% Critical Value	0.095036
Data do not follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	1.594424
Adjusted Gamma UCL	1.60205

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.42964
Lilliefors 5% Critical Value	0.083348
Data not lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	0.289587
95% Chebyshev (MVUE) UCL	0.355283
97.5% Chebyshev (MVUE) UCL	0.434597
99% Chebyshev (MVUE) UCL	0.590393

95% Non-parametric UCLs	
CLT UCL	1.916456
Adj-CLT UCL (Adjusted for skewness)	2.208701
Mod-t UCL (Adjusted for skewness)	1.968812
Jackknife UCL	1.923228
Standard Bootstrap UCL	1.93685
Bootstrap-t UCL	2.899267
Hall's Bootstrap UCL	2.461035
Percentile Bootstrap UCL	2.002381
BCA Bootstrap UCL	2.345664
95% Chebyshev (Mean, Sd) UCL	3.256303
97.5% Chebyshev (Mean, Sd) UCL	4.187416
99% Chebyshev (Mean, Sd) UCL	6.016408

Summary Statistics for Raw Data

From File	C:\Documents and Settings\78495\My Documents\Rohm & Haas Cincinnati\95% UCLs\Soil\95% UCL S-Metals.xls										
Variable name		NumObs	Minimum	Maximum	Mean	Median	Sd	CV	Skewness	Variance	UCLs
Antimony		120	0.27	8.9	0.662167	0.6	0.773188	1.167664	10.36933	0.59782	0.779175
Arsenic		124	0.75	16.2	5.47629	5.3	3.236344	0.590974	0.92058	10.47392	5.957966
Chromium		129	0.55	388	17.95364	10.6	40.83655	2.274555	7.110286	1667.624	33.62588

Data File	C:\Documents and Settings\78495\My Docun	Variable:	Antimony		
Raw Statistics		Normal Distribution Test			
Number of Valid Samples	120	Lilliefors Test Statisitic			0.467785
Number of Unique Samples	14	Lilliefors 5% Critical Value			0.08088
Minimum	0.27	Data not normal at 5% significance level			
Maximum	8.9				
Mean	0.662167	95% UCL (Assuming Normal Distribution)			
Median	0.6	Student's-t UCL			0.779175
Standard Deviation	0.773188				
Variance	0.59782	Gamma Distribution Test			
Coefficient of Variation	1.167664	A-D Test Statistic			1.8E+308
Skewness	10.36933	A-D 5% Critical Value			0.754984
		K-S Test Statistic			0.413673
Gamma Statistics		K-S 5% Critical Value			0.084461
k hat	4.818414	Data do not follow gamma distribution			
k star (bias corrected)	4.70351	at 5% significance level			
Theta hat	0.137424				
Theta star	0.140781	95% UCLs (Assuming Gamma Distribution)			
nu hat	1156.419	Approximate Gamma UCL			0.710653
nu star	1128.842	Adjusted Gamma UCL			0.711257
Approx.Chi Square Value (.05)	1051.824				
Adjusted Level of Significance	0.048	Lognormal Distribution Test			
Adjusted Chi Square Value	1050.931	Lilliefors Test Statisitic			0.363683
		Lilliefors 5% Critical Value			0.08088
Log-transformed Statistics		Data not lognormal at 5% significance level			
Minimum of log data	-1.309333				
Maximum of log data	2.186051	95% UCLs (Assuming Lognormal Distribution)			
Mean of log data	-0.519581	95% H-UCL			0.655076
Standard Deviation of log data	0.308603	95% Chebyshev (MVUE) UCL			0.701762
Variance of log data	0.095236	97.5% Chebyshev (MVUE) UCL			0.735618
		99% Chebyshev (MVUE) UCL			0.802122
		95% Non-parametric UCLs			
		CLT UCL			0.778264
		Adj-CLT UCL (Adjusted for skewness)			0.849653
		Mod-t UCL (Adjusted for skewness)			0.79031
		Jackknife UCL			0.779175
		Standard Bootstrap UCL			0.77905
		Bootstrap-t UCL			1.324665
RECOMMENDATION		Hall's Bootstrap UCL			1.560144
Data are Non-parametric (0.05)		Percentile Bootstrap UCL			0.800333
		BCA Bootstrap UCL			0.8975
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL			0.969827
or Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL			1.102952
		99% Chebyshev (Mean, Sd) UCL			1.36445

Data File	C:\Documents and Settings\78495\My Docum	Variable:	Arsenic	

Raw Statistics	
Number of Valid Samples	124
Number of Unique Samples	81
Minimum	0.75
Maximum	16.2
Mean	5.47629
Median	5.3
Standard Deviation	3.236344
Variance	10.47392
Coefficient of Variation	0.590974
Skewness	0.92058

Gamma Statistics	
k hat	2.50443
k star (bias corrected)	2.449215
Theta hat	2.186641
Theta star	2.235937
nu hat	621.0986
nu star	607.4054
Approx.Chi Square Value (.05)	551.2231
Adjusted Level of Significance	0.048065
Adjusted Chi Square Value	550.6004

Log-transformed Statistics	
Minimum of log data	-0.287682
Maximum of log data	2.785011
Mean of log data	1.487693
Standard Deviation of log data	0.721546
Variance of log data	0.520628

RECOMMENDATION
Data are normal (0.05)
Use Student's-t UCL

Normal Distribution Test	
Lilliefors Test Statisitic	0.072093
Lilliefors 5% Critical Value	0.079565
Data are normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	5.957966

Gamma Distribution Test	
A-D Test Statistic	1.671317
A-D 5% Critical Value	0.762146
K-S Test Statistic	0.106107
K-S 5% Critical Value	0.084092
Data do not follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	6.03445
Adjusted Gamma UCL	6.041275

Lognormal Distribution Test	
Lilliefors Test Statisitic	0.149859
Lilliefors 5% Critical Value	0.079565
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	6.524591
95% Chebyshev (MVUE) UCL	7.528673
97.5% Chebyshev (MVUE) UCL	8.307797
99% Chebyshev (MVUE) UCL	9.838236

95% Non-parametric UCLs	
CLT UCL	5.954338
Adj-CLT UCL (Adjusted for skewness)	5.980011
Mod-t UCL (Adjusted for skewness)	5.96197
Jackknife UCL	5.957966
Standard Bootstrap UCL	5.949948
Bootstrap-t UCL	5.997476
Hall's Bootstrap UCL	5.997725
Percentile Bootstrap UCL	5.987016
BCA Bootstrap UCL	5.965
95% Chebyshev (Mean, Sd) UCL	6.743127
97.5% Chebyshev (Mean, Sd) UCL	7.291288
99% Chebyshev (Mean, Sd) UCL	8.368044

Data File	C:\Documents and Settings\78495\My Docun	Variable:	Chromium	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	129	Lilliefors Test Statisitic		0.392794
Number of Unique Samples	103	Lilliefors 5% Critical Value		0.078008
Minimum	0.55	Data not normal at 5% significance level		
Maximum	388			
Mean	17.95364	95% UCL (Assuming Normal Distribution)		
Median	10.6	Student's-t UCL		23.91076
Standard Deviation	40.83655			
Variance	1667.624	Gamma Distribution Test		
Coefficient of Variation	2.274555	A-D Test Statistic		11.13969
Skewness	7.110286	A-D 5% Critical Value		0.782335
		K-S Test Statistic		0.255612
Gamma Statistics		K-S 5% Critical Value		0.084352
k hat	1.034702	Data do not follow gamma distribution		
k star (bias corrected)	1.015807	at 5% significance level		
Theta hat	17.35151			
Theta star	17.67426	95% UCLs (Assuming Gamma Distribution)		
nu hat	266.9531	Approximate Gamma UCL		20.85816
nu star	262.0782	Adjusted Gamma UCL		20.89328
Approx.Chi Square Value (.05)	225.5836			
Adjusted Level of Significance	0.04814	Lognormal Distribution Test		
Adjusted Chi Square Value	225.2045	Lilliefors Test Statisitic		0.147565
		Lilliefors 5% Critical Value		0.078008
Log-transformed Statistics		Data not lognormal at 5% significance level		
Minimum of log data	-0.597837			
Maximum of log data	5.961005	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	2.332143	95% H-UCL		17.64839
Standard Deviation of log data	0.870718	95% Chebyshev (MVUE) UCL		20.79649
Variance of log data	0.758149	97.5% Chebyshev (MVUE) UCL		23.31016
		99% Chebyshev (MVUE) UCL		28.24778
		95% Non-parametric UCLs		
		CLT UCL		23.86765
		Adj-CLT UCL (Adjusted for skewness)		26.27271
		Mod-t UCL (Adjusted for skewness)		24.2859
		Jackknife UCL		23.91076
		Standard Bootstrap UCL		23.85778
		Bootstrap-t UCL		31.95469
RECOMMENDATION		Hall's Bootstrap UCL		45.16446
Data are Non-parametric (0.05)		Percentile Bootstrap UCL		24.33907
		BCA Bootstrap UCL		26.75473
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL		33.62588
		97.5% Chebyshev (Mean, Sd) UCL		40.40727
		99% Chebyshev (Mean, Sd) UCL		53.728

APPENDIX H

CHEMICAL/PHYSICAL CONSTANTS

FOR

CHEMICALS OF POTENTIAL CONCERN

APPENDIX H
PHYSICAL PROPERTIES FOR CHEMICALS OF POTENTIAL CONCERN
ROHM AND HAAS CHEMICALS LLC
Reading, Ohio

		Parameter Value[a/]													
COPC[b/]	CAS Number[c/]	H'	Ref[d/]	D^{air} (cm^2/s)[e/]	Ref	D^{wat} (cm^2/s)[e/]	Ref	Koc (L/kg)[e/]	Ref	Kd (cm^3/g)[e/]	Ref	OAF	Ref	DAF	Ref
Volatile Organic Compounds															
1,2-Dichlorobenzene	95-50-1	0.0779	SSL	0.069	SSL	0.0000079	SSL	617	SSL	3.702	CA	**[f/]	U	--[g/]	
1,4-Dichlorobenzene	106-46-7	0.0996	SSL	0.069	SSL	0.0000079	SSL	617	SSL	3.702	CA	**	B	--	
Acetone	67-64-1	0.00159	SSL	0.124	SSL	0.0000114	SSL	0.575	SSL	0.00345	CA	**	B	--	
Benzene	71-43-2	0.228	SSL	0.088	SSL	0.0000098	SSL	58.9	SSL	0.3534	CA	**	B	--	
Chlorobenzene	108-90-7	0.152	SSL	0.073	SSL	0.0000087	SSL	219	SSL	1.314	CA	0.31	B	--	
Chloroform	67-66-3	0.15	SSL	0.104	SSL	0.00001	SSL	39.8	SSL	0.0796	CA	0.2	B	--	
1,2-Dichloroehane	107-06-2	0.0401	SSL	0.104	SSL	9.9E-06	SSL	17.4	SSL	0.0348	CA	1	B	--	
Methylene Chloride	75-09-2	0.0898	SSL	0.101	SSL	0.0000117	SSL	11.7	SSL	0.0702	CA	**	B	--	
Tetrachloroethene	127-18-4	0.754	SSL	0.072	SSL	8.2E-06	SSL	155	SSL	0.31	CA	1	B	--	
Toluene	108-88-3	0.272	SSL	0.087	SSL	0.0000086	SSL	182	SSL	1.092	CA	**	B	--	
Trichloroethene	79-01-6	0.422	SSL	0.079	SSL	9.1E-06	SSL	166	SSL	0.332	CA	0.15	B	--	
Vinyl Chloride	75-01-04	1.11	SSL	0.106	SSL	1.23E-05	SSL	18.6	SSL	0.0372	CA	1	U	--	
Semivolatile Organic Compounds															
4-Methylphenol	106445	0.0000409	EPI	0.074	W9	0.00005	W9	434	EPI	8.68	CA	1	NA	0.1	D
Aniline	62533	0.0000826	EPI	--		--		--		--		1		--	
Benzo(a)anthracene	56-55-3	0.000137	SSL	0.051	SSL	0.000009	SSL	398000	SSL	2388	CA	**	U	0.13	U
Benzo(a)pyrene	50-32-8	0.0000463	SSL	0.043	SSL	0.000009	SSL	1020000	SSL	6120	CA	**	U	0.13	U
Benzo(b)fluoranthene	205-99-2	0.00455	SSL	0.0226	SSL	5.56E-06	SSL	1230000	SSL	7380	CA	**	U	0.13	U
PCB-1254 (Arochlor 1254)	11097-69-1	0.0116	EPI	0.0202	W9	0.000005	W9	75600	EPI	453.6	CA	**	U	0.14	U
bis(2-Ethylhexyl) Phthalate	117-81-7	4.18E-06	SSL	0.0351	SSL	3.66E-06	SSL	1.51E+07	SSL	90600	CA	0.19	B	0.1	U

Pesticides/Herbicides															
beta-BHC	319857	0.0000305	SSL	0.0142	SSL	7.34E-06	SSL	1260	SSL	2.52	CA	1	B	0.1	U
delta-BHC	319868	0.0000175	EPI	0.0221	W9	5.57E-06	W9	3380	EPI	6.76	CA	1	I	0.04	U
gamma-BHC	58899	0.000574	SSL	0.0142	SSL	7.34E-06	SSL	1070	SSL	2.14	CA	1	U	0.04	U
4,4-DDE	72559	0.000861	SSL	0.0144	SSL	5.87E-06	SSL	4470000	SSL	8940	CA	1	B	0.1	U
Dieldrin	60571	0.000619	SSL	0.0125	SSL	4.74E-06	SSL	21400	SSL	42.8	CA	0.5	B	0.1	U
Endrin	72-20-8	0.000308	SSL	0.0125	SSL	4.74E-06	SSL	12300	SSL	73.8	CA	0.02	B	0.1	U
Heptachlor	76448	0.0447	SSL	0.0112	SSL	5.69E-06	SSL	1410000	SSL	2820	CA	1	B	0.1	U
Heptachlor epoxide	102473	0.00039	SSL	0.0132	SSL	4.23E-06	SSL	83200	SSL	166.4	CA	1	B	0.1	D
Inorganics															
Aluminum	7429905	--	NU	--	NU	--	NU	--	NU	1500	BAES	1	U	--	
Antimony	7440-36-0	--	NU	--	NU	--	NU	--	NU	45	SSL	0.15	U	--	
Arsenic	7440-38-2	--	NU	--	NU	--	NU	--	NU	31	SSL	**	U	0.03	U
Cadmium	7440439	--	NU	--	NU	--	NU	--	NU	4300	SSL	0.025	U	0.001	U
Chromium, Total	7440-47-3	--	NU	--	NU	--	NU	--	NU	14	SSL	0.013	U	--	
Copper	7440508	--	NU	--	NU	--	NU	--	NU	35	BAES	0.3	B	--	
Iron	7439896	--	NU	--	NU	--	NU	--	NU	--	NU	1	U	--	
Lead	7439821	--	NU	--	NU	--	NU	--	NU	900	BAES	0.15	B	--	
Manganese	7439965	--	NU	--	NU	--	NU	--	NU	65	BAES	0.04	U	--	
Nickel	7440020	--	NU	--	NU	--	NU	--	NU	1900	SSL	0.04	U	--	
Thallium	7446186	--	NU	--	NU	--	NU	--	NU	96	SSL	1	U	--	
Vanadium	7440622	--	NU	--	NU	--	NU	--	NU	1000	SSL	0.026	U	--	

[a/] Parameters defined as: H' = Henry's law constant (unitless); D^{air} = Diffusivity in air; D^{wat} = Diffusivity in water; Koc = Organic carbon partition coefficient; Kd = Soil-water partition coefficient; OAF = Oral absorption factor; DAF = Dermal absorption factor.

[b/] COPC = Chemical of potential concern.

[c/] CAS = Chemical abstracts service number.

[d/] Ref = References; SSL = USEPA (2004a, Inorganic K_d values based on a site specific pH of 8.0); U = USEPA (2002b); B = Bast & Borges (1996); W9 = USEPA (2001) Water9 software; EPI = USEPA (2000) EPISuite software; CA = Calculated per USEPA (1996a) guidance; BAES = Baes et. al. (1984); NU = Not used; D = A value of zero was used for inorganics.

[e/] Units are defined as: cm^2/s = Square centimeters per second; L/kg = Liters per kilogram; and cm^3/g = Cubic centimeters per gram.

[f/] "**" = Per USEPA (2004a) guidance, toxicity factors were not adjusted for chemicals with gastrointestinal absorption values greater than 50-percent.

[g/] "--" = Data unavailable.

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APPENDIX I

VAPOR MIGRATION MODELING

(JOHNSON AND ETTINGER MODEL)

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemica
95501	2.80E+06	1,2-Dichlorobenzene

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, h_B (cm)	ENTER Thickness of soil stratum C, h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	30.48	0	30.48			C		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
Lookup Soil Parameters					Lookup Soil Parameters					Lookup Soil Parameters				
C	1.43	0.459	0.215	0.006										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
6.90E-02	7.90E-06	1.90E-03	25	9,700	453.57	705.00	6.17E+02	1.56E+02	0.0E+00	2.0E-01	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	15.48	0.244	ERROR	ERROR	0.324	2.26E-09	0.821	1.86E-09	4,388	6.02E+05	1.34E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.25E+06	3.50E-04	15	11,676	7.23E-04	3.10E-02	1.76E-04	2.99E-03	0.00E+00	0.00E+00	2.99E-03	15.48	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.70E+00	4.84E+06	0.10	2.05E+00	2.99E-03	4.39E+02	5.77E+06	1.52E-05	7.33E+01	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	2.0E-01

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	6.02E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.5E-01

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemica
106467	1.70E+05	1,4-Dichlorobenzene

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	30.48	0	30.48			C		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
Lookup Soil Parameters					Lookup Soil Parameters					Lookup Soil Parameters				
C	1.43	0.459	0.215	0.006										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
6.90E-02	7.90E-06	2.39E-03	25	9,271	447.21	684.75	6.17E+02	7.90E+01	0.0E+00	8.0E-01	S

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	15.48	0.244	ERROR	ERROR	0.324	2.26E-09	0.821	1.86E-09	4,388	1.70E+05	1.34E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.25E+06	3.50E-04	15	11,232	9.47E-04	4.06E-02	1.76E-04	2.99E-03	0.00E+00	0.00E+00	2.99E-03	15.48	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.70E+00	1.79E+06	0.10	2.05E+00	2.99E-03	4.39E+02	5.82E+06	1.52E-05	2.71E+01	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	8.0E-01

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	3.05E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.3E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemica
67641	2.30E+04	Acetone

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	30.48	0	30.48			C		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
Lookup Soil Parameters					Lookup Soil Parameters					Lookup Soil Parameters				
C	1.43	0.459	0.215	0.006										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
1.24E-01	1.14E-05	3.87E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	0.0E+00	3.5E-01	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	15.48	0.244	ERROR	ERROR	0.324	2.26E-09	0.821	1.86E-09	4,388	2.30E+04	1.34E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.25E+06	3.50E-04	15	7,545	2.08E-05	8.90E-04	1.76E-04	5.73E-03	0.00E+00	0.00E+00	5.73E-03	15.48	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.45E-03	1.33E+05	0.10	2.05E+00	5.73E-03	4.39E+02	3.40E+03	1.52E-05	2.03E+00	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	3.5E-01

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	1.54E+08	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.0E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemica
71432	9.30E+02	Benzene

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	30.48	0	30.48			C		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
Lookup Soil Parameters					Lookup Soil Parameters					Lookup Soil Parameters				
C	1.43	0.459	0.215	0.006										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	5.89E+01	1.79E+03	7.8E-06	3.0E-02	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	15.48	0.244	ERROR	ERROR	0.324	2.26E-09	0.821	1.86E-09	4,388	9.30E+02	1.34E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.25E+06	3.50E-04	15	8,111	2.83E-03	1.22E-01	1.76E-04	3.81E-03	0.00E+00	0.00E+00	3.81E-03	15.48	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.53E-01	2.15E+05	0.10	2.05E+00	3.81E-03	4.39E+02	2.05E+05	1.52E-05	3.27E+00	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	7.8E-06	3.0E-02

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	9.39E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
6.2E-06	7.5E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemica
108907	4.20E+04	Chlorobenzene

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	30.48	0	30.48			C		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
Lookup Soil Parameters					Lookup Soil Parameters					Lookup Soil Parameters				
C	1.43	0.459	0.215	0.006										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	0.0E+00	6.0E-02	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	15.48	0.244	ERROR	ERROR	0.324	2.26E-09	0.821	1.86E-09	4,388	4.20E+04	1.34E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.25E+06	3.50E-04	15	9,792	1.64E-03	7.05E-02	1.76E-04	3.16E-03	0.00E+00	0.00E+00	3.16E-03	15.48	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.31E+00	2.01E+06	0.10	2.05E+00	3.16E-03	4.39E+02	2.51E+06	1.52E-05	3.04E+01	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	6.0E-02

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	6.97E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.5E-01

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemica
75092	1.10E+04	Methylene chloride

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	30.48	0	30.48			C		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
Lookup Soil Parameters					Lookup Soil Parameters					Lookup Soil Parameters				
C	1.43	0.459	0.215	0.006										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
1.01E-01	1.17E-05	2.18E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	15.48	0.244	ERROR	ERROR	0.324	2.26E-09	0.821	1.86E-09	4,388	1.10E+04	1.34E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.25E+06	3.50E-04	15	7,022	1.22E-03	5.25E-02	1.76E-04	4.38E-03	0.00E+00	0.00E+00	4.38E-03	15.48	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
7.02E-02	2.51E+06	0.10	2.05E+00	4.38E-03	4.39E+02	4.20E+04	1.52E-05	3.82E+01	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	4.7E-07	3.0E+00

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	2.99E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.4E-06	8.7E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SL-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemica
108883	2.40E+05	Toluene

MORE

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	30.48	0	30.48			C		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
Lookup Soil Parameters					Lookup Soil Parameters					Lookup Soil Parameters				
C	1.43	0.459	0.215	0.006										

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based soil concentration.

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Physical state at soil temperature, (S,L,G)
8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	5.0E+00	L

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R ($\mu g/kg$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	15.48	0.244	ERROR	ERROR	0.324	2.26E-09	0.821	1.86E-09	4,388	2.40E+05	1.34E+05

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
1.25E+06	3.50E-04	15	9,143	3.11E-03	1.34E-01	1.76E-04	3.77E-03	0.00E+00	0.00E+00	3.77E-03	15.48	15

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.09E+00	2.53E+07	0.10	2.05E+00	3.77E-03	4.39E+02	2.36E+05	1.52E-05	3.85E+02	NA	NA	NA	NA

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ ($\mu g/m^3$)	Finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Final finite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	NA	NA	NA	NA	5.0E+00

END

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	NA	NA	6.65E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	5.3E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

GROUNDWATER VOLATILIZATION TO INDOOR AIR

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95501	1.90E+03	1,2-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.90E-02	7.90E-06	1.90E-03	25	9,700	453.57	705.00	6.17E+02	1.56E+02	0.0E+00	2.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	11,676	7.23E-04	3.10E-02	1.76E-04	2.99E-03	1.12E-02	0.00E+00	4.61E-04	2.64E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	5.89E+04	0.10	2.05E+00	2.99E-03	4.39E+02	5.77E+06	1.30E-05	7.64E-01	NA	2.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.56E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.6E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467	3.30E+02	1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.90E-02	7.90E-06	2.39E-03	25	9,271	447.21	684.75	6.17E+02	7.90E+01	0.0E+00	8.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	11,232	9.47E-04	4.06E-02	1.76E-04	2.99E-03	1.12E-02	0.00E+00	4.56E-04	2.63E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.34E+04	0.10	2.05E+00	2.99E-03	4.39E+02	5.82E+06	1.30E-05	1.74E-01	NA	8.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	7.90E+04	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.5E-04

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
107062	6.60E+02	1,2-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	9.90E-06	9.77E-04	25	7,643	356.65	561.00	1.74E+01	8.52E+03	2.6E-05	0.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	8,510	4.84E-04	2.07E-02	1.76E-04	4.52E-03	1.68E-02	0.00E+00	7.01E-04	3.99E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.37E+04	0.10	2.05E+00	4.52E-03	4.39E+02	3.04E+04	1.37E-05	1.87E-01	2.6E-05	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	8.52E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.2E-06	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67641	4.50E+04	Acetone

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.24E-01	1.14E-05	3.87E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	0.0E+00	3.5E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	7,545	2.08E-05	8.90E-04	1.76E-04	5.73E-03	2.01E-02	0.00E+00	1.73E-03	6.02E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.01E+04	0.10	2.05E+00	5.73E-03	4.39E+02	3.40E+03	1.42E-05	5.68E-01	NA	3.5E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.00E+09	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.1E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	1.50E+02	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	5.89E+01	1.79E+03	7.8E-06	3.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	8,111	2.83E-03	1.22E-01	1.76E-04	3.81E-03	1.42E-02	0.00E+00	5.69E-04	3.32E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.82E+04	0.10	2.05E+00	3.81E-03	4.39E+02	2.05E+05	1.34E-05	2.44E-01	7.8E-06	3.0E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.79E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
4.7E-07	5.6E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	4.50E+03	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	0.0E+00	6.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	9,792	1.64E-03	7.05E-02	1.76E-04	3.16E-03	1.18E-02	0.00E+00	4.77E-04	2.77E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.17E+05	0.10	2.05E+00	3.16E-03	4.39E+02	2.51E+06	1.31E-05	4.15E+00	NA	6.0E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	4.72E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.8E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67663	1.90E+02	Chloroform

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	0.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	7,543	1.96E-03	8.42E-02	1.76E-04	4.51E-03	1.68E-02	0.00E+00	6.75E-04	3.93E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.60E+04	0.10	2.05E+00	4.51E-03	4.39E+02	3.11E+04	1.37E-05	2.18E-01	2.3E-05	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	7.92E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.2E-06	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75092	2.80E+02	Methylene chloride

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.01E-01	1.17E-05	2.18E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	7,022	1.22E-03	5.25E-02	1.76E-04	4.38E-03	1.63E-02	0.00E+00	6.63E-04	3.84E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.47E+04	0.10	2.05E+00	4.38E-03	4.39E+02	4.20E+04	1.36E-05	2.00E-01	4.7E-07	3.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.30E+07	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.3E-08	4.6E-05

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	8.20E+01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	6.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	9,542	8.35E-03	3.58E-01	1.76E-04	3.12E-03	1.16E-02	0.00E+00	4.63E-04	2.71E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.94E+04	0.10	2.05E+00	3.12E-03	4.39E+02	3.12E+06	1.30E-05	3.82E-01	5.9E-06	6.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	2.00E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
5.5E-07	4.4E-04

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108883	2.40E+04	Toluene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	NA	5.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	9,143	3.11E-03	1.34E-01	1.76E-04	3.77E-03	1.41E-02	0.00E+00	5.62E-04	3.28E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.20E+06	0.10	2.05E+00	3.77E-03	4.39E+02	2.36E+05	1.34E-05	4.28E+01	NA	5.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	5.26E+05	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	5.9E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	8.80E+00	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	2.0E-06	6.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	8,543	5.08E-03	2.18E-01	1.76E-04	3.42E-03	1.28E-02	0.00E+00	5.09E-04	2.98E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.91E+03	0.10	2.05E+00	3.42E-03	4.39E+02	8.27E+05	1.32E-05	2.53E-02	2.0E-06	6.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.47E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.2E-08	2.9E-05

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	1.50E+01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
11.1	15	304.8	213.36	91.44	0	B	S	C		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
C	1.43	0.459	0.215	S	1.66	0.375	0.054				

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	975	1219	488	0.1	0.83	

MORE ↓

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)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

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 (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.06E-01	1.23E-05	2.69E-02	25	5,250	259.25	432.00	1.86E+01	8.80E+03	8.8E-06	1.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	289.8	0.244	0.321	ERROR	0.324	2.26E-09	0.821	1.86E-09	17.05	0.375	0.122	0.253	4,388

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.34E+05	1.25E+06	3.50E-04	15	4,988	1.78E-02	7.65E-01	1.76E-04	4.59E-03	1.71E-02	0.00E+00	6.80E-04	3.99E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	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, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.15E+04	0.10	2.05E+00	4.59E-03	4.39E+02	2.58E+04	1.37E-05	1.57E-01	8.8E-06	1.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	8.80E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.4E-07	1.1E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL DOWN TO "END"

END

APPENDIX J

HUMAN HEALTH RISK ASSESSMENT CALCULATIONS

PART A OF APPENDIX J

OUTDOOR INDUSTRIAL WORKER

PART A OF APPENDIX J
NONINTRUSIVE WORKER
CARCINOGENIC AND NONCARCINOGENIC RISK ESTIMATES -- INGESTION OF SURFACE SOIL
Rohm and Haas Chemicals LLC
Reading, Ohio

Exposure Assumptions

Receptor	Nonintrusive Worker	
COPC Concentration in Soil/Sediment ($C_{soil/sed}$)	chemical-specific	mg/Kg
Soil/Sediment Ingestion Rate ($IR_{soil/sed}$)	100	mg/day
Exposure Frequency (EF)	250	days/yr
Exposure Duration (ED)	25	yrs
Fraction Contaminated Soil/Sediment Ingested (FI)	1	unitless
Conversion Factor (CF)	0.000001	Kg/mg
Averaging Time, Carcinogens (AT_c)	70	yrs
Averaging Time, Noncarcinogens (AT_{nc})	25	yrs
Oral Slope Factor (SF_o)	chemical-specific	$(mg/Kg\text{-}day)^{-1}$
Body Weight (BW)	70	Kg
Oral Reference Dose on (RfD_o)	chemical-specific	mg/Kg-day

Risk and Hazard Equations

Carcinogenic:

$$Risk = \frac{(C_{soil\,sed})(IR_{soil\,sed})(EF)(ED)(FI)(CF)(SF_o)}{(BW)(AT_c)(365day/year)}$$

Non-Carcinogenic:

$$Hazard = \frac{(C_{soil/sed})(IR_{soil/sed})(EF)(ED)(FI)(CF)}{(RfD_o)(BW)(AT_{nc})(365day/year)}$$

PART A OF APPENDIX J
INGESTION WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

NON-CARCINOGEN

Intake (mg/kg-d) = (CS x IR x CF x FI x EF x ED)/(BW x AT)
Hazard Quotient = Intake/RfD

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
1,2-Dichlorobenzene	3.65E-01	1.00E-06	100	1	250	25	70	9125	3.57E-07	0.09	3.97E-06
1,4-Dichlorobenzene	3.65E-01	1.00E-06	100	1	250	25	70	9125	3.57E-07	0.03	1.19E-05
Acetone	1.50E+01	1.00E-06	100	1	250	25	70	9125	1.47E-05	0.9	1.63E-05
Benzene	1.70E-03	1.00E-06	100	1	250	25	70	9125	1.66E-09	0.004	4.16E-07
Chlorobenzene	9.20E-03	1.00E-06	100	1	250	25	70	9125	9.00E-09	0.02	4.50E-07
Methylene chloride	1.80E-03	1.00E-06	100	1	250	25	70	9125	1.76E-09	0.06	2.94E-08
Toluene	5.60E-04	1.00E-06	100	1	250	25	70	9125	5.48E-10	0.08	6.85E-09
Benzo(a)anthracene	5.40E+00	1.00E-06	100	1	250	25	70	9125	5.28E-06	--	--
Benzo(a)pyrene	6.20E+00	1.00E-06	100	1	250	25	70	9125	6.07E-06	--	--
Benzo(b)fluoranthene	7.00E+00	1.00E-06	100	1	250	25	70	9125	6.85E-06	--	--
Aroclor 1254	9.80E-01	1.00E-06	100	1	250	25	70	9125	9.59E-07	0.00002	4.79E-02
bis(2-Ethylhexyl) phthalate	4.60E-01	1.00E-06	100	1	250	25	70	9125	4.50E-07	0.02	2.25E-05
Endrin	2.10E-03	1.00E-06	100	1	250	25	70	9125	2.05E-09	0.0003	6.85E-06
Antimony	6.00E-01	1.00E-06	100	1	250	25	70	9125	5.87E-07	0.0004	1.47E-03
Arsenic	1.62E+01	1.00E-06	100	1	250	25	70	9125	1.59E-05	0.0003	5.28E-02
Chromium	2.17E+02	1.00E-06	100	1	250	25	70	9125	2.12E-04	0.021	1.01E-02

total hazard index= 1.12E-01

PART A OF APPENDIX J
INGESTION WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

CARCINOGEN

Intake (mg/kg-d) = (CS x IR x CF x FI x EF x ED)/(BW x AT)
Cancer Risk = Intake x SF

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)	SF $(mg/kg\text{-}d)^{-1}$	Cancer Risk
1,2-Dichlorobenzene	3.65E-01	1.00E-06	100	1	250	25	70	25550	1.28E-07	--	--
1,4-Dichlorobenzene	3.65E-01	1.00E-06	100	1	250	25	70	25550	1.28E-07	0.024	3.06E-09
Acetone	1.50E+01	1.00E-06	100	1	250	25	70	25550	5.24E-06	--	--
Benzene	1.70E-03	1.00E-06	100	1	250	25	70	25550	5.94E-10	0.055	3.27E-11
Chlorobenzene	9.20E-03	1.00E-06	100	1	250	25	70	25550	3.21E-09	--	--
Methylene chloride	1.80E-03	1.00E-06	100	1	250	25	70	25550	6.29E-10	0.0075	4.72E-12
Toluene	5.60E-04	1.00E-06	100	1	250	25	70	25550	1.96E-10	--	--
Benzo(a)anthracene	5.40E+00	1.00E-06	100	1	250	25	70	25550	1.89E-06	0.73	1.38E-06
Benzo(a)pyrene	6.20E+00	1.00E-06	100	1	250	25	70	25550	2.17E-06	7.3	1.58E-05
Benzo(b)fluoranthene	7.00E+00	1.00E-06	100	1	250	25	70	25550	2.45E-06	0.73	1.79E-06
Aroclor 1254	9.80E-01	1.00E-06	100	1	250	25	70	25550	3.42E-07	2	6.85E-07
bis(2-Ethylhexyl) phthalate	4.60E-01	1.00E-06	100	1	250	25	70	25550	1.61E-07	0.014	2.25E-09
Endrin	2.10E-03	1.00E-06	100	1	250	25	70	25550	7.34E-10	--	--
Antimony	6.00E-01	1.00E-06	100	1	250	25	70	25550	2.10E-07	--	--
Arsenic	1.62E+01	1.00E-06	100	1	250	25	70	25550	5.66E-06	1.5	8.49E-06
Chromium	2.17E+02	1.00E-06	100	1	250	25	70	25550	7.58E-05	--	--

total Cancer Risk= 2.82E-05

PART A OF APPENDIX J
NONINTRUSIVE WORKER
CARCINOGENIC AND NONCOARCINOGENIC RISK ESTIMATES -- DERMAL CONTACT WITH SURFACE SOIL
Rohm and Haas Chemicals LLC
Reading, Ohio

Exposure Assumptions

Receptor	Nonintrusive Worker	
COPC Concentration in Soil/Sediment ($C_{soil/sed}$)	chemical-specific	mg/Kg
Exposure Frequency (EF)	250	days/yr
Fraction of EF in Contact with Soil (ET)	1	unitless
Exposure Duration (ED)	25	yrs
Exposed Body Surface Area (SA)	3300	cm^2
Soil-to-Skin Adherence Factor (AF)	0.2	mg/cm^2-event
Dermal Soil Absorption Factor (DAF)	chemical-specific	unitless
Averaging Time, Carcinogens (AT_c)	70	yrs
Averaging Time, Noncarcinogens (AT_n)	25	yrs
Oral Slope Factor Adjusted for GI Absorption (SF_d)	chemical-specific	$(mg/Kg\text{-}day)^{-1}$
Body Weight (BW)	70	Kg
Oral Reference Dose Adjusted for GI Absorption (RfD_d)	chemical-specific	mg/Kg-day
Conversion Factor (CF)	0.000001	Kg/mg
Oral Absorption Factor (OAF)	chemical-specific	unitless
Event Frequency (EV)	1	events/day

Risk and Hazard Equations

Carcinogenic:

$$Risk = \frac{(C_{soil/sed})(EF)(ET)(ED)(SA)(AF)(DAF)(SF_d)(CF)}{(BW)(AT_c)(365 days/year)}$$

Where $SF_d = SF_o/OAF$

Non-Carcinogenic:

$$Hazard = \frac{(C_{soil/sed})(EF)(ET)(ED)(SA)(AF)(DAF)(CF)}{(RfD_d)(BW)(AT_{nc})(365 days/year)}$$

Where $RfD_d = (RfD_o)*(OAF)$

PART A OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

NON-CARCINOGEN

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2-event)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	3.65E-01	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
1,4-Dichlorobenzene	3.65E-01	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
Acetone	1.50E+01	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
Benzene	1.70E-03	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
Chlorobenzene	9.20E-03	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
Methylene chloride	1.80E-03	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
Toluene	5.60E-04	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
Benzo(a)anthracene	5.40E+00	1.00E-06	0.2	0.13	1	250	25	3300	70	9125	4.53E-06
Benzo(a)pyrene	6.20E+00	1.00E-06	0.2	0.13	1	250	25	3300	70	9125	5.21E-06
Benzo(b)fluoranthene	7.00E+00	1.00E-06	0.2	0.13	1	250	25	3300	70	9125	5.88E-06
Aroclor 1254	9.80E-01	1.00E-06	0.2	0.14	1	250	25	3300	70	9125	8.86E-07
bis(2-Ethylhexyl) phthalate	4.60E-01	1.00E-06	0.2	0.1	1	250	25	3300	70	9125	2.97E-07
Endrin	2.10E-03	1.00E-06	0.2	0.1	1	250	25	3300	70	9125	1.36E-09
Antimony	6.00E-01	1.00E-06	0.2	--	1	250	25	3300	70	9125	--
Arsenic	1.62E+01	1.00E-06	0.2	0.03	1	250	25	3300	70	9125	3.14E-06
Chromium	2.17E+02	1.00E-06	0.2	--	1	250	25	3300	70	9125	--

PART A OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

CARCINOGEN

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2-event)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	3.65E-01	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
1,4-Dichlorobenzene	3.65E-01	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
Acetone	1.50E+01	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
Benzene	1.70E-03	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
Chlorobenzene	9.20E-03	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
Methylene chloride	1.80E-03	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
Toluene	5.60E-04	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
Benzo(a)anthracene	5.40E+00	1.00E-06	0.2	0.13	1	250	25	3300	70	25550	1.62E-06
Benzo(a)pyrene	6.20E+00	1.00E-06	0.2	0.13	1	250	25	3300	70	25550	1.86E-06
Benzo(b)fluoranthene	7.00E+00	1.00E-06	0.2	0.13	1	250	25	3300	70	25550	2.10E-06
Aroclor 1254	9.80E-01	1.00E-06	0.2	0.14	1	250	25	3300	70	25550	3.16E-07
bis(2-Ethylhexyl) phthalate	4.60E-01	1.00E-06	0.2	0.1	1	250	25	3300	70	25550	1.06E-07
Endrin	2.10E-03	1.00E-06	0.2	0.1	1	250	25	3300	70	25550	4.84E-10
Antimony	6.00E-01	1.00E-06	0.2	--	1	250	25	3300	70	25550	--
Arsenic	1.62E+01	1.00E-06	0.2	0.03	1	250	25	3300	70	25550	1.12E-06
Chromium	2.17E+02	1.00E-06	0.2	--	1	250	25	3300	70	25550	--

PART A OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

Hazard Quotient = Intake/RfD

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
1,2-Dichlorobenzene	--	9.00E-02	--
1,4-Dichlorobenzene	--	3.00E-02	--
Acetone	--	0.9	--
Benzene	--	0.004	--
Chlorobenzene	--	6.20E-03	--
Methylene chloride	--	6.00E-02	--
Toluene	--	8.00E-02	--
Benzo(a)anthracene	4.53E-06	--	--
Benzo(a)pyrene	5.21E-06	--	--
Benzo(b)fluoranthene	5.88E-06	--	--
Aroclor 1254	8.86E-07	0.00002	4.43E-02
bis(2-Ethylhexyl) phthalate	2.97E-07	0.0038	7.82E-05
Endrin	1.36E-09	0.000006	2.26E-04
Antimony	--	0.00006	--
Arsenic	3.14E-06	0.0003	1.05E-02
Chromium	--	0.000273	--
		total hazard index=	5.51E-02

PART A OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SF $(mg/kg-d)^{-1}$	Cancer Risk
1,2-Dichlorobenzene	--	--	--
1,4-Dichlorobenzene	--	0.024	--
Acetone	--	--	--
Benzene	--	0.055	--
Chlorobenzene	--	--	--
Methylene chloride	--	0.0075	--
Toluene	--	--	--
Benzo(a)anthracene	1.62E-06	0.73	1.18E-06
Benzo(a)pyrene	1.86E-06	7.3	1.36E-05
Benzo(b)fluoranthene	2.10E-06	0.73	1.53E-06
Aroclor 1254	3.16E-07	2	6.33E-07
bis(2-Ethylhexyl) phthalate	1.06E-07	7.37E-02	7.82E-09
Endrin	4.84E-10	--	--
Antimony	--	--	--
Arsenic	1.12E-06	1.5	1.68E-06
Chromium	--	--	--
		total Cancer Risk=	1.86E-05

PART A OF APPENDIX J
NONINTRUSIVE WORKER
CARCINOGENIC AND NONCOARCINOGENIC RISK ESTIMATES -- INHALATION OF VOLATILES/PARTICULATES FROM SURFACE SOIL
Rohm and Haas Chemicals LLC
Reading, Ohio

Exposure Assumptions

Receptor	Nonintrusive Worker	
COPC Ambient Air Concentration due to volatile (organics) or particulate (inorganics) emissions from soil (Cair-VOC/Particulate)	chemical-specific	µg/m^3
Exposure Frequency (EF)	250	days/yr
Exposure Duration (ED)	25	yrs
Fraction of EF in Contact with Soil (ET)	1	unitless
Averaging Time, Carcinogens (AT_C)	70	yrs
Averaging Time, Noncarcinogens (AT_N)	25	yrs
Inhalation Unit Risk Factor(URF)	chemical-specific	(µg/m^3)$^{-1}$
Inhalation Reference Concentration (RfC)	chemical-specific	µg/m^3
Volatilization Factor (VF)	chemical-specific	M^3/Kg
Particulate emission factor (PEF)	6.244889E+08	m^3/kg

Risk and Hazard Equations

Carcinogenic:

$$Risk = \frac{(C_{air-VOC/Particulate})(EF)(ED)(ET)(URF)}{(AT_c)(365 days/year)}$$

Non-Carcinogenic:

$$HQ = \frac{(C_{air-VOC/Particulate})(EF)(ED)(ET)}{(RfC)(AT_{nc})(365\ days/year)}$$

where:

$$C_{air-VOC} = \frac{C_{soil}}{VF}$$ for organics; and

$$C_{air-Particulate} = \frac{C_{soil}}{PEF}$$ for inorganics

PART A OF APPENDIX J
CALCULATIONS FOR ESTIMATING VOLATILIZATION FACTOR AND PARTICULATE EMISSION FACTOR [a/]
Rohm and Haas Chemicals LLC
Reading, Ohio

Equations

$$VF = \frac{Q/C \times (3.14 \times D_A \times T)^{1/2} \times 10^{-4}}{(2 \times \rho_b \times D_A)}$$

where:

$$D_A = \frac{[(\theta_a{}^{10/3} D_i H' + \theta_w{}^{10/3} D_w)/n^2]}{\rho_b K_d + \theta_w + \theta_a H'}$$

$$PEF = Q/C\left[\frac{3600 \text{seconds/hour}}{0.036(1-V)(U_m/U_t)^3(F(x))}\right]$$

Input Parameter	Definition	Value
VF	Volatilization factor (m^3/Kg) [b/]	Calculated below
A	Area (Acres)	30
Q/C	Inverse of the mean concentration at the center of source (g/m^2-s per Kg/m^3) [c/]	43.08
T	Exposure interval (s) [d/]	9.5E+08
ρ_b	Dry soil bulk density (g/cm^3) [e/]	1.5
D_A	Apparent Diffusivity (cm^2/s) [f/]	Calculated below
θ_a	Air-filled soil porosity (L_{air}/L_{soil}) [g/]	2.8E-01
D_i	Diffusivity in air (cm^2/s)	chemical-specific
H'	Henry's law constant (dimensionless)	chemical-specific
θ_w	Water-filled soil porosity (L_{water}/L_{soil}) [h/]	1.5E-01 [i/]
D_w	Diffusivity in water (cm^2/s)	chemical-specific
n	Total soil porosity (L_{pore}/L_{soil}) [j/]	0.43
K_d	Soil-water partion coefficient (cm^3/g) [k/] = K_{oc} x f_{oc} (organics)	chemical-specific
K_{oc}	Soil organic carbon partition coefficient (cm^3/g)	chemical-specific
f_{oc}	Fraction of organic carbon (unitless)	0.006
PEF	Particulate Emission Factor (m^3/Kg)	6.2E+08
V	Fraction of vegetative cover (unitless)	0.5
U_m	Mean annual wind speed (m/s)	4.69
U_t	Equivalent threshold value of wind speed at 7 m (m/s)	11.32
F(x)	Function dependent on U_m/U_t derived using Cowherd et al. (1985) (unitless)	0.194

PART A OF APPENDIX J
CALCULATIONS FOR ESTIMATING VOLATILIZATION FACTOR AND PARTICULATE EMISSION FACTOR [a/]
Rohm and Haas Chemicals LLC
Reading, Ohio

COPC [l/]	D_i	D_w	H'	K_{oc}	K_d	D_a	VF
Volatile Organic Compounds							
1,2-Dichlorobenzene	6.9E-02	7.9E-06	7.8E-02	6.2E+02	3.7E+00	7.5E-05	9.1E+03
1,4-Dichlorobenzene	6.9E-02	7.9E-06	1.0E-01	6.2E+02	3.7E+00	9.6E-05	8.0E+03
Acetone	1.2E-01	1.1E-05	1.6E-03	5.8E-01	3.5E-03	1.0E-04	7.8E+03
Benzene	8.8E-02	9.8E-06	2.3E-01	5.9E+01	3.5E-01	2.2E-03	1.7E+03
Chlorobenzene	7.3E-02	8.7E-06	1.5E-01	2.2E+02	1.3E+00	4.1E-04	3.9E+03
Methylene Chloride	1.0E-01	1.2E-05	9.0E-02	1.2E+01	7.0E-02	2.6E-03	1.5E+03
Toluene	8.7E-02	8.6E-06	2.7E-01	1.8E+02	1.1E+00	1.0E-03	2.5E+03
Semivolatile Organic Compounds							
Benzo(a)anthracene	5.1E-02	9.0E-06	1.4E-04	4.0E+05	2.4E+03	1.8E-10	5.8E+06
Benzo(a)pyrene	4.3E-02	9.0E-06	4.6E-05	1.0E+06	6.1E+03	2.7E-11	1.5E+07
Benzo(b)fluoranthene	2.3E-02	5.6E-06	4.6E-03	1.2E+06	7.4E+03	7.5E-10	2.9E+06
PCB-1254 (Arochlor 1254)	2.0E-02	5.0E-06	1.2E-02	7.6E+04	4.5E+02	2.8E-08	4.7E+05
bis(2-Ethylhexyl) Phthalate	3.5E-02	3.7E-06	4.2E-06	1.5E+07	9.1E+04	3.4E-13	1.3E+08
Pesticides/Herbicides							
Endrin	1.3E-02	4.7E-06	3.1E-04	1.2E+04	7.4E+01	3.2E-09	1.4E+06
Inorganics							
Antimony	--[m/]	--	--	--	4.5E+01	--	--
Arsenic	--	--	--	--	3.1E+01	--	--
Chromium, Total	--	--	--	--	1.4E+01	--	--

[a/] Calculations and default values were done per USEPA (1996a) Soil Screening Guidance: Users Guide.
[b/] m^3/kg = Cubic meters per kilogram.
[c/] g/m^2-s per kg/m^3 = Grams per square meter second per kilogram per cubic meter. The Q/C term was based on the source area, climatic zone, and Cleveland, Ohio (USEPA, 1996a).
[d/] s = Seconds.
[e/] g/cm^3 = Grams per cubic centimeter.
[f/] cm^2/s = Square centimeters per second.
[g/] L_{air}/L_{soil} = Liters of air per liters of soil.
[h/] L_{water}/L_{soil} = Liters of water per liters of soil.

[i/] Default value recommended by USEPA (1996a) in Equation 10. This value is consistent with the default value recommended by USEPA (2003c).
[j/] L_{pore}/L_{soil} = Liters pore space per liters of soil.
[k/] cm^3/g = Cubic centimeters per gram.
[l/] COPC = Chemical of potential concern.
[m/] "--" = Data unavailable.

ACRES	QC_VAL*	PROJECT
0.5	83.22	RHHS
1	73.06	RHHS
2	64.78	RHHS
5	55.99	RHHS
10	50.38	RHHS
30	43.08	RHHS

* Q/C for Cleveland.

PART A OF APPENDIX J
INHALATION WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

NON-CARCINOGEN

HQ = [CS x (1/VF) x ED x ET x EF]/(RfC x AT) (organics) HQ = [CS x (1/PEF) x ED x ET x EF]/(RfC x AT) (inorganics)

Constituent of Concern	Concent. in Soil (CS) (ug/kg)	Volatilize Factor (VF) (m^3/kg)	Exposure Duration (ED) (yrs)	Fraction of EF in contact with soil (ET) (unitless)	Exposure Frequency (EF) (days/yr)	Particulate Emission Factor (PEF) (m^3/kg)	Reference Concentration (RfC) (µg/m^3)	Averaging Time (AT) (days)	Hazard Quotient
1,2-Dichlorobenzene	3.65E+02	9.10E+03	25	1	250	--	199.5	9125	1.38E-04
1,4-Dichlorobenzene	3.65E+02	8.00E+03	25	1	250	--	800	9125	3.91E-05
Acetone	1.50E+04	7.80E+03	25	1	250	--	--	9125	--
Benzene	1.70E+00	1.70E+03	25	1	250	--	30	9125	2.28E-05
Chlorobenzene	9.20E+00	3.90E+03	25	1	250	--	59.5	9125	2.72E-05
Methylene chloride	1.80E+00	1.50E+03	25	1	250	--	3010	9125	2.73E-07
Toluene	5.60E-01	2.50E+03	25	1	250	--	5000	9125	3.07E-08
Benzo(a)anthracene	5.40E+03	5.80E+06	25	1	250	--	--	9125	--
Benzo(a)pyrene	6.20E+03	1.50E+07	25	1	250	--	--	9125	--
Benzo(b)fluoranthene	7.00E+03	2.90E+06	25	1	250	--	--	9125	--
Aroclor 1254	9.80E+02	4.70E+05	25	1	250	--	0.07	9125	2.04E-02
bis(2-Ethylhexyl) phthalate	4.60E+02	1.30E+08	25	1	250	--	--	9125	--
Endrin	2.10E+00	1.40E+06	25	1	250	--	--	9125	--
Antimony	6.00E+02	--	25	1	250	6.24E+08	--	9125	--
Arsenic	1.62E+04	--	25	1	250	6.24E+08	--	9125	--
Chromium	2.17E+05	--	25	1	250	6.24E+08	0.7	9125	3.40E-04

total hazard index= 2.10E-02

PART A OF APPENDIX J
INHALATION WITH COPCS IN SURFACE SOIL
NONINTRUSIVE WORKER (OUTDOOR)

CARCINOGEN

Risk = [CS x (1/VF) x ED x EF x ET x URF]/(AT) (organics) **Risk = [CS x (1/PEF) x ED x EF x ET x URF]/(AT) (inorganics)**

Constituent of Concern	Concent. in Soil (CS) (ug/kg)	Volatilize Factor (VF) (m^3/kg)	Exposure Duration (ED) (yrs)	Fraction of EF in contact with soil (ET)	Exposure Frequency (EF) (days/yr)	Particulate Emission Factor (PEF) (m^3/kg)	Unit Risk Factor ($\mu g/m^3)^{-1}$	Averaging Time (AT) (days)	Cancer Risk
1,2-Dichlorobenzene	3.65E+02	9.10E+03	25	1	250	--	--	25550	--
1,4-Dichlorobenzene	3.65E+02	8.00E+03	25	1	250	--	6.285E-06	25550	7.01E-08
Acetone	1.50E+04	7.80E+03	25	1	250	--	--	25550	--
Benzene	1.70E+00	1.70E+03	25	1	250	--	0.0000078	25550	1.91E-09
Chlorobenzene	9.20E+00	3.90E+03	25	1	250	--	--	25550	--
Methylene chloride	1.80E+00	1.50E+03	25	1	250	--	4.70E-07	25550	1.38E-10
Toluene	5.60E-01	2.50E+03	25	1	250	--	--	25550	--
Benzo(a)anthracene	5.40E+03	5.80E+06	25	1	250	--	--	25550	--
Benzo(a)pyrene	6.20E+03	1.50E+07	25	1	250	--	--	25550	--
Benzo(b)fluoranthene	7.00E+03	2.90E+06	25	1	250	--	--	25550	--
Aroclor 1254	9.80E+02	4.70E+05	25	1	250	--	0.0001	25550	5.10E-08
bis(2-Ethylhexyl) phthalate	4.60E+02	1.30E+08	25	1	250	--	--	25550	--
Endrin	2.10E+00	1.40E+06	25	1	250	--	--	25550	--
Antimony	6.00E+02	--	25	1	250	6.24E+08	--	25550	--
Arsenic	1.62E+04	--	25	1	250	6.24E+08	0.0043	25550	2.73E-08
Chromium	2.17E+05	--	25	1	250	6.24E+08	0.00171	25550	1.45E-07

total Cancer Risk= 2.96E-07

PART A OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER
NONINTRUSIVE INDUSTRIAL WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

NON-CARCINOGEN

Intake (mg/kg-d) = (CA x ED x ET x EF x IR)/(BW x AT)

Chemical of Concern	Concent. in Air (CA) (mg/m3)	Exposure Duration (ED) (yrs)	Exposure Time (ET) (hrs/d)	Exposure Frequency (EF) (days/yr)	Inhalation Rate (IR) (m^3/hr)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	7.74E-05	25	8	250	0.83	70	9125	5.03E-06
1,4-Dichlorobenzene	1.51E-05	25	8	250	0.83	70	9125	9.83E-07
1,2-Dichloroethane	2.70E-05	25	8	250	0.83	70	9125	1.76E-06
Acetone	2.67E-04	25	8	250	0.83	70	9125	1.74E-05
Benzene	1.37E-05	25	8	250	0.83	70	9125	8.92E-07
Chlorobenzene	2.75E-04	25	8	250	0.83	70	9125	1.78E-05
Chloroform	1.50E-05	25	8	250	0.83	70	9125	9.78E-07
Methylene chloride	1.80E-05	25	8	250	0.83	70	9125	1.17E-06
Tetrachloroethene	1.49E-05	25	8	250	0.83	70	9125	9.68E-07
Toluene	2.33E-03	25	8	250	0.83	70	9125	1.52E-04
Trichloroethene	1.11E-06	25	8	250	0.83	70	9125	7.23E-08
Vinyl chloride	5.58E-06	25	8	250	0.83	70	9125	3.63E-07

CARCINOGEN

Intake (mg/kg-d) = (CA x ED x ET x EF x IR)/(BW x AT)

Chemical of Concern	Concent. in Air (CA) (mg/m3)	Exposure Duration (ED) (yrs)	Exposure Time (ET) (hrs/d)	Exposure Frequency (EF) (days/yr)	Inhalation Rate (IR) (m^3/hr)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	7.74E-05	25	8	250	0.83	70	25550	1.80E-06
1,4-Dichlorobenzene	1.51E-05	25	8	250	0.83	70	25550	3.51E-07
1,2-Dichloroethane	2.70E-05	25	8	250	0.83	70	25550	6.28E-07
Acetone	2.67E-04	25	8	250	0.83	70	25550	6.21E-06
Benzene	1.37E-05	25	8	250	0.83	70	25550	3.19E-07
Chlorobenzene	2.75E-04	25	8	250	0.83	70	25550	6.37E-06
Chloroform	1.50E-05	25	8	250	0.83	70	25550	3.49E-07
Methylene chloride	1.80E-05	25	8	250	0.83	70	25550	4.17E-07
Tetrachloroethene	1.49E-05	25	8	250	0.83	70	25550	3.46E-07
Toluene	2.33E-03	25	8	250	0.83	70	25550	5.41E-05
Trichloroethene	1.11E-06	25	8	250	0.83	70	25550	2.58E-08
Vinyl chloride	5.58E-06	25	8	250	0.83	70	25550	1.30E-07

PART A OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER
NONINTRUSIVE INDUSTRIAL WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

CAair= **CAgw x VFgw,amb x 10^{-3} m^3/L**

Chemical of Concern	Concent. in Air (CA) (mg/m^3)	Concent. in GW (CW) (mg/l)	VFgw,amb (cm^3-water/ cm^3-air)
1,2-Dichlorobenzene	7.74E-05	1.9	4.07E-08
1,4-Dichlorobenzene	1.51E-05	0.33	4.59E-08
1,2-Dichloroethane	2.70E-05	0.66	4.10E-08
Acetone	2.67E-04	45	5.94E-09
Benzene	1.37E-05	0.15	9.16E-08
Chlorobenzene	2.75E-04	4.5	6.10E-08
Chloroform	1.50E-05	0.19	7.92E-08
Methylene chloride	1.80E-05	0.28	6.42E-08
Tetrachloroethene	1.49E-05	0.082	1.82E-07
Toluene	2.33E-03	24	9.72E-08
Trichloroethene	1.11E-06	0.0088	1.26E-07
Vinyl chloride	5.58E-06	0.015	3.72E-07

VFgw,amb= **1/[(1+(DFamb x Lgw)/(Dwseff))x1/Heff]**

VFgw,amb volatilization factor, groundwater to ambient air (cm^3-water/cm^3-air)
Dwseff effective diffusivity - avg. water table to surface (cm^2/sec)
DFamb dispersion factor for ambient air (cm/s)
Heff effective Henry's law coefficient (cm^3 -water/cm^3 -air)
Lgw depth to groundwater (cm)

PART A OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER
NONINTRUSIVE INDUSTRIAL WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

Chemical of Concern	VFgw,amb (cm^3-water/ cm^3-air)	DFamb (cm/s)	Heff (cm^3-water/ cm^3-air)	Lgw (cm)	Dwseff (cm^2/sec)
1,2-Dichlorobenzene	4.07E-08	10	7.8E-02	237.74	1.24E-03
1,4-Dichlorobenzene	4.59E-08	10	1.0E-01	237.74	1.09E-03
1,2-Dichloroethane	4.10E-08	10	4.0E-02	237.74	2.44E-03
Acetone	5.94E-09	10	1.6E-03	237.74	8.83E-03
Benzene	9.16E-08	10	2.3E-01	237.74	9.55E-04
Chlorobenzene	6.10E-08	10	1.5E-01	237.74	9.67E-04
Chloroform	7.92E-08	10	1.5E-01	237.74	1.26E-03
Methylene chloride	6.42E-08	10	9.0E-02	237.74	1.70E-03
Tetrachloroethene	1.82E-07	10	7.5E-01	237.74	5.76E-04
Toluene	9.72E-08	10	2.7E-01	237.74	8.56E-04
Trichloroethene	1.26E-07	10	4.2E-01	237.74	7.16E-04
Vinyl chloride	3.72E-07	10	1.1E+00	237.74	8.04E-04

Dwseff (cm^2/sec)=	**Lgw/[(hv/Dseff)+(hcap/Dcapeff)]**
Dseff	effective diffusivity - vadose zone soils (cm^2/sec)
Dcapeff	effective diffusivity - capillary fringe zone (cm^2/sec)
hv	vadose zone thickness (cm)
hcap	capillary zone thickness (cm)
Lgw	depth to groundwater (cm), Lgw=hv + hcap

Chemical of Concern	Dwseff (cm^2/sec)	Dseff (cm^2/sec)	Dcapeff (cm^2/sec)	hv (cm)	hcap	Lgw
1,2-Dichlorobenzene	1.24E-03	5.38E-03	3.37E-05	232.74	5.00	237.74
1,4-Dichlorobenzene	1.09E-03	5.38E-03	2.86E-05	232.74	5.00	237.74
1,2-Dichloroethane	2.44E-03	8.11E-03	7.25E-05	232.74	5.00	237.74
Acetone	8.83E-03	9.74E-03	1.65E-03	232.74	5.00	237.74
Benzene	9.55E-04	6.86E-03	2.32E-05	232.74	5.00	237.74
Chlorobenzene	9.67E-04	5.69E-03	2.44E-05	232.74	5.00	237.74
Chloroform	1.26E-03	8.11E-03	3.11E-05	232.74	5.00	237.74
Methylene chloride	1.70E-03	7.88E-03	4.52E-05	232.74	5.00	237.74
Tetrachloroethene	5.76E-04	5.62E-03	1.35E-05	232.74	5.00	237.74
Toluene	8.56E-04	6.79E-03	2.05E-05	232.74	5.00	237.74
Trichloroethene	7.16E-04	6.16E-03	1.70E-05	232.74	5.00	237.74
Vinyl chloride	8.04E-04	8.27E-03	1.87E-05	232.74	5.00	237.74

PART A OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER
NONINTRUSIVE INDUSTRIAL WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

Dseff= **Dair x ($\theta as^{3.33}/\theta t^2$) + Dwat x (1/H) x ($\theta ws^{3.33}/\theta t^2$)**

Dair molecular diffusion coefficient in air (cm^2/sec)

Dwat molecular diffusion coefficient in water (cm^2/sec)

θas volumetric air content in vadose zone soils (cm^3/cm^3)

θws volumetric water content in vadose zone soils (cm^3/cm^3)

θt total soil porosity vadose zone (cm^3/cm^3)

Chemical of Concern	Dseff (cm^2/sec)	θas (cm^3/cm^3)	θt (cm^3/cm^3)	θws (cm^3/cm^3)	H (dimensionless)	Dair (cm^2/sec)	Dwat (cm^2/sec)
1,2-Dichlorobenzene	5.38E-03	0.28	0.43	0.15	7.8E-02	6.9E-02	7.9E-06
1,4-Dichlorobenzene	5.38E-03	0.28	0.43	0.15	1.0E-01	6.9E-02	7.9E-06
1,2-Dichloroethane	8.11E-03	0.28	0.43	0.15	4.0E-02	1.0E-01	9.9E-06
Acetone	9.74E-03	0.28	0.43	0.15	1.6E-03	1.2E-01	1.1E-05
Benzene	6.86E-03	0.28	0.43	0.15	2.3E-01	8.8E-02	9.8E-06
Chlorobenzene	5.69E-03	0.28	0.43	0.15	1.5E-01	7.3E-02	8.7E-06
Chloroform	8.11E-03	0.28	0.43	0.15	1.5E-01	1.0E-01	1.0E-05
Methylene chloride	7.88E-03	0.28	0.43	0.15	9.0E-02	1.0E-01	1.2E-05
Tetrachloroethene	5.62E-03	0.28	0.43	0.15	7.5E-01	7.2E-02	8.2E-06
Toluene	6.79E-03	0.28	0.43	0.15	2.7E-01	8.7E-02	8.6E-06
Trichloroethene	6.16E-03	0.28	0.43	0.15	4.2E-01	7.9E-02	9.1E-06
Vinyl chloride	8.27E-03	0.28	0.43	0.15	1.1E+00	1.1E-01	1.2E-05

Dcapeff= **Dair x ($\theta acap^{3.33}/\theta t^2$) + Dwat x (1/H) x ($\theta wcap^{3.33}/\theta t^2$)**

$\theta acap$ volumetric air content in capillary zone soils (cm^3/cm^3)

$\theta wcap$ volumetric water content in capillary zone soils (cm3/cm3)

Chemical of Concern	Dcapeff (cm^2/sec)	$\theta acap$ (cm^3/cm^3)	θt (cm^3/cm^3)	$\theta wcap$ (cm^3/cm^3)	H (dimensionless)	Dair (cm^2/sec)	Dwat (cm^2/sec)
1,2-Dichlorobenzene	3.37E-05	0.043	0.43	0.387	7.8E-02	6.9E-02	7.9E-06
1,4-Dichlorobenzene	2.86E-05	0.043	0.43	0.387	1.0E-01	6.9E-02	7.9E-06
1,2-Dichloroethane	7.25E-05	0.043	0.43	0.387	4.0E-02	1.0E-01	9.9E-06
Acetone	1.65E-03	0.043	0.43	0.387	1.6E-03	1.2E-01	1.1E-05
Benzene	2.32E-05	0.043	0.43	0.387	2.3E-01	8.8E-02	9.8E-06
Chlorobenzene	2.44E-05	0.043	0.43	0.387	1.5E-01	7.3E-02	8.7E-06
Chloroform	3.11E-05	0.043	0.43	0.387	1.5E-01	1.0E-01	1.0E-05
Methylene chloride	4.52E-05	0.043	0.43	0.387	9.0E-02	1.0E-01	1.2E-05
Tetrachloroethene	1.35E-05	0.043	0.43	0.387	7.5E-01	7.2E-02	8.2E-06
Toluene	2.05E-05	0.043	0.43	0.387	2.7E-01	8.7E-02	8.6E-06
Trichloroethene	1.70E-05	0.043	0.43	0.387	4.2E-01	7.9E-02	9.1E-06
Vinyl chloride	1.87E-05	0.043	0.43	0.387	1.1E+00	1.1E-01	1.2E-05

PART A OF APPENDIX J
NONINTRUSIVE INDUSTRIAL WORKER
ROHM AND HAAS CHEMCIAL LLC
READING, OHIO

GROUNDWATER INHALATION

	CARCINOGEN			NON-CARCINOGEN		
Chemical of Concern	**Intake**	**Slope Factor**	**Cancer Risk**	**Intake**	**RfD (subchronic) (mg/kg/day)**	**Hazard Quotient**
1,2-Dichlorobenzene	1.80E-06	-	-	5.03E-06	5.70E-02	8.82E-05
1,4-Dichlorobenzene	3.51E-07	2.20E-02	7.73E-09	9.83E-07	2.29E-01	4.29E-06
1,2-Dichloroethane	6.28E-07	9.10E-02	5.71E-08	1.76E-06	1.40E-03	1.26E-03
Acetone	6.21E-06	-	-	1.74E-05	9.00E-01	1.93E-05
Benzene	3.19E-07	2.73E-02	8.70E-09	8.92E-07	8.57E-03	1.04E-04
Chlorobenzene	6.37E-06	-	-	1.78E-05	1.70E-02	1.05E-03
Chloroform	3.49E-07	8.05E-02	2.81E-08	9.78E-07	1.40E-02	6.98E-05
Methylene chloride	4.17E-07	1.60E-03	6.67E-10	1.17E-06	8.60E-01	1.36E-06
Tetrachloroethene	3.46E-07	2.07E-02	7.16E-09	9.68E-07	1.00E-01	9.68E-06
Toluene	5.41E-05	-	-	1.52E-04	1.43E+00	1.06E-04
Trichloroethene	2.58E-08	7.00E-03	1.81E-10	7.23E-08	1.70E-01	4.25E-07
Vinyl chloride	1.30E-07	1.54E-02	2.00E-09	3.63E-07	2.86E-02	1.27E-05
		Total Risk	**1.12E-07**		Hazard Index	**2.72E-03**

PART B OF APPENDIX J

CONSTRUCTION WORKER

PART B OF APPENDIX J
INTRUSIVE WORKER
CARCINOGENIC AND NONCARCINOGENIC RISK ESTIMATES -- INGESTION OF MIXED SOIL (0-15 FT BGS)
ROHM AND HASS CHEMICALS, INC.
READING, OHIO

Exposure Assumptions

Receptor	Intrusive Worker	
COPC Concentration in Soil/Sediment ($C_{soil/sed}$)	chemical-specific	mg/Kg
Soil/Sediment Ingestion Rate ($IR_{soil/sed}$)	330	mg/day
Exposure Frequency (EF)	90	days/yr
Exposure Duration (ED)	1	yrs
Fraction Contaminated Soil/Sediment Ingested (FI)	1	unitless
Conversion Factor (CF)	0.000001	Kg/mg
Averaging Time, Carcinogens (AT_c)	70	yrs
Averaging Time, Noncarcinogens (AT_{nc})	1	yrs
Oral Slope Factor (SF_o)	chemical-specific	$(mg/Kg\text{-}day)^{-1}$
Body Weight (BW)	70	Kg
Oral Reference Dose on (RfD_o)	chemical-specific	mg/Kg-day

Risk and Hazard Equations

Carcinogenic:

$$Risk = \frac{(C_{soil/sed})(IR_{soil/sed})(EF)(ED)(FI)(CF)(SF_o)}{(BW)(AT_c)(365 day/year)}$$

Non-Carcinogenic:

$$Hazard = \frac{(C_{soil/sed})(IR_{soil/sed})(EF)(ED)(FI)(CF)}{(RfD_o)(BW)(AT_{nc})(365 day/year)}$$

COPC [a/]	CAS [b/]	EPC (mg/Kg)[c/]	SF_o (mg/kg-day)$^{-1}$ [d/]	RFD_o (mg/kg-day)	Cancer Risk	% Of Total	Hazard Quotient	% Of Total
Volatile Organic Compounds								
1,2-Dichlorobenzene	95-50-1	182.1388	--[e/]	0.14	--	--	2.4E-03	3%
1,4-Dichlorobenzene	106-46-7	14.79034	0.013	0.0024	5.9E-09	1%	5.7E-04	1%
Acetone	67-64-1	11.62633	--	0.9	--	--	1.5E-05	<1%
Benzene	71-43-2	0.93	0.055	0.004	8.5E-10	<1%	2.7E-04	<1%
Chlorobenzene	108-90-7	4.652028	--	0.02	--	--	2.7E-04	<1%
Methylene Chloride	75-09-2	3.032692	0.0075	0.06	3.8E-10	<1%	5.9E-05	<1%
Toluene	108-88-3	36.91877	--	0.08	--	--	5.4E-04	1%
Semivolatile Organic Compounds								
Benzo(a)anthracene	56-55-3	5.4	0.73	--	6.5E-08	6%	--	--
Benzo(a)pyrene	50-32-8	6.2	7.3	--	7.5E-07	69%	--	--
Benzo(b)fluoranthene	205-99-2	7	0.73	--	8.5E-08	8%	--	--
PCB-1254 (Arochlor 1254)	11097-69-1	0.98	2	0.00002	3.3E-08	3%	5.7E-02	63%
bis(2-Ethylhexyl) Phthalate	117-81-7	14.12465	0.014	0.02	3.3E-09	<1%	8.2E-04	1%
Pesticides/Herbicides								
Endrin	72-20-8	0.3951337	--	0.0003	--	--	1.5E-03	2%
Inorganics								
Antimony	7440-36-0	0.7791747	--	0.0004	--	--	2.3E-03	3%
Arsenic	7440-38-2	5.957965	1.5	0.0003	1.5E-07	14%	2.3E-02	26%
Chromium, Total	7440-47-3	33.62588	--	0.021	--	--	1.9E-03	2%
				Pathway Sums	1.1E-06		9.1E-02	

[a/] COPC = Chemical of potential concern.
[b/] CAS = Chemical Abstracts Service number.
[c/] Exposure Point Concentration, mg/Kg = Milligrams per kilogram.
[d/] mg/Kg-day = Milligrams per kilogram-day.
[e/] "--" = Data unavailable.

COPC [a/]	CAS [b/]	EPC (mg/Kg)[c/]	Carc Intake	Non-Carc Intake
Volatile Organic Compounds				
1,2-Dichlorobenzene	95-50-1	182.1388	3.0E-06	2.1E-04
1,4-Dichlorobenzene	106-46-7	14.79034	2.5E-07	1.7E-05
Acetone	67-64-1	11.62633	1.9E-07	1.4E-05
Benzene	71-43-2	0.93	1.5E-08	1.1E-06
Chlorobenzene	108-90-7	4.652028	7.7E-08	5.4E-06
Methylene Chloride	75-09-2	3.032692	5.0E-08	3.5E-06
Toluene	108-88-3	36.91877	6.1E-07	4.3E-05
Semivolatile Organic Compounds				
Benzo(a)anthracene	56-55-3	5.4	9.0E-08	6.3E-06
Benzo(a)pyrene	50-32-8	6.2	1.0E-07	7.2E-06
Benzo(b)fluoranthene	205-99-2	7	1.2E-07	8.1E-06
PCB-1254 (Arochlor 1254)	11097-69-1	0.98	1.6E-08	1.1E-06
bis(2-Ethylhexyl) Phthalate	117-81-7	14.12465	2.3E-07	1.6E-05
Pesticides/Herbicides				
Endrin	72-20-8	0.3951337	6.6E-09	4.6E-07
Inorganics				
Antimony	7440-36-0	0.7791747	1.3E-08	9.1E-07
Arsenic	7440-38-2	5.957965	9.9E-08	6.9E-06
Chromium, Total	7440-47-3	33.62588	5.6E-07	3.9E-05

[a/] COPC = Chemical of potential concern.
[b/] CAS = Chemical Abstracts Service number.
[c/] Exposure Point Concentration, mg/Kg = Milligrams per kilogram.
[d/] mg/Kg-day = Milligrams per kilogram-day.

PART B OF APPENDIX J
INTRUSIVE WORKER
CARCINOGENIC AND NONCOARCINOGENIC RISK ESTIMATES -- DERMAL CONTACT WITH MIXED SOIL (0-15 FT BGS)
ROHM AND HASS CHEMICALS, INC.
READING, OHIO

Exposure Assumptions

Receptor	Intrusive Worker	
COPC Concentration in Soil/Sediment ($C_{soil/sed}$)	chemical-specific	mg/Kg
Exposure Frequency (EF)	90	days/yr
Fraction of EF in Contact with Soil (ET)	1	unitless
Exposure Duration (ED)	1	yrs
Exposed Body Surface Area (SA)	3300	cm^2
Soil-to-Skin Adherence Factor (AF)	0.3	mg/cm^2-event
Dermal Soil Absorption Factor (DAF)	chemical-specific	unitless
Averaging Time, Carcinogens (AT_c)	70	yrs
Averaging Time, Noncarcinogens (AT_n)	1	yrs
Oral Slope Factor Adjusted for GI Absorption (SF_d)	chemical-specific	$(mg/Kg\text{-}day)^{-1}$
Body Weight (BW)	70	Kg
Oral Reference Dose Adjusted for GI Absorption (RfD_d)	chemical-specific	mg/Kg-day
Conversion Factor (CF)	0.000001	Kg/mg
Oral Absorption Factor (OAF)	chemical-specific	unitless
Event Frequency (EV)	1	events/day

Risk and Hazard Equations

Carcinogenic:

$$Risk = \frac{(C_{soil/sed})(EF)(ET)(ED)(SA)(AF)(DAF)(SF_d)(CF)}{(BW)(AT_c)(365 days/year)}$$

Where $SF_d = SF_o/OAF$

Non-Carcinogenic:

$$Hazard = \frac{(C_{soil/sed})(EF)(ET)(ED)(SA)(AF)(DAF)(CF)}{(RfD_d)(BW)(AT_{nc})(365 days/year)}$$

Where $RfD_d = (RfD_o)*(OAF)$

COPC [a/]	CAS [b/]	EPC (mg/kg)[c/]	DAF (unitless)	SF_d (mg/kg-day)$^{-1}$[d/]	RFD_d (mg/kg)	Cancer Risk	% Of Total	Hazard Quotient	% Of Total
Volatile Organic Compounds									
1,2-Dichlorobenzene	95-50-1	182.1388	--[e/]	--	0.09	--	--	--	--
1,4-Dichlorobenzene	106-46-7	14.79034	--	0.024	0.03	--	--	--	--
Acetone	67-64-1	11.62633	--	--	0.9	--	--	--	--
Benzene	71-43-2	0.93	--	0.055	0.004	--	--	--	--
Chlorobenzene	108-90-7	4.652028	--	--	0.0062	--	--	--	--
Methylene Chloride	75-09-2	3.032692	--	0.0075	0.06	--	--	--	--
Toluene	108-88-3	36.91877	--	--	0.08	--	--	--	--
Semivolatile Organic Compounds									
Benzo(a)anthracene	56-55-3	5.4	0.13	0.73	--	2.6E-08	7%	--	--
Benzo(a)pyrene	50-32-8	6.2	0.13	7.3	--	2.9E-07	76%	--	--
Benzo(b)fluoranthene	205-99-2	7	0.13	0.73	--	3.3E-08	9%	--	--
PCB-1254 (Arochlor 1254)	11097-69-1	0.98	0.14	2	0.00002	1.4E-08	4%	2.4E-02	48%
bis(2-Ethylhexyl) Phthalate	117-81-7	14.12465	0.1	7.368421E-02	0.0038	5.2E-09	1%	1.3E-03	3%
Pesticides/Herbicides									
Endrin	72-20-8	0.3951337	0.1	--	0.000006	--	--	2.3E-02	46%
Inorganics									
Antimony	7440-36-0	0.7791747	--	--	0.00006	--	--	--	--
Arsenic	7440-38-2	5.957965	0.03	1.5	0.0003	1.3E-08	3%	2.1E-03	4%
Chromium, Total	7440-47-3	33.62588	--	--	0.000273	--	--	--	--
					Pathway Sums	3.8E-07		5.0E-02	

[a/] COPC = Chemical of potential concern.
[b/] CAS = Chemical Abstracts Service number.
[c/] Exposure Point Concentration,
[d/] mg/Kg-day = Milligrams per kilogram-day.
[e/] "--" = Data unavailable.

COPC [a/]	CAS [b/]	EPC (mg/kg)[c/]	DAF (unitless)	Carc Intake	Non-Carc Intake
Volatile Organic Compounds					
1,2-Dichlorobenzene	95-50-1	182.1388	--[e/]	--	--
1,4-Dichlorobenzene	106-46-7	14.79034	--	--	--
Acetone	67-64-1	11.62633	--	--	--
Benzene	71-43-2	0.93	--	--	--
Chlorobenzene	108-90-7	4.652028	--	--	--
Methylene Chloride	75-09-2	3.032692	--	--	--
Toluene	108-88-3	36.91877	--	--	--
Semivolatile Organic Compounds					
Benzo(a)anthracene	56-55-3	5.4	0.13	3.5E-08	2.4E-06
Benzo(a)pyrene	50-32-8	6.2	0.13	4.0E-08	2.8E-06
Benzo(b)fluoranthene	205-99-2	7	0.13	4.5E-08	3.2E-06
PCB-1254 (Arochlor 1254)	11097-69-1	0.98	0.14	6.8E-09	4.8E-07
bis(2-Ethylhexyl) Phthalate	117-81-7	14.12465	0.1	7.0E-08	4.9E-06
Pesticides/Herbicides					
Endrin	72-20-8	0.3951337	0.1	2.0E-09	1.4E-07
Inorganics					
Antimony	7440-36-0	0.7791747	--	--	--
Arsenic	7440-38-2	5.957965	0.03	8.9E-09	6.2E-07
Chromium, Total	7440-47-3	33.62588	--	--	--

[a/] COPC = Chemical of potential concern.
[b/] CAS = Chemical Abstracts Service number.
[c/] Exposure Point Concentration,
[d/] mg/Kg-day = Milligrams per kilogram-day.
[e/] "--" = Data unavailable.

PART B OF APPENDIX J
INTRUSIVE WORKER
CARCINOGENIC AND NONCOARCINOGENIC RISK ESTIMATES -- INHALATION OF VOLATILES/PARTICULATES FROM MIXED SOIL (0-15 FT BGS)
ROHM AND HASS CHEMICALS, INC.
READING, OHIO

Exposure Assumptions

Receptor	Intrusive Worker	
COPC Ambient Air Concentration due to volatile (organics) or particulate (inorganics) emissions from soil (Cair-VOC/Particulate)	chemical-specific	µg/m^3
Exposure Frequency (EF)	90	days/yr
Exposure Duration (ED)	1	yrs
Fraction of EF in Contact with Soil (ET)	1	unitless
Averaging Time, Carcinogens (AT_C)	70	yrs
Averaging Time, Noncarcinogens (AT_N)	1	yrs
Inhalation Unit Risk Factor(URF)	chemical-specific	(µg/m^3)$^{-1}$
Inhalation Reference Concentration (RfC)	chemical-specific	µg/m^3
Volatilization Factor (VF)	chemical-specific	m^3/Kg
Particulate emission factor (PEF)	6.244889E+08	m^3/kg

Risk and Hazard Equations

Carcinogenic:

$$Risk = \frac{(C_{air-VOC/Particulate})(EF)(ED)(ET)(URF)}{(AT_c)(365 days/year)}$$

Non-Carcinogenic:

$$HQ = \frac{(C_{air-VOC/Particulate})(EF)(ED)(ET)}{(RfC)(AT_{nc})(365\ days/year)}$$

where:

$$C_{air-VOC} = \frac{C_{soil}}{VF}$$ for organics; and

$$C_{air-Particulate} = \frac{C_{soil}}{PEF}$$ for inorganics

COPC[a/]	CAS[b/]	EPC (µg/kg)[c/]	Volatilization Factor (m^3/kg)[d/]	$C_{air-VOC/Particulate}$ (µg/m^3)[e/]	URF (µg/m^3)$^{-1}$	RFC (µg/m^3)	Cancer Risk	% Of Total	Hazard Quotient	% Of Total
Volatile Organic Compounds										
1,2-Dichlorobenzene	95-50-1	182138.8	9.1E+03	2.0E+01	--[f/]	199.5	--	--	2.5E-02	58%
1,4-Dichlorobenzene	106-46-7	14790.34	8.0E+03	1.8E+00	6.285E-06	800	4.1E-08	68%	5.7E-04	1%
Acetone	67-64-1	11626.33	7.8E+03	1.5E+00	--	--	--	--	--	--
Benzene	71-43-2	930	1.7E+03	5.5E-01	0.0000078	30	1.5E-08	25%	4.5E-03	10%
Chlorobenzene	108-90-7	4652.027	3.9E+03	1.2E+00	--	59.5	--	--	5.0E-03	12%
Methylene Chloride	75-09-2	3032.692	1.5E+03	2.0E+00	4.7E-07	3010	3.3E-09	5%	1.6E-04	<1%
Toluene	108-88-3	36918.77	2.5E+03	1.5E+01	--	5000	--	--	7.4E-04	2%
Semivolatile Organic Compounds										
Benzo(a)anthracene	56-55-3	5400	5.8E+06	9.2E-04	--	--	--	--	--	--
Benzo(a)pyrene	50-32-8	6200	1.5E+07	4.1E-04	--	--	--	--	--	--
Benzo(b)fluoranthene	205-99-2	7000	2.9E+06	2.4E-03	--	--	--	--	--	--
PCB-1254 (Arochlor 1254)	11097-69-1	980	4.7E+05	2.1E-03	0.0001	0.07	7.3E-10	1%	7.3E-03	17%
bis(2-Ethylhexyl) Phthalate	117-81-7	14124.65	1.3E+08	1.1E-04	--	--	--	--	--	--
Pesticides/Herbicides										
Endrin	72-20-8	395.1337	1.4E+06	2.8E-04	--	--	--	--	--	--
Inorganics										
Antimony	7440-36-0	779.1747	--	1.2E-06	--	--	--	--	--	--
Arsenic	7440-38-2	5957.965	--	9.5E-06	0.0043	--	1.4E-10	<1%	--	--
Chromium, Total	7440-47-3	33625.88	--	5.4E-05	0.00171	0.7	3.2E-10	<1%	1.9E-05	<1%
					Pathway Sums		6.0E-08		4.3E-02	

a/ COPC = Chemical of potential concern.

b/ CAS = Chemical Abstracts Service number.

c/ µg/Kg = Micrograms per kilogram.

d/ m3/kg = Cubic meters per kilogram. Volatilization Factors used for volatile organic compounds only.

e/ µg/m3 = Micrograms per cubic meter.

f/ "--" = Data unavailable.

PART B OF APPENDIX J
CALCULATIONS FOR ESTIMATING VOLATILIZATION FACTOR AND PARTICULATE EMISSION FACTOR [a/]
ROHM AND HASS CHEMICALS, INC.
READING, OHIO

Equations

$$VF = \frac{Q/C \times (3.14 \times D_A \times T)^{1/2} \times 10^{-4}}{(2 \times \rho_b \times D_A)}$$

where:

$$D_A = \frac{[(\theta_a^{10/3} D_i H' + \theta_w^{10/3} D_w)/n^2]}{\rho_b K_d + \theta_w + \theta_a H'}$$

$$PEF = Q/C\left[\frac{3600 \text{seconds/hour}}{0.036(1-V)(U_m/U_t)^3(F(x))}\right]$$

Input Parameter	Definition	Value
VF	Volatilization factor (m^3/Kg) [b/]	Calculated below
A	Area (Acres)	30
Q/C	Inverse of the mean concentration at the center of source (g/m^2-s per Kg/m^3) [c/]	43.08
T	Exposure interval (s) [d/]	9.5E+08
ρ_b	Dry soil bulk density (g/cm^3) [e/]	1.5
D_A	Apparent Diffusivity (cm^2/s) [f/]	Calculated below
θ_a	Air-filled soil porosity (L_{air}/L_{soil}) [g/]	2.8E-01
D_i	Diffusivity in air (cm^2/s)	chemical-specific
H'	Henry's law constant (dimensionless)	chemical-specific
θ_w	Water-filled soil porosity (L_{water}/L_{soil}) [h/]	1.5E-01 [i/]
D_w	Diffusivity in water (cm^2/s)	chemical-specific
n	Total soil porosity (L_{pore}/L_{soil}) [j/]	0.43
K_d	Soil-water partion coefficient (cm^3/g) [k/] = K_{oc} x f_{oc} (organics)	chemical-specific
K_{oc}	Soil organic carbon partition coefficient (cm^3/g)	chemical-specific
f_{oc}	Fraction of organic carbon (unitless)	0.006
PEF	Particulate Emission Factor (m^3/Kg)	6.2E+08
V	Fraction of vegetative cover (unitless)	0.5
U_m	Mean annual wind speed (m/s)	4.69
U_t	Equivalent threshold value of wind speed at 7 m (m/s)	11.32
F(x)	Function dependent on U_m/U_t derived using Cowherd et al. (1985) (unitless)	0.194

COPC [l/]	D_i	D_w	H'	K_{oc}	K_d	D_a	VF
Volatile Organic Compounds							
1,2-Dichlorobenzene	6.9E-02	7.9E-06	7.8E-02	6.2E+02	3.7E+00	7.5E-05	9.1E+03
1,4-Dichlorobenzene	6.9E-02	7.9E-06	1.0E-01	6.2E+02	3.7E+00	9.6E-05	8.0E+03
Acetone	1.2E-01	1.1E-05	1.6E-03	5.8E-01	3.5E-03	1.0E-04	7.8E+03
Benzene	8.8E-02	9.8E-06	2.3E-01	5.9E+01	3.5E-01	2.2E-03	1.7E+03
Chlorobenzene	7.3E-02	8.7E-06	1.5E-01	2.2E+02	1.3E+00	4.1E-04	3.9E+03
Methylene Chloride	1.0E-01	1.2E-05	9.0E-02	1.2E+01	7.0E-02	2.6E-03	1.5E+03
Toluene	8.7E-02	8.6E-06	2.7E-01	1.8E+02	1.1E+00	1.0E-03	2.5E+03
Semivolatile Organic Compounds							
Benzo(a)anthracene	5.1E-02	9.0E-06	1.4E-04	4.0E+05	2.4E+03	1.8E-10	5.8E+06
Benzo(a)pyrene	4.3E-02	9.0E-06	4.6E-05	1.0E+06	6.1E+03	2.7E-11	1.5E+07
Benzo(b)fluoranthene	2.3E-02	5.6E-06	4.6E-03	1.2E+06	7.4E+03	7.5E-10	2.9E+06
PCB-1254 (Arochlor 1254)	2.0E-02	5.0E-06	1.2E-02	7.6E+04	4.5E+02	2.8E-08	4.7E+05
bis(2-Ethylhexyl) Phthalate	3.5E-02	3.7E-06	4.2E-06	1.5E+07	9.1E+04	3.4E-13	1.3E+08
Pesticides/Herbicides							
Endrin	1.3E-02	4.7E-06	3.1E-04	1.2E+04	7.4E+01	3.2E-09	1.4E+06
Inorganics							
Antimony	--[m/]	--	--	--	4.5E+01	--	--
Arsenic	--	--	--	--	3.1E+01	--	--
Chromium, Total	--	--	--	--	1.4E+01	--	--

a/ Calculations and default values were done per USEPA (1996a) Soil Screening Guidance: Users Guide.

b/ m^3/kg = Cubic meters per kilogram.

c/ g/m^2-s per kg/m^3 = Grams per square meter second per kilogram per cubic meter. The Q/C term was based on the site-specific source area, climatic zone, and Cleveland, Ohio (USEPA, 1996a).

d/ s = Seconds.

e/ g/cm^3 = Grams per cubic centimeter.

f/ cm^2/s = Square centimeters per second.

g/ L_{air}/L_{soil} = Liters of air per liters of soil.

h/ L_{water}/L_{soil} = Liters of water per liters of soil.

i/ Default value recommended by USEPA (1996a) in Equation 10. This value is consistent with the default value recommended by USEPA (2003c).

j/ L_{pore}/L_{soil} = Liters pore space per liters of soil.
k/ cm^3/g = Cubic centimeters per gram.
l/ COPC = Chemical of potential concern.
m/ "--" = Data unavailable.

ACRES	QC_VAL*	PROJECT
0.5	83.22	RHHS
1	73.06	RHHS
2	64.78	RHHS
5	55.99	RHHS
10	50.38	RHHS
30	43.08	RHHS

* - Q/C for Cleveland, Ohio.

PART B OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

NON-CARCINOGEN

Intake (mg/kg-d) = (CA x ED x ET x EF x IR)/(BW x AT)

Chemical of Concern	Concent. in Air (CA) (mg/m3)	Exposure Duration (ED) (yrs)	Exposure Time (ET) (hrs/d)	Exposure Frequency (EF) (days/yr)	Inhalation Rate (IR) (m^3/hr)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	7.74E-05	1	8	90	2.5	70	9125	2.18E-07
1,4-Dichlorobenzene	1.51E-05	1	8	90	2.5	70	9125	4.27E-08
1,2-Dichloroethane	2.70E-05	1	8	90	2.5	70	9125	7.62E-08
Acetone	2.67E-04	1	8	90	2.5	70	9125	7.54E-07
Benzene	1.37E-05	1	8	90	2.5	70	9125	3.87E-08
Chlorobenzene	2.75E-04	1	8	90	2.5	70	9125	7.74E-07
Chloroform	1.50E-05	1	8	90	2.5	70	9125	4.24E-08
Methylene chloride	1.80E-05	1	8	90	2.5	70	9125	5.06E-08
Tetrachloroethene	1.49E-05	1	8	90	2.5	70	9125	4.20E-08
Toluene	2.33E-03	1	8	90	2.5	70	9125	6.58E-06
Trichloroethene	1.11E-06	1	8	90	2.5	70	9125	3.14E-09
Vinyl chloride	5.58E-06	1	8	90	2.5	70	9125	1.57E-08

CARCINOGEN

Intake (mg/kg-d) = (CA x ED x ET x EF x IR)/(BW x AT)

Chemical of Concern	Concent. in Air (CA) (mg/m3)	Exposure Duration (ED) (yrs)	Exposure Time (ET) (hrs/d)	Exposure Frequency (EF) (days/yr)	Inhalation Rate (IR) (m^3/hr)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	7.74E-05	1	8	90	2.5	70	25550	7.79E-08
1,4-Dichlorobenzene	1.51E-05	1	8	90	2.5	70	25550	1.52E-08
1,2-Dichloroethane	2.70E-05	1	8	90	2.5	70	25550	2.72E-08
Acetone	2.67E-04	1	8	90	2.5	70	25550	2.69E-07
Benzene	1.37E-05	1	8	90	2.5	70	25550	1.38E-08
Chlorobenzene	2.75E-04	1	8	90	2.5	70	25550	2.76E-07
Chloroform	1.50E-05	1	8	90	2.5	70	25550	1.51E-08
Methylene chloride	1.80E-05	1	8	90	2.5	70	25550	1.81E-08
Tetrachloroethene	1.49E-05	1	8	90	2.5	70	25550	1.50E-08
Toluene	2.33E-03	1	8	90	2.5	70	25550	2.35E-06
Trichloroethene	1.11E-06	1	8	90	2.5	70	25550	1.12E-09
Vinyl chloride	5.58E-06	1	8	90	2.5	70	25550	5.62E-09

PART B OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

CAair= **CAgw x VFgw,amb x 10^{-3} m^3/L**

Chemical of Concern	Concent. in Air (CA) (mg/m^3)	Concent. in GW (CW) (mg/l)	VFgw,amb (cm^3-water/ cm^3-air)
1,2-Dichlorobenzene	7.74E-05	1.9	4.07E-08
1,4-Dichlorobenzene	1.51E-05	0.33	4.59E-08
1,2-Dichloroethane	2.70E-05	0.66	4.10E-08
Acetone	2.67E-04	45	5.94E-09
Benzene	1.37E-05	0.15	9.16E-08
Chlorobenzene	2.75E-04	4.5	6.10E-08
Chloroform	1.50E-05	0.19	7.92E-08
Methylene chloride	1.80E-05	0.28	6.42E-08
Tetrachloroethene	1.49E-05	0.082	1.82E-07
Toluene	2.33E-03	24	9.72E-08
Trichloroethene	1.11E-06	0.0088	1.26E-07
Vinyl chloride	5.58E-06	0.015	3.72E-07

VFgw,amb= **1/[(1+(DFamb x Lgw)/(Dwseff))x1/Heff]**

VFgw,amb volatilization factor, groundwater to ambient air (cm^3-water/cm^3-air)
Dwseff effective diffusivity - avg. water table to surface (cm^2/sec)
DFamb dispersion factor for ambient air (cm/s)
Heff effective Henry's law coefficient (cm^3 -water/cm^3 -air)
Lgw depth to groundwater (cm)

PART B OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

Chemical of Concern	VFgw,amb (cm^3-water/ cm^3-air)	DFamb (cm/s)	Heff (cm^3-water/ cm^3-air)	Lgw (cm)	Dwseff (cm^2/sec)
1,2-Dichlorobenzene	4.07E-08	10	7.8E-02	237.74	1.24E-03
1,4-Dichlorobenzene	4.59E-08	10	1.0E-01	237.74	1.09E-03
1,2-Dichloroethane	4.10E-08	10	4.0E-02	237.74	2.44E-03
Acetone	5.94E-09	10	1.6E-03	237.74	8.83E-03
Benzene	9.16E-08	10	2.3E-01	237.74	9.55E-04
Chlorobenzene	6.10E-08	10	1.5E-01	237.74	9.67E-04
Chloroform	7.92E-08	10	1.5E-01	237.74	1.26E-03
Methylene chloride	6.42E-08	10	9.0E-02	237.74	1.70E-03
Tetrachloroethene	1.82E-07	10	7.5E-01	237.74	5.76E-04
Toluene	9.72E-08	10	2.7E-01	237.74	8.56E-04
Trichloroethene	1.26E-07	10	4.2E-01	237.74	7.16E-04
Vinyl chloride	3.72E-07	10	1.1E+00	237.74	8.04E-04

Dwseff (cm^2/sec)=	**Lgw/[(hv/Dseff)+(hcap/Dcapeff)]**
Dseff	effective diffusivity - vadose zone soils (cm^2/sec)
Dcapeff	effective diffusivity - capillary fringe zone (cm^2/sec)
hv	vadose zone thickness (cm)
hcap	capillary zone thickness (cm)
Lgw	depth to groundwater (cm), Lgw=hv + hcap

Chemical of Concern	Dwseff (cm^2/sec)	Dseff (cm^2/sec)	Dcapeff (cm^2/sec)	hv (cm)	hcap	Lgw
1,2-Dichlorobenzene	1.24E-03	5.38E-03	3.37E-05	232.74	5.00	237.74
1,4-Dichlorobenzene	1.09E-03	5.38E-03	2.86E-05	232.74	5.00	237.74
1,2-Dichloroethane	2.44E-03	8.11E-03	7.25E-05	232.74	5.00	237.74
Acetone	8.83E-03	9.74E-03	1.65E-03	232.74	5.00	237.74
Benzene	9.55E-04	6.86E-03	2.32E-05	232.74	5.00	237.74
Chlorobenzene	9.67E-04	5.69E-03	2.44E-05	232.74	5.00	237.74
Chloroform	1.26E-03	8.11E-03	3.11E-05	232.74	5.00	237.74
Methylene chloride	1.70E-03	7.88E-03	4.52E-05	232.74	5.00	237.74
Tetrachloroethene	5.76E-04	5.62E-03	1.35E-05	232.74	5.00	237.74
Toluene	8.56E-04	6.79E-03	2.05E-05	232.74	5.00	237.74
Trichloroethene	7.16E-04	6.16E-03	1.70E-05	232.74	5.00	237.74
Vinyl chloride	8.04E-04	8.27E-03	1.87E-05	232.74	5.00	237.74

PART B OF APPENDIX J
INHALATION OF VOLATILES FROM GROUNDWATER INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICAL LLC
READING, OHIO

Dseff= **Dair x ($\theta as^{3.33}/\theta t^2$) + Dwat x (1/H) x ($\theta ws^{3.33}/\theta t^2$)**

Dair molecular diffusion coefficient in air (cm^2/sec)
Dwat molecular diffusion coefficient in water (cm^2/sec)
θas volumetric air content in vadose zone soils (cm^3/cm^3)
θws volumetric water content in vadose zone soils (cm^3/cm^3)
θt total soil porosity vadose zone (cm^3/cm^3)

Chemical of Concern	Dseff (cm^2/sec)	θas (cm^3/cm^3)	θt (cm^3/cm^3)	θws (cm^3/cm^3)	H (dimensionless)	Dair (cm^2/sec)	Dwat (cm^2/sec)
1,2-Dichlorobenzene	5.38E-03	0.28	0.43	0.15	7.8E-02	6.9E-02	7.9E-06
1,4-Dichlorobenzene	5.38E-03	0.28	0.43	0.15	1.0E-01	6.9E-02	7.9E-06
1,2-Dichloroethane	8.11E-03	0.28	0.43	0.15	4.0E-02	1.0E-01	9.9E-06
Acetone	9.74E-03	0.28	0.43	0.15	1.6E-03	1.2E-01	1.1E-05
Benzene	6.86E-03	0.28	0.43	0.15	2.3E-01	8.8E-02	9.8E-06
Chlorobenzene	5.69E-03	0.28	0.43	0.15	1.5E-01	7.3E-02	8.7E-06
Chloroform	8.11E-03	0.28	0.43	0.15	1.5E-01	1.0E-01	1.0E-05
Methylene chloride	7.88E-03	0.28	0.43	0.15	9.0E-02	1.0E-01	1.2E-05
Tetrachloroethene	5.62E-03	0.28	0.43	0.15	7.5E-01	7.2E-02	8.2E-06
Toluene	6.79E-03	0.28	0.43	0.15	2.7E-01	8.7E-02	8.6E-06
Trichloroethene	6.16E-03	0.28	0.43	0.15	4.2E-01	7.9E-02	9.1E-06
Vinyl chloride	8.27E-03	0.28	0.43	0.15	1.1E+00	1.1E-01	1.2E-05

Dcapeff= **Dair x ($\theta acap^{3.33}/\theta t^2$) + Dwat x (1/H) x ($\theta wcap^{3.33}/\theta t^2$)**

$\theta acap$ volumetric air content in capillary zone soils (cm^3/cm^3)
$\theta wcap$ volumetric water content in capillary zone soils (cm3/cm3)

Chemical of Concern	Dcapeff (cm^2/sec)	$\theta acap$ (cm^3/cm^3)	θt (cm^3/cm^3)	$\theta wcap$ (cm^3/cm^3)	H (dimensionless)	Dair (cm^2/sec)	Dwat (cm^2/sec)
1,2-Dichlorobenzene	3.37E-05	0.043	0.43	0.387	7.8E-02	6.9E-02	7.9E-06
1,4-Dichlorobenzene	2.86E-05	0.043	0.43	0.387	1.0E-01	6.9E-02	7.9E-06
1,2-Dichloroethane	7.25E-05	0.043	0.43	0.387	4.0E-02	1.0E-01	9.9E-06
Acetone	1.65E-03	0.043	0.43	0.387	1.6E-03	1.2E-01	1.1E-05
Benzene	2.32E-05	0.043	0.43	0.387	2.3E-01	8.8E-02	9.8E-06
Chlorobenzene	2.44E-05	0.043	0.43	0.387	1.5E-01	7.3E-02	8.7E-06
Chloroform	3.11E-05	0.043	0.43	0.387	1.5E-01	1.0E-01	1.0E-05
Methylene chloride	4.52E-05	0.043	0.43	0.387	9.0E-02	1.0E-01	1.2E-05
Tetrachloroethene	1.35E-05	0.043	0.43	0.387	7.5E-01	7.2E-02	8.2E-06
Toluene	2.05E-05	0.043	0.43	0.387	2.7E-01	8.7E-02	8.6E-06
Trichloroethene	1.70E-05	0.043	0.43	0.387	4.2E-01	7.9E-02	9.1E-06
Vinyl chloride	1.87E-05	0.043	0.43	0.387	1.1E+00	1.1E-01	1.2E-05

PART B OF APPENDIX J
DERMAL CONTACT WITH GROUNDWATER - INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NONCARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	1.28E-04	1	90	1	3300	70	365	1.49E-03
1,4-Dichlorobenzene	2.23E-05	1	90	1	3300	70	365	2.59E-04
1,2-Dichloroethane	3.34E-06	1	90	1	3300	70	365	3.88E-05
Acetone	2.36E-05	1	90	1	3300	70	365	2.74E-04
Benzene	2.37E-06	1	90	1	3300	70	365	2.75E-05
Chlorobenzene	1.67E-04	1	90	1	3300	70	365	1.94E-03
Chloroform	1.79E-06	1	90	1	3300	70	365	2.08E-05
Methylene chloride	1.08E-06	1	90	1	3300	70	365	1.26E-05
Tetrachloroethene	5.05E-06	1	90	1	3300	70	365	5.87E-05
Toluene	8.60E-04	1	90	1	3300	70	365	1.00E-02
Trichloroethene	1.57E-07	1	90	1	3300	70	365	1.83E-06
Vinyl chloride	8.04E-08	1	90	1	3300	70	365	9.35E-07
bis-(2Ethylhexyl) phthalate	5.42E-06	1	90	1	3300	70	365	6.30E-05
4-Methylphenol	3.02E-06	1	90	1	3300	70	365	3.52E-05
Aniline	2.64E-05	1	90	1	3300	70	365	3.07E-04
beta-BHC	1.10E-06	1	90	1	3300	70	365	1.28E-05
delta-BHC	9.23E-08	1	90	1	3300	70	365	1.07E-06
gamma-BHC	4.33E-08	1	90	1	3300	70	365	5.04E-07
4,4-DDE	1.91E-07	1	90	1	3300	70	365	2.22E-06
Dieldrin	1.94E-07	1	90	1	3300	70	365	2.25E-06
Heptachlor	2.94E-07	1	90	1	3300	70	365	3.42E-06
Heptachlor epoxide	4.46E-08	1	90	1	3300	70	365	5.18E-07
Aluminum	1.97E-05	1	90	1	3300	70	365	2.28E-04
Antimony	5.30E-07	1	90	1	3300	70	365	6.16E-06
Arsenic	3.06E-07	1	90	1	3300	70	365	3.55E-06
Cadmium	1.09E-08	1	90	1	3300	70	365	1.26E-07
Chromium	3.62E-06	1	90	1	3300	70	365	4.20E-05
Copper	2.32E-06	1	90	1	3300	70	365	2.70E-05
Iron	4.78E-05	1	90	1	3300	70	365	5.55E-04
Lead	2.03E-07	1	90	1	3300	70	365	2.35E-06
Manganese	6.50E-06	1	90	1	3300	70	365	7.56E-05
Nickel	1.95E-07	1	90	1	3300	70	365	2.27E-06
Thallium	8.35E-09	1	90	1	3300	70	365	9.71E-08
Vanadium	7.40E-08	1	90	1	3300	70	365	8.60E-07

PART B OF APPENDIX J
DERMAL CONTACT WITH GROUNDWATER - INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

CARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
1,2-Dichlorobenzene	1.28E-04	1	90	1	3300	70	25550	2.13E-05
1,4-Dichlorobenzene	2.23E-05	1	90	1	3300	70	25550	3.70E-06
1,2-Dichloroethane	3.34E-06	1	90	1	3300	70	25550	5.55E-07
Acetone	2.36E-05	1	90	1	3300	70	25550	3.92E-06
Benzene	2.37E-06	1	90	1	3300	70	25550	3.93E-07
Chlorobenzene	1.67E-04	1	90	1	3300	70	25550	2.77E-05
Chloroform	1.79E-06	1	90	1	3300	70	25550	2.97E-07
Methylene chloride	1.08E-06	1	90	1	3300	70	25550	1.80E-07
Tetrachloroethene	5.05E-06	1	90	1	3300	70	25550	8.38E-07
Toluene	8.60E-04	1	90	1	3300	70	25550	1.43E-04
Trichloroethene	1.57E-07	1	90	1	3300	70	25550	2.61E-08
Vinyl chloride	8.04E-08	1	90	1	3300	70	25550	1.34E-08
bis-(2Ethylhexyl) phthalate	5.42E-06	1	90	1	3300	70	25550	9.00E-07
4-Methylphenol	3.02E-06	1	90	1	3300	70	25550	5.02E-07
Aniline	2.64E-05	1	90	1	3300	70	25550	4.38E-06
beta-BHC	1.10E-06	1	90	1	3300	70	25550	1.83E-07
delta-BHC	9.23E-08	1	90	1	3300	70	25550	1.53E-08
gamma-BHC	4.33E-08	1	90	1	3300	70	25550	7.20E-09
4,4-DDE	1.91E-07	1	90	1	3300	70	25550	3.17E-08
Dieldrin	1.94E-07	1	90	1	3300	70	25550	3.22E-08
Heptachlor	2.94E-07	1	90	1	3300	70	25550	4.88E-08
Heptachlor epoxide	4.46E-08	1	90	1	3300	70	25550	7.40E-09
Aluminum	1.97E-05	1	90	1	3300	70	25550	3.26E-06
Antimony	5.30E-07	1	90	1	3300	70	25550	8.80E-08
Arsenic	3.06E-07	1	90	1	3300	70	25550	5.07E-08
Cadmium	1.09E-08	1	90	1	3300	70	25550	1.80E-09
Chromium	3.62E-06	1	90	1	3300	70	25550	6.00E-07
Copper	2.32E-06	1	90	1	3300	70	25550	3.85E-07
Iron	4.78E-05	1	90	1	3300	70	25550	7.93E-06
Lead	2.03E-07	1	90	1	3300	70	25550	3.36E-08
Manganese	6.50E-06	1	90	1	3300	70	25550	1.08E-06
Nickel	1.95E-07	1	90	1	3300	70	25550	3.24E-08
Thallium	8.35E-09	1	90	1	3300	70	25550	1.39E-09
Vanadium	7.40E-08	1	90	1	3300	70	25550	1.23E-08

PART B OF APPENDIX J
DERMAL CONTACT WITH GROUNDWATER - INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Calculate dose absorbed (DA). For organics DA event is calculated as follows:

Absorbed dose (mg/kg-d) = (DA event x EV x EF x ED x SA)/(BW x AT)

Organics: DA event is calculated as follows:

If Tevent < t*, then: DA event = 2FA x Kp x Cw x CF x $(6\tau Tevent/3.14)^{1/2}$

If Tevent>t*, then: DA event = FA x Kp x Cw x CF x $[Tevent/(1+B) + 2\tau(1+3B+3B^2)/(1+B)^2]$

Where: CF = Correction factor of 0.001 L/cm^3

Tevent = 0.5 hrs for dermal contact during construction activities

	Cw (mg/L)	t* (hrs)	Kp(cm/hr)	τ(hr)	B	DA event (mg/cm^2)	FA
1,2-Dichlorobenzene	1.9	1.71	4.10E-02	0.71	0.2	1.28E-04	1
1,4-Dichlorobenzene	0.33	1.71	4.10E-02	0.71	0.2	2.23E-05	1
1,2-Dichloroethane	0.66	0.92	4.20E-03	0.38	0	3.34E-06	1
Acetone	45	0.53	5.69E-04	0.22	0.0	2.36E-05	1
Benzene	0.15	0.7	1.50E-02	0.29	0.1	2.37E-06	1
Chlorobenzene	4.5	1.09	2.80E-02	0.46	0.1	1.67E-04	1
Chloroform	0.19	1.19	6.80E-03	0.5	0	1.79E-06	1
Methylene chloride	0.28	0.76	3.50E-03	0.32	0	1.08E-06	1
Tetrachloroethene	0.082	2.18	3.30E-02	0.91	0.2	5.05E-06	1
Toluene	24	0.84	3.10E-02	0.35	0.1	8.60E-04	1
Trichloroethene	0.0088	1.39	1.20E-02	0.58	0.1	1.57E-07	1
Vinyl chloride	0.015	0.57	5.60E-03	0.24	0	8.04E-08	1
bis-(2Ethylhexyl) phthalate	0.034	3.99E+01	2.50E-02	16.64	0.2	5.42E-06	0.8
4-Methylphenol	0.33	4.81E-01	9.95E-03	0.22	0.03	3.02E-06	1
Aniline	12	0.85	1.90E-03	0.35	0	2.64E-05	1
beta-BHC	0.012	10.60	2.79E-02	4.42	0.2	1.10E-06	0.8
delta-BHC	0.001	10.74	2.79E-02	4.47	0.2	9.23E-08	0.8
gamma-BHC	0.00047	10.72	2.79E-02	4.47	0.2	4.33E-08	0.8
4,4-DDE	0.0003	25.08	1.60E-01	6.48	1.1	1.91E-07	0.8
Dieldrin	0.0027	35.09	1.20E-02	14.62	0.1	1.94E-07	0.8
Heptachlor	0.006	31.85	8.60E-03	13.27	0.1	2.94E-07	0.8
Heptachlor epoxide	0.00091	31.85	8.60E-03	13.27	0.1	4.46E-08	0.8

PART B OF APPENDIX J
DERMAL CONTACT WITH GROUNDWATER - INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Inorganic: Daevent= Kp x Cw x Tevent

Where: CF = Correction factor of 0.001 L/cm^3

	Cw (mg/l)	Kp (cm/hr)	Tevent (hr)	DA event (mg/cm^2)
Aluminum	3.93E+01	1.00E-03	0.5	1.97E-05
Antimony	1.06E+00	1.00E-03	0.5	5.30E-07
Arsenic	6.11E-01	1.00E-03	0.5	3.06E-07
Cadmium	2.17E-02	1.00E-03	0.5	1.09E-08
Chromium	7.23E+00	1.00E-03	0.5	3.62E-06
Copper	4.64E+00	1.00E-03	0.5	2.32E-06
Iron	9.55E+01	1.00E-03	0.5	4.78E-05
Lead	4.05E-01	1.00E-03	0.5	2.03E-07
Manganese	1.30E+01	1.00E-03	0.5	6.50E-06
Nickel	1.95E+00	2.00E-04	0.5	1.95E-07
Thallium	1.67E-02	1.00E-03	0.5	8.35E-09
Vanadium	1.48E-01	1.00E-03	0.5	7.40E-08

Kp, B, tevent, t* and FA were calculated for acetone, 4-methylphenol, beta-BHC, delta-BHC and gamma-BHC using the following equations:

log Kp= (-2.8) + 0.66 log Kow - 0.0056 MW

B=Kp/Kp,ve= Kp x $(MW)^{1/2}$/2.6

τ (hr/event)= 0.105 x $10^{(0.0056MW)}$

If B<=0.6, then t*=2.4τevent

FA t*/τevent

	log Kow	Kp (cm/hr)	MW	B	τ(hr/event)	t*	t*/τevent	FA
Acetone	-0.24	0.000569	58.08	0.001667832	0.222043109	0.5329035	63.05081964	1
4-Methylphenol	1.94	0.00995	50.08	0.027082072	0.200279869	0.4806717	69.90218266	1
beta-BHC	4.14	0.0279	290	0.182738415	4.417629598	10.602311	3.169120382	0.8
delta-BHC	4.14	0.0279	291	0.18305321	4.474961457	10.739907	3.128518566	0.8
gamma-BHC	4.14	0.0279	290.83	0.182999733	4.465162812	10.716391	3.135383991	0.8

Source: US EPA, 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final, July.
Oak Ridge National Laboratory Risk Assessment Information System website.

PART B OF APPENDIX J
INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICALS LLC
READING, OHO

GROUNDWATER INHALATION

	CARCINOGEN			NON-CARCINOGEN		
Chemical of Concern	**Intake**	**Slope Factor**	**Cancer Risk**	**Intake**	**RfD (mg/kg/day)**	**Hazard Quotient**
1,2-Dichlorobenzene	7.79E-08	-	**-**	2.18E-07	5.70E-02	3.83E-06
1,4-Dichlorobenzene	1.52E-08	2.20E-02	3.35E-10	4.27E-08	2.29E-01	1.86E-07
1,2-Dichloroethane	2.72E-08	9.10E-02	2.48E-09	7.62E-08	1.40E-03	5.44E-05
Acetone	2.69E-07	**-**	**-**	7.54E-07	9.00E-01	8.37E-07
Benzene	1.38E-08	2.73E-02	3.77E-10	3.87E-08	8.57E-03	4.52E-06
Chlorobenzene	2.76E-07	-	-	7.74E-07	1.70E-02	4.55E-05
Chloroform	1.51E-08	8.05E-02	1.22E-09	4.24E-08	1.40E-02	3.03E-06
Methylene chloride	1.81E-08	1.60E-03	2.89E-11	5.06E-08	8.60E-01	5.89E-08
Tetrachloroethene	1.50E-08	2.07E-02	3.10E-10	4.20E-08	1.00E-01	4.20E-07
Toluene	2.35E-06	-	-	6.58E-06	1.43E+00	4.60E-06
Trichloroethene	1.12E-09	7.00E-03	7.84E-12	3.14E-09	1.70E-01	1.85E-08
Vinyl chloride	5.62E-09	1.54E-02	8.65E-11	1.57E-08	2.86E-02	5.50E-07
		Total Risk	**4.84E-09**		Hazard Index	**1.18E-04**

PART B OF APPENDIX J
INTRUSIVE CONSTRUCTION WORKER
ROHM AND HAAS CHEMICALS LLC
READING, OHO

GROUNDWATER DERMAL CONTACT

	CARCINOGEN			NON-CARCINOGEN		
Chemical of Concern	**Intake**	**Slope Factor**	**Cancer Risk**	**Intake**	**RfD (mg/kg/day)**	**Hazard Quotient**
1,2-Dichlorobenzene	2.13E-05	-	-	1.49E-03	9.00E-02	1.66E-02
1,4-Dichlorobenzene	3.70E-06	2.40E-02	8.88E-08	2.59E-04	3.00E-02	8.64E-03
1,2-Dichloroethane	5.55E-07	9.10E-02	5.05E-08	3.88E-05	2.00E-02	1.94E-03
Acetone	3.92E-06	-	-	2.74E-04	9.00E-01	3.05E-04
Benzene	3.93E-07	5.50E-02	2.16E-08	2.75E-05	4.00E-03	6.88E-03
Chlorobenzene	2.77E-05	-	-	1.94E-03	6.20E-03	3.13E-01
Chloroform	2.97E-07	-	-	2.08E-05	2.00E-03	1.04E-02
Methylene chloride	1.80E-07	7.50E-03	1.35E-09	1.26E-05	6.00E-02	2.10E-04
Tetrachloroethene	8.38E-07	5.40E-01	4.53E-07	5.87E-05	1.00E-02	5.87E-03
Toluene	1.43E-04	-	-	1.00E-02	8.00E-02	1.25E-01
Trichloroethene	2.61E-08	8.70E-02	2.27E-09	1.83E-06	9.00E-04	2.03E-03
Vinyl chloride	1.34E-08	7.20E-01	9.62E-09	9.35E-07	3.00E-03	3.12E-04
bis-(2Ethylhexyl) phthalate	9.00E-07	7.40E-02	6.66E-08	6.30E-05	3.80E-02	1.66E-03
4-Methylphenol	5.02E-07	-	-	3.52E-05	5.00E-03	7.03E-03
Aniline	4.38E-06	5.70E-03	2.50E-08	3.07E-04	7.00E-03	4.38E-02
beta-BHC	1.83E-07	1.80E+00	3.29E-07	1.28E-05	2.00E-04	6.40E-02
delta-BHC	1.53E-08	-	-	1.07E-06	-	-
gamma-BHC	7.20E-09	1.30E+00	9.36E-09	5.04E-07	3.00E-04	1.68E-03
4,4-DDE	3.17E-08	3.40E-01	1.08E-08	2.22E-06	-	-
Dieldrin	3.22E-08	1.60E+01	5.15E-07	2.25E-06	2.50E-05	9.01E-02
Heptachlor	4.88E-08	4.50E+00	2.20E-07	3.42E-06	5.00E-04	6.83E-03
Heptachlor epoxide	7.40E-09	9.10E+00	6.74E-08	5.18E-07	1.30E-05	3.99E-02
Aluminum	3.26E-06	-	-	2.28E-04	1.00E+00	2.28E-04
Antimony	8.80E-08	-	-	6.16E-06	6.00E-05	1.03E-01
Arsenic	5.07E-08	1.50E+00	7.61E-08	3.55E-06	3.00E-04	1.18E-02
Cadmium	1.80E-09	-	-	1.26E-07	1.25E-05	1.01E-02
Chromium	6.00E-07	-	-	4.20E-05	1.95E-02	2.15E-03
Copper	3.85E-07	-	-	2.70E-05	1.20E-02	2.25E-03
Iron	7.93E-06	-	-	5.55E-04	3.00E-01	1.85E-03
Lead	3.36E-08	-	-	2.35E-06	-	-
Manganese	1.08E-06	-	-	7.56E-05	5.60E-03	1.35E-02
Nickel	3.24E-08	-	-	2.27E-06	8.00E-04	2.83E-03
Thallium	1.39E-09	-	-	9.71E-08	6.60E-05	1.47E-03
Vanadium	1.23E-08	-	-	8.60E-07	2.60E-05	3.31E-02
		Total Risk	**1.95E-06**		Hazard Index	**9.28E-01**

PART C OF APPENDIX J

ADULT RECREATIONAL USERS

PART C OF APPDNEIX J
INCIDENTAL INGESTION OF SURFACE WATER - RECREATIONAL USERS (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Noncarcinogen

Intake (mg/kg-d) = (CW x IRW x ET x EF x ED)/(BW x AT)

Chemical of Concern	SW Conc. (CW) (mg/l)	Ingestion Rate (IR) L/event	Exposure Time (ET) hours/event	Exposure Frequency (EF) (events/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochloromethane	0.00086	0.05	0.5	26	24	70	8760	2.19E-08
Thallium	0.0068	0.05	0.5	26	24	70	8760	1.73E-07

Carcinogen

Intake (mg/kg-d) = (CW x IRW x ET x EF x ED)/(BW x AT)

Chemical of Concern	SW Conc. (CW) (mg/l)	Ingestion Rate (IR) L/event	Exposure Time (ET) hours/event	Exposure Frequency (EF) (events/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochloromethane	0.00086	0.05	0.5	26	24	70	25550	7.50E-09
Thallium	0.0068	0.05	0.5	26	24	70	25550	5.93E-08

PART C OF APPENDIX J
DERMAL CONTACT WITH SURFACE WATER - RECREATIONAL USERS (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NONCARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochlorometha	7.95E-12	1	26	24	18000	70	8760	1.46E-10
Thallium	3.40E-09	1	26	24	18000	70	8760	6.23E-08

CARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochlorometha	7.95E-12	1	26	24	18000	70	25550	4.99E-11
Thallium	3.40E-09	1	26	24	18000	70	25550	2.14E-08

Calculate dose absorbed (DA). For organics DA event is calculated as follows:

Absorbed dose (mg/kg-d) = (DA event x EV x EF x ED x SA)/(BW x AT)

Organics: DA event is calculated as follows:

If Tevent < T*, then: DA event = 2FA x Kp x Cw x CF1 x CF2 x $(6\tau Tevent/3.14)^{1/2}$

If Tevent>t*, then: DA event = FA x Kp x Cw x CF1 x CF2 x $[Tevent/(1+B) + 2\tau(1+3B+3B^2)/(1+B)^2]$

Where: CF = Correction factor of 0.001 L/cm^3

Tevent = 0.5 hrs for dermal contact during each swimming event

	Cw (mg/L)	t* (hrs)	Kp(cm/hr)	τ(hr)	B	DA event (mg/cm^2)	FA
Dibromochlorometha	0.00086	2.12	4.60E-03	0.88	0	7.95E-12	1

Inorganic: Daevent= Kp x Cw x Tevent Where: CF = Correction factor of 0.001 L/cm^3

	Cw (mg/L)	Kp	Tevent	DA event (mg/cm^2)
Thallium	0.0068	1.00E-03	0.5	3.40E-09

PART C OF APPENDIX J
SURFACE WATER INCIDENTAL INGESTION AND DERMAL CONTACT - RECREATIONAL USERS (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

SURFACE WATER INGESTION

Chemical of Concern	CARCINOGEN			NON-CARCINOGEN		
	Intake	Slope Factor	Cancer Risk	Intake	RfD (mg/kg/day)	Hazard Quotient
Dibromochloromethan	7.50E-09	8.40E-02	6.30E-10	2.19E-08	2.00E-02	1.09E-06
Thallium	5.93E-08	--	--	1.73E-07	6.60E-05	2.62E-03
		Total Risk	**6.30E-10**		Hazard Index	**2.62E-03**

SURFACE WATER DERMAL CONTACT

Chemical of Concern	CARCINOGEN			NON-CARCINOGEN		
	Intake	Slope Factor	Cancer Risk	Intake	RfD (mg/kg/day)	Hazard Quotient
Dibromochloromethan	4.99E-11	8.40E-02	4.19E-12	1.46E-10	2.00E-02	7.28E-09
Thallium	2.14E-08	--	--	6.23E-08	6.60E-05	9.44E-04
		Total Risk	**4.19E-12**		Hazard Index	**9.44E-04**

PART C OF APPENDIX J
INCIDENTAL INGESTION OF COPCS IN SEDIMENTS - RECREATIONAL USERS (Adult)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NON-CARCINOGEN

Intake= **(CS x IR x CF x FI x EF x ED)/(BW x AT)**

Chemical of Concern	Maximum Sediment Concentration (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	100	1	26	24	70	8760	1.42E-07
Benzo(a)pyrene	1.20E+00	1.00E-06	100	1	26	24	70	8760	1.22E-07
Benzo(b)fluoranthene	1.30E+00	1.00E-06	100	1	26	24	70	8760	1.32E-07
beta-BHC	9.40E-02	1.00E-06	100	1	26	24	70	8760	9.57E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	100	1	26	24	70	8760	1.93E-08
Dieldrin	2.40E-02	1.00E-06	100	1	26	24	70	8760	2.44E-09
Arsenic	6.30E+00	1.00E-06	100	1	26	24	70	8760	6.41E-07

Intake= **(CS x IR x CF x FI x EF x ED)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	100	1	26	24	70	25550	4.88E-08
Benzo(a)pyrene	1.20E+00	1.00E-06	100	1	26	24	70	25550	4.19E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	100	1	26	24	70	25550	4.54E-08
beta-BHC	9.40E-02	1.00E-06	100	1	26	24	70	25550	3.28E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	100	1	26	24	70	25550	6.63E-09
Dieldrin	2.40E-02	1.00E-06	100	1	26	24	70	25550	8.37E-10
Arsenic	6.30E+00	1.00E-06	100	1	26	24	70	25550	2.20E-07

PART C OF APPENDIX J
INCIDENTAL INGESTION OF COPCS IN SEDIMENTS - RECREATIONAL USERS (Adult)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SForal (mg/kg-d)$^{-1}$	Cancer Risk
Benzo(a)anthracene	4.88E-08	0.73	3.57E-08
Benzo(a)pyrene	4.19E-08	7.3	3.06E-07
Benzo(b)fluoranthene	4.54E-08	0.73	3.31E-08
beta-BHC	3.28E-09	1.8	5.90E-09
Dibenz(a,h)anthracene	6.63E-09	7.3	4.84E-08
Dieldrin	8.37E-10	16	1.34E-08
Arsenic	2.20E-07	1.5	3.30E-07
		total Cancer Risk=	7.72E-07

Hazard Quotient

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)anthracene	1.42E-07	--	--
Benzo(a)pyrene	1.22E-07	--	--
Benzo(b)fluoranthene	1.32E-07	--	--
beta-BHC	9.57E-09	0.0002	4.78E-05
Dibenz(a,h)anthracene	1.93E-08	--	--
Dieldrin	2.44E-09	0.00005	4.88E-05
Arsenic	6.41E-07	0.0003	2.14E-03
		total hazard index=	2.23E-03

PART C OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SEDIMENTS - RECREATIONAL USERS (Adult)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NON-CARCINOGEN

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	0.2	0.13	1	26	24	1450	70	8760	5.37E-08
Benzo(a)pyrene	1.20E+00	1.00E-06	0.2	0.13	1	26	24	1450	70	8760	4.60E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	0.2	0.13	1	26	24	1450	70	8760	4.99E-08
beta-BHC	9.40E-02	1.00E-06	0.2	0.1	1	26	24	1450	70	8760	2.77E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	0.2	0.13	1	26	24	1450	70	8760	7.29E-09
Dieldrin	2.40E-02	1.00E-06	0.2	0.1	1	26	24	1450	70	8760	7.08E-10
Arsenic	6.30E+00	1.00E-06	0.2	0.03	1	26	24	1450	70	8760	5.58E-08

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	0.2	0.13	1	26	24	1450	70	25550	1.84E-08
Benzo(a)pyrene	1.20E+00	1.00E-06	0.2	0.13	1	26	24	1450	70	25550	1.58E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	0.2	0.13	1	26	24	1450	70	25550	1.71E-08
beta-BHC	9.40E-02	1.00E-06	0.2	0.1	1	26	24	1450	70	25550	9.51E-10
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	0.2	0.13	1	26	24	1450	70	25550	2.50E-09
Dieldrin	2.40E-02	1.00E-06	0.2	0.1	1	26	24	1450	70	25550	2.43E-10
Arsenic	6.30E+00	1.00E-06	0.2	0.03	1	26	24	1450	70	25550	1.91E-08

PART C OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SEDIMENTS - RECREATIONAL USERS (Adult)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SFder $(mg/kg-d)^{-1}$	Cancer Risk
Benzo(a)anthracene	1.84E-08	0.73	1.34E-08
Benzo(a)pyrene	1.58E-08	7.3	1.15E-07
Benzo(b)fluoranthene	1.71E-08	0.73	1.25E-08
beta-BHC	9.51E-10	1.8	1.71E-09
Dibenz(a,h)anthracene	2.50E-09	7.3	1.82E-08
Dieldrin	2.43E-10	16	3.89E-09
Arsenic	1.91E-08	1.5	2.87E-08
		total Cancer Risk=	1.94E-07

Hazard Quotient

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)anthracene	5.37E-08	--	--
Benzo(a)pyrene	4.60E-08	--	--
Benzo(b)fluoranthene	4.99E-08	--	--
beta-BHC	2.77E-09	0.0002	1.39E-05
Dibenz(a,h)anthracene	7.29E-09	--	--
Dieldrin	7.08E-10	0.000025	2.83E-05
Arsenic	5.58E-08	0.0003	1.86E-04
		total hazard index=	2.28E-04

PART D OF APPENDIX J

CHILD RECREATIONAL USERS

PART D OF APPENDIX J
INCIDENTAL INGESTION OF SURFACE WATER - RECREATIONAL USERS (CHILD)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Noncarcinogen

Intake (mg/kg-d) = (CW x IRW x ET x EF x ED)/(BW x AT)

Chemical of Concern	SW Conc. (CW) (mg/l)	Ingestion Rate (IR) L/event	Exposure Time (ET) hours/event	Exposure Frequency (EF) (events/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochloromethane	0.00086	0.05	0.5	26	6	15	2190	1.02E-07
Thallium	0.0068	0.05	0.5	26	6	15	2190	8.07E-07

Carcinogen

Intake (mg/kg-d) = (CW x IRW x ET x EF x ED)/(BW x AT)

Chemical of Concern	SW Conc. (CW) (mg/l)	Ingestion Rate (IR) L/event	Exposure Time (ET) hours/event	Exposure Frequency (EF) (events/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochloromethane	0.00086	0.05	0.5	26	6	15	25550	8.75E-09
Thallium	0.0068	0.05	0.5	26	6	15	25550	6.92E-08

PART D OF APPENDIX J
DERMAL CONTACT WITH SURFACE WATER - RECREATIONAL USERS (CHILD)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NONCARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochlorometha	7.95E-12	1	26	6	6600	15	2190	2.49E-10
Thallium	3.40E-09	1	26	6	6600	15	2190	1.07E-07

CARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochlorometha	7.95E-12	1	26	6	6600	15	25550	2.14E-11
Thallium	3.40E-09	1	26	6	6600	15	25550	9.13E-09

Calculate dose absorbed (DA). For organics DA event is calculated as follows:

Absorbed dose (mg/kg-d) = (DA event x EV x EF x ED x SA)/(BW x AT)

Organics: DA event is calculated as follows:

If Tevent < T*, then: DA event = 2FA x Kp x Cw x CF1 x CF2 x $(6\tau Tevent/3.14)^{1/2}$

If Tevent>t*, then: DA event = FA x Kp x Cw x CF1 x CF2 x $[Tevent/(1+B) + 2\tau(1+3B+3B^2)/(1+B)^2]$

Where: CF = Correction factor of 0.001 L/cm^3

Tevent = 0.5 hrs for dermal contact during each swimming event

	Cw (mg/L)	t* (hrs)	Kp(cm/hr)	τ(hr)	B	DA event (mg/cm^2)	FA
Dibromochlorometha	0.00086	2.12	4.60E-03	0.88	0	7.95E-12	1

Inorganic: Daevent= Kp x Cw x Tevent Where: CF = Correction factor of 0.001 L/cm^3

	Cw (mg/L)	Kp	Tevent	DA event (mg/cm^2)
Thallium	0.0068	1.00E-03	0.5	3.40E-09

PART D OF APPENDIX J
SURFACE WATER INCIDENTAL INGESTION AND DERMAL CONTACT - RECREATIONAL USERS (CHILD)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

SURFACE WATER INGESTION

Chemical of Concern	CARCINOGEN			NON-CARCINOGEN		
	Intake	Slope Factor	Cancer Risk	Intake	RfD (mg/kg/day)	Hazard Quotient
Dibromochloromethan	8.75E-09	8.40E-02	7.35E-10	1.02E-07	2.00E-02	5.11E-06
Thallium	6.92E-08	--	--	8.07E-07	6.60E-05	1.22E-02
		Total Risk	**7.35E-10**		Hazard Index	**1.22E-02**

SURFACE WATER DERMAL CONTACT

Chemical of Concern	CARCINOGEN			NON-CARCINOGEN		
	Intake	Slope Factor	Cancer Risk	Intake	RfD (mg/kg/day)	Hazard Quotient
Dibromochloromethan	2.14E-11	8.40E-02	1.79E-12	2.49E-10	2.00E-02	1.25E-08
Thallium	9.13E-09	--	--	1.07E-07	6.60E-05	1.61E-03
		Total Risk	**1.79E-12**		Hazard Index	**1.61E-03**

PART D OF APPENDIX J
INCIDENTAL INGESTION OF COPCS IN SEDIMENTS - RECREATIONAL USERS (CHILD)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NON-CARCINOGEN

Intake= **(CS x IR x CF x FI x EF x ED)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	200	1	26	6	15	2190	1.33E-06
Benzo(a)pyrene	1.20E+00	1.00E-06	200	1	26	6	15	2190	1.14E-06
Benzo(b)fluoranthene	1.30E+00	1.00E-06	200	1	26	6	15	2190	1.23E-06
beta-BHC	9.40E-02	1.00E-06	200	1	26	6	15	2190	8.93E-08
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	200	1	26	6	15	2190	1.80E-07
Dieldrin	2.40E-02	1.00E-06	200	1	26	6	15	2190	2.28E-08
Arsenic	6.30E+00	1.00E-06	200	1	26	6	15	2190	5.98E-06

Intake= **(CS x IR x CF x FI x EF x ED)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	200	1	26	6	15	25550	1.14E-07
Benzo(a)pyrene	1.20E+00	1.00E-06	200	1	26	6	15	25550	9.77E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	200	1	26	6	15	25550	1.06E-07
beta-BHC	9.40E-02	1.00E-06	200	1	26	6	15	25550	7.65E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	200	1	26	6	15	25550	1.55E-08
Dieldrin	2.40E-02	1.00E-06	200	1	26	6	15	25550	1.95E-09
Arsenic	6.30E+00	1.00E-06	200	1	26	6	15	25550	5.13E-07

PART D OF APPENDIX J
INCIDENTAL INGESTION OF COPCS IN SEDIMENTS - RECREATIONAL USERS (CHILD)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SForal $(mg/kg-d)^{-1}$	Cancer Risk
Benzo(a)anthracene	1.14E-07	0.73	8.32E-08
Benzo(a)pyrene	9.77E-08	21.9	2.14E-06
Benzo(b)fluoranthene	1.06E-07	0.73	7.73E-08
beta-BHC	7.65E-09	1.8	1.38E-08
Dibenz(a,h)anthracene	1.55E-08	7.3	1.13E-07
Dieldrin	1.95E-09	16	3.13E-08
Arsenic	5.13E-07	1.5	7.69E-07
		total Cancer Risk=	3.23E-06

Hazard Quotient

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)anthracene	1.33E-06	--	--
Benzo(a)pyrene	1.14E-06	--	--
Benzo(b)fluoranthene	1.23E-06	--	--
beta-BHC	8.93E-08	0.0002	4.46E-04
Dibenz(a,h)anthracene	1.80E-07	--	--
Dieldrin	2.28E-08	0.000050	4.56E-04
Arsenic	5.98E-06	0.0003	1.99E-02
		total hazard index=	2.08E-02

PART D OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SEDIMENTS - RECREATIONAL USERS (CHILD)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NON-CARCINOGEN

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	0.4	0.13	1	26	6	725	15	2190	2.51E-07
Benzo(a)pyrene	1.20E+00	1.00E-06	0.4	0.13	1	26	6	725	15	2190	2.15E-07
Benzo(b)fluoranthene	1.30E+00	1.00E-06	0.4	0.13	1	26	6	725	15	2190	2.33E-07
beta-BHC	9.40E-02	1.00E-06	0.4	0.1	1	26	6	725	15	2190	1.29E-08
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	0.4	0.13	1	26	6	725	15	2190	3.40E-08
Dieldrin	2.40E-02	1.00E-06	0.4	0.1	1	26	6	725	15	2190	3.31E-09
Arsenic	6.30E+00	1.00E-06	0.4	0.03	1	26	6	725	15	2190	2.60E-07

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	0.4	0.13	1	26	6	725	15	25550	2.15E-08
Benzo(a)pyrene	1.20E+00	1.00E-06	0.4	0.13	1	26	6	725	15	25550	1.84E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	0.4	0.13	1	26	6	725	15	25550	1.99E-08
beta-BHC	9.40E-02	1.00E-06	0.4	0.1	1	26	6	725	15	25550	1.11E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	0.4	0.13	1	26	6	725	15	25550	2.92E-09
Dieldrin	2.40E-02	1.00E-06	0.4	0.1	1	26	6	725	15	25550	2.83E-10
Arsenic	6.30E+00	1.00E-06	0.4	0.03	1	26	6	725	15	25550	2.23E-08

PART D OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SEDIMENTS - RECREATIONAL USERS (CHILD)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SF $(mg/kg\text{-}d)^{-1}$	Cancer Risk
Benzo(a)anthracene	2.15E-08	0.73	1.57E-08
Benzo(a)pyrene	1.84E-08	21.9	4.03E-07
Benzo(b)fluoranthene	1.99E-08	0.73	1.46E-08
beta-BHC	1.11E-09	1.8	2.00E-09
Dibenz(a,h)anthracene	2.92E-09	7.3	2.13E-08
Dieldrin	2.83E-10	16	4.53E-09
Arsenic	2.23E-08	1.5	3.35E-08
		total Cancer Risk=	4.95E-07

Hazard Quotient

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)anthracene	2.51E-07	--	--
Benzo(a)pyrene	2.15E-07	--	--
Benzo(b)fluoranthene	2.33E-07	--	--
beta-BHC	1.29E-08	0.0002	6.47E-05
Dibenz(a,h)anthracene	3.40E-08	--	--
Dieldrin	3.31E-09	0.000025	1.32E-04
Arsenic	2.60E-07	0.0003	8.68E-04
		total hazard index=	1.06E-03

PART E OF APPENDIX J

BALL FIELD RECREATIONAL USERS
AGE 6-13
AND
AGE 13-17

Table E-1A
Summary of Volatile Organic Detections in
Soil Samples near the Baseball Field
Rohm and Haas Chemicals LLC
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	Acetone	Acrylonitrile	Benzene	Bromodichloromethane	Carbon disulfide	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Cyclohexane	Dichlorodifluoromethane	Ethylbenzene	Iodomethane	Isopropylbenzene	Methyl acetate	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (total)
UAW09-20-1.5'	3/27/2001	<0.0049	<0.0049	<0.0049	<0.02	<0.02	NA	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0025	<0.0098	<0.0049	<0.0049	NA	<0.0049	<0.0098	<0.0098	<0.0049	<0.0049	<0.0049	<0.0049	<0.0098	<0.0098
Background Soil																											
B01-1.5'	10/9/2001	<0.0046	<0.0046	<0.0046	<0.018	0.0044 J B	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0023	<0.0092	<0.0046	<0.0046	NA	<0.0046	<0.0092	<0.0092	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0092
B02-1.5'	10/9/2001	<0.0046	<0.0046	<0.0046	<0.018	0.0044 J B	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0023	<0.0092	<0.0046	<0.0046	NA	<0.0046	<0.0092	<0.0092	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0092
B03-1.5'	10/9/2001	<0.0048	<0.0048	<0.0048	<0.019	0.004 J B	NA	<0.0048	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0024	<0.0096	<0.0048	<0.0048	NA	<0.0048	<0.0096	<0.0096	<0.0048	<0.0048	<0.0048	<0.0048	<0.0096	<0.0096
B04-1.5'	10/9/2001	<0.0054	<0.0054	<0.0054	<0.022	0.0044 J B	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.0027	<0.011	<0.0054	<0.0054	NA	<0.0054	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.011
B04-1.5' (Dup)	10/9/2001	<0.0055	<0.0055	<0.0055	<0.022	0.005 J B	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.0027	<0.011	<0.0055	<0.0055	NA	<0.0055	<0.011	<0.011	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.011
B05-1.5'	10/9/2001	<0.0046	<0.0046	<0.0046	<0.018	0.0039 J B	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0023	<0.0092	<0.0046	<0.0046	NA	<0.0046	<0.0092	<0.0092	<0.0046	<0.0046	<0.0046	<0.0046	<0.0092	<0.0092

Notes:
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.

* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level.
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds. Please refer to Appendix D of the Supplemental RI for excerpts from the Quality Assurance Review (Envionmental Standards, 2004) and to review data qualification of "non-detect" results.

E = Detection exceeded laboratory calibration range.

Table E-1B
Summary of Semivolatile Organic Detections in
Soil Samples near the Baseball Fields
Rohm and Haas Chemicals LLC
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1'-Biphenyl	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dimethylphenol	2-Methylnaphthalene	2-Methylphenol	3-Methylphenol	4-Methylphenol	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl) phthalat	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Di-n-octyl phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
UAW09-20-1.5'	3/27/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
Background Soil																																			
B01-1.5'	10/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
B02-1.5'	10/9/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
B03-1.5'	10/9/2001	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
B04-1.5'	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	0.06 J	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
B04-1.5' (Dup)	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	0.063 J	0.076 J	0.1 J	0.072 J	<0.35	<0.35	<0.35	0.082 J	<0.35	<0.35	<0.35	<0.35	0.15 J	<0.35	<0.35	<0.35	0.096 J	<0.35	0.14 J
B05-1.5'	10/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37

Notes:
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<10 = Indicates constituent not detected at or above indicated detection limit.
* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds. Please refer to Appendix D of the Supplemental RI for excerpts from the Quality Assurance Review (Environmental Standards, 2004) and to review data qualification of "non-detect" results.

Table E-1C
Summary of Pesticide and Polychlorinated Biphenyl Detections in Soil Samples near the Baseball Fields
Rohm and Haas Chemicals LLC
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	beta-BHC	gamma-BHC (Lindane	alpha-Chlordane	gamma-Chlordane	Chlorobenzilate	Diallate	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor epoxide	Isodrin	Methoxychlor	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
UAW09-20-1.5'	3/27/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039
Background Soil																													
B01-1.5'	10/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037
B02-1.5'	10/9/2001	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	NA	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	<0.0075	<0.0075	<0.038	<0.038	<0.038	<0.038	<0.038	<0.038
B03-1.5'	10/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0038	<0.0038	<0.038	<0.038	<0.038	<0.038	<0.038	<0.038
B04-1.5'	10/9/2001	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	NA	NA	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0071	<0.0071	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035
B04-1.5' (Dup)	10/9/2001	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	NA	NA	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0071	<0.0071	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035
B05-1.5'	10/9/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0037	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037

Notes:
J = Estimated result; result is less than reporting limit
PG = The percentage difference between the original and confirmation analyses is greater than 40%
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<0.021 = Indicates constituent not detected at or above indicated detection limit.

Table E-1D
Summary of Inorganic Detections in
Soil Samples near the Baseball Fields
Rohm and Haas Chemicals LLC
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
UAW09-20-1.5'	3/27/2001	<58	NA	6280	<1.2	5.8	45.7	0.19 B	<0.23	1530	8.5	6.7	7.8	<0.58	11300	10.6	1260	516	0.013 B	9	572 B	0.51 B	<0.58	<584	<1.2	NA	16.8	35.9 MBD
Background Soil																												
B01-1.5'	10/9/2001	NA	<56	9620	<1.1	7.4	47.4 J	0.26 B	0.19 B	1210 L	10.1	7.1 L	12.5	<0.56	15600	9.5	1680	424 J	0.026 B	12.5 L	655	<0.56	<0.56	<556	<1.1	0.88 B J	20	39 L
B02-1.5'	10/9/2001	NA	79	10800	<1.1	8.4	58.7 J	0.37 B	0.21 B	1720	11.8	6.7	13.3	<0.57	17200	10.1	1840	379 J	0.027 B	13.2	688	<0.57	<0.57	<569	<1.1	0.79 B J	21.9	42
B03-1.5'	10/9/2001	NA	79	10800	<1.1	5.1	68 J	0.5 B	0.27	3870	12.2	8	13.4	<0.57	18700	11.1	2380	589 J	0.026 B	15.1	976	<0.57	<0.57	<569	<1.1	0.9 B J	18.3	41.1
B04-1.5'	10/9/2001	NA	<54	1870	<1.1	4	9.8 B J	<0.54	0.16 B	86600	3.7	2.8 B	7.3	<0.54	5760	4.1	31100	191 J	0.0098 B	6.5	368 B	<0.54	<0.54	69.2 B	1.5	0.93 B J	6.2	22.3
B04-1.5' (Dup)	10/9/2001	NA	<53	2200	<1.1	3.7	11.4 B J	<0.53	0.16 B	97000	3.7	2.9 B	6.8	<0.53	5980	4.3	36200	198 J	<0.11	6.2	387 B	<0.53	<0.53	66.6 B	1.2	0.97 B J	6.7	21.6
B05-1.5'	10/9/2001	NA	<56	13000	<1.1	10	66.1 J	0.46 B	0.22 B	2370	15.7	8	15.6	<0.56	19800	11.4	2090	393 J	0.03 B	14.9	660	<0.56	<0.56	<565	<1.1	0.82 B J	23.9	51.4

Notes:
B = Estimated result; result is less than reporting limit.
E = Matrix Interference.
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
L = Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
MBB = This analyte is present at a reportable level in the associated method blank but is less than 5% of the sample amount.
This table only includes target analytes detected in one or more Facility Investigation samples.

NA = Indicates chemical was not on the target analyte list for that sample.
<1.1 = Indicates constituent not detected at or above indicated detection limit.
* = Indicates that Environmental Standards qualified the data as a "non-detect" as part of the 10% data validation. The analyte was detected in a field and/or laboratory blank at a similar level.
The only validation qualifiers that have been annotated into the summary tables are qualifications of detected compounds.

TABLE E-2

EXPOSURE POINT CONCENTRATION SUMMARY

SOIL

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil (off-site)
Exposure Medium:	Soil, Ambient Air

Exposure Point	Chemical of Potential Concern	Units	Detected Maximum Concentration (Qualifier)	Screening Toxicity Value	Selection as COPC	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Off-site Soil	Acetone	mg/kg	0.005 J B	1.60E+01	No	NA	mg/kg	NA	NA
(<2 feet)	Benzo(a)anthracene	mg/kg	0.063 J	0.62	No	NA	mg/kg	NA	NA
	Benzo(a)pyrene	mg/kg	0.076 J	0.062	Yes	7.60E-02	mg/kg	max.	Samples are limited
	Benzo(b)fluoranthene	mg/kg	0.1 J	0.62	No	NA	mg/kg	NA	NA
	Benzo(ghi)perylene*	mg/kg	0.072 J	2300	No	NA	mg/kg	NA	NA
	bis(2-Ethylhexyl) phthalate	mg/kg	0.06 J	35	No	NA	mg/kg	NA	NA
	Chrysene	mg/kg	0.082 J	62	No	NA	mg/kg	NA	NA
	Fluoranthene	mg/kg	0.15 J	2300	No	NA	mg/kg	NA	NA
	Phenanthrene*	mg/kg	0.096 J	12000	No	NA	mg/kg	NA	NA
	Pyrene	mg/kg	0.14 J	2300	No	NA	mg/kg	NA	NA
	Aluminum	mg/kg	13000	76000	No	NA	mg/kg	NA	NA
	Arsenic	mg/kg	10	0.39	Yes	1.00E+01	mg/kg	max.	Samples are limited
	Barium	mg/kg	68	1600	No	NA	mg/kg	NA	NA
	Beryllium	mg/kg	0.5	63	No	NA	mg/kg	NA	NA
	Cadmium	mg/kg	0.27	8	No	NA	mg/kg	NA	NA
	Calcium	mg/kg	97000	NA	No	NA	mg/kg	NA	NA
	Chromium	mg/kg	15.7	38	No	NA	mg/kg	NA	NA
	Cobalt	mg/kg	8	900	No	NA	mg/kg	NA	NA
	Copper	mg/kg	15.6	3100	No	NA	mg/kg	NA	NA
	Iron	mg/kg	19800	23000	No	NA	mg/kg	NA	NA
	Lead	mg/kg	11.4	400	No	NA	mg/kg	NA	NA
	Magnesium	mg/kg	36200	NA	No	NA	mg/kg	NA	NA
	Manganese	mg/kg	589	1800	No	NA	mg/kg	NA	NA
	Mercury	mg/kg	0.03	23	No	NA	mg/kg	NA	NA
	Nickel	mg/kg	15.1	130	No	NA	mg/kg	NA	NA

TABLE E-2

EXPOSURE POINT CONCENTRATION SUMMARY

SOIL

Rohm and Haas Chemicals LLC

Reading, Ohio

Scenario Timeframe:	Current/Future
Medium:	Soil (off-site)
Exposure Medium:	Soil, Ambient Air

Exposure Point	Chemical of Potential Concern	Units	Detected Maximum Concentration (Qualifier)	Screening Toxicity Value	Selection as COPC	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Off-site Soil	Potassium	mg/kg	976	NA	No	NA	mg/kg	NA	NA
(<2 feet)	Selenium	mg/kg	0.51	5	No	NA	mg/kg	NA	NA
(cont.)	Thallium	mg/kg	1.5	5.2	No	NA	mg/kg	NA	NA
	Tin	mg/kg	0.97	47000	No	NA	mg/kg	NA	NA
	Vanadium	mg/kg	23.9	78	No	NA	mg/kg	NA	NA
	Zinc	mg/kg	51.4	12000	No	NA	mg/kg	NA	NA

NA - not applicable

max. - maximum concentration

* fluoranthene is used as a surrogate for benzo(ghi)perylene; and anthracene is used as a surrogate for phenanthrene.

PART E OF APPENDIX J
INGESTION WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 6-13)

NON-CARCINOGEN

Intake (mg/kg-d) = (CS x IR x CF x FI x EF x ED)/(BW x AT)
Hazard Quotient = Intake/RfD

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)pyrene	0.076	1.00E-06	200	1	64	8	35	2920	7.61E-08	--	--
Arsenic	1.00E+01	1.00E-06	200	1	64	8	35	2920	1.00E-05	0.0003	3.3E-02

total hazard index= 3.3E-02

CARCINOGEN

Intake (mg/kg-d) = (CS x IR x CF x FI x EF x ED)/(BW x AT)
Cancer Risk = Intake x SF

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)	SF $(mg/kg\text{-}d)^{-1}$	Cancer Risk
Benzo(a)pyrene	0.076	1.00E-06	200	1	64	8	35	25550	8.70E-09	21.9	1.9E-07
Arsenic	1.00E+01	1.00E-06	200	1	64	8	35	25550	1.15E-06	1.5	1.7E-06

total Cancer Risk= 1.9E-06

PART E OF APPENDIX J
INHALATION WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 6-13)

NON-CARCINOGEN

HQ = [CS x (1/VF) x ED x ET x EF]/(RfC x AT) (organics) HQ = [CS x (1/PEF) x ED x ET x EF]/(RfC x AT) (inorganics)

Constituent of Concern	Concent. in Soil (CS) (ug/kg)	Volatilize Factor (VF) (m^3/kg)	Exposure Duration (ED) (yrs)	Fraction of EF in contact with soil (ET) (unitless)	Exposure Frequency (EF) (days/yr)	Particulate Emission Factor (PEF) (m^3/kg)	Reference Concentration (RfC) (µg/m^3)	Averaging Time (AT) (days)	Hazard Quotient
Benzo(a)pyrene	76	1.8E+07	8	1	64	--	--	2920	--
Arsenic	1.00E+04	--	8	1	64	7.3E+08	--	2920	--

total hazard index= 0.00E+00

CARCINOGEN

Risk = [CS x (1/VF) x ED x EF x ET x URF]/(AT) (organics) Risk = [CS x (1/PEF) x ED x EF x ET x URF]/(AT) (inorganics)

Constituent of Concern	Concent. in Soil (CS) (ug/kg)	Volatilize Factor (VF) (m^3/kg)	Exposure Duration (ED) (yrs)	Fraction of EF in contact with soil (ET)	Exposure Frequency (EF) (days/yr)	Particulate Emission Factor (PEF) (m^3/kg)	Unit Risk Factor (µg/m^3)$^{-1}$	Averaging Time (AT) (days)	Cancer Risk
Benzo(a)pyrene	76	1.8E+07	8	1	64	--	--	25550	--
Arsenic	1.00E+04	--	8	1	64	7.3E+08	0.0043	25550	1.2E-09

total Cancer Risk= 1.2E-09

PART E OF APPENDIX J
INHALATION WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 6-13)

$VF=(Q/C(3.14xDaxT)^{1/2}x10^{-4})/(2xPbxDa)$		Benzo(a)pyrene	
VF	Volatilization Factor (m^3/kg)	1.8E+07	
Q/C	Inverse of the mean concentration at the center of source (g/m^2-s per Kg/m^3)	50.38	(10 acre for Cleveland)
T	Exposure Interval (s)	9.5E+08	
Pb	Dry Soil Bulk Density (g/cm^3)	1.5E+00	
Da	Apparent Diffusivity (cm^2/s)		
$Da=[(\Theta a^{10/3}DiH'+\Theta w^{10/3}Dw)/n^2]/(PbKd+\Theta w+\Theta aH')$		2.7E-11	
Θa	Air-filled Soil Porosity (Lair/Lsoil)	0.28	
Di	Diffusivity in Air (cm^2/s)	0.043	
H'	Henry's Law Constant (dimensionless)	4.60E-05	
Θw	Water-filled Soil Porosity (Lwater/Lsoil)	0.15	
Dw	Diffusivity in Water (cm^2/s)	9.E-06	
n	Total Soil Porosity (Lpore/Lsoil)	0.43	
Kd	Soil-water Partion Coefficient (cm^3/g) = Koc x foc (organics)	6.E+03	
Koc	Soil Organic Carbon Partition Coefficient (cm^3/g)	1.E+06	
foc	Fraction of Organic Carbon (unitless)	0.006	
$PEF=Q/C((3600seconds/hr)/(0.036(1-V)(Um/Ut)^3(F(x)))$			
PEF	Particulate Emission Factor (m^3/kg)	7.3E+08	
Q/C	Inverse of the mean concentration at the center of source (g/m^2-s per Kg/m^3)	50.38	(10 acre for Cleveland)
V	Fraction of vegetative cover (unitless)	0.5	
Um	Mean annual wind speed (m/s)	4.69	
Ut	Equivalent threshold value of wind speed at 7 m (m/s)	11.32	
F(x)	Function dependent on Um/Ut derived using Cowherd et al. (1985) (unitless)	0.194	

PART E OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 6-13)

NON-CARCINOGEN

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2-event)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)pyrene	0.076	1.00E-06	0.3	0.03	1	64	8	2626	35	2920	9.00E-09
Arsenic	1.00E+01	1.00E-06	0.3	0.03	1	64	8	2626	35	2920	1.18E-06

CARCINOGEN

Intake= **(CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)**

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2-event)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)pyrene	0.076	1.00E-06	0.3	0.03	1	64	8	2626	35	25550	1.03E-09
Arsenic	1.00E+01	1.00E-06	0.3	0.03	1	64	8	2626	35	25550	1.35E-07

Hazard Quotient =

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)pyrene	9.00E-09	--	--
Arsenic	1.18E-06	0.0003	3.9E-03
		total hazard index=	3.9E-03

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SF $(mg/kg-d)^{-1}$	Cancer Risk
Benzo(a)pyrene	1.03E-09	21.9	2.3E-08
Arsenic	1.35E-07	1.5	2.0E-07
		total Cancer Risk=	2.3E-07

PART E OF APPENDIX J
RECREATIONAL RECEPTOR (Age 6-13)
Average Body Weight
Rohm and Haas Chemicals LLC
Reading, Ohio

Age(yr)	Body Weight of Children (Boys and Girls Mean) (kg)
6	22.6
7	24.9
8	28.1
9	31.5
10	36.3
11	41.1
12	45.3
13	50.4
Average body weight for Jvenile (6-13yr)	35.0

Source: Bodyweight from USEPA Exposure Factors Handbook, 1997, Table 7-3.

PART E OF APPENDIX J
RECREATIONAL RECEPTOR (Age 6-13)
Average Surface Soil Skin Contact Area
Rohm and Haas Chemicals LLC
Reading, Ohio

	Fraction of Total SA (unitless)				Total Body SA (m2, 50th %tile)	Total Body SA (m2, 50th %tile)	Total Body SA (m2, 50th %tile)	Exposed Surface (3)=(1)*(2)*10000
Age(yr)	hands	forearms	lower legs	Total (hands, forearms, lower legs, and feet) (1)	Female	Male	Male & Female	(cm^2)
6<7	0.0471	0.059	0.108	0.2141	0.843	0.866	0.85	1829
7<8	0.053	0.0554	0.115	0.2234	0.917	0.936	0.93	2070
8<9	0.053	0.0554	0.115	0.2234	1	1	1.00	2234
9<10	0.053	0.0554	0.115	0.2234	1.06	1.07	1.07	2379
10<11	0.0539	0.0617	0.122	0.2376	1.17	1.18	1.18	2792
11<12	0.0539	0.0617	0.122	0.2376	1.3	1.23	1.27	3006
12<13	0.0539	0.0617	0.122	0.2376	1.4	1.34	1.37	3255
13	0.0511	0.0545	0.128	0.2336	1.48	1.47	1.48	3446

Average Surface Area for Jvenile (6-13yr) **2626**

Source: Fraction of total surface area (SA) and total body SA for male and female children are from Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final, July 2004, Exhibit C-1.

PART E OF APPENDIX J
INGESTION WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 13-17)

NON-CARCINOGEN

Intake (mg/kg-d) = (CS x IR x CF x FI x EF x ED)/(BW x AT)
Hazard Quotient = Intake/RfD

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)pyrene	0.076	1.00E-06	200	1	96	5	58.1	1825	6.88E-08	--	--
Arsenic	1.00E+01	1.00E-06	200	1	96	5	58.1	1825	9.05E-06	0.0003	3.0E-02

total hazard index= 3.0E-02

CARCINOGEN

Intake (mg/kg-d) = (CS x IR x CF x FI x EF x ED)/(BW x AT)
Cancer Risk = Intake x SF

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)	SF $(mg/kg\text{-}d)^{-1}$	Cancer Risk
Benzo(a)pyrene	0.076	1.00E-06	200	1	96	5	58.1	25550	4.91E-09	21.9	1.1E-07
Arsenic	1.00E+01	1.00E-06	200	1	96	5	58.1	25550	6.47E-07	1.5	9.7E-07

total Cancer Risk= 1.1E-06

PART E OF APPENDIX J
INHALATION WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 13-17)

NON-CARCINOGEN

HQ = [CS x (1/VF) x ED x ET x EF]/(RfC x AT) (organics) **HQ = [CS x (1/PEF) x ED x ET x EF]/(RfC x AT) (inorganics)**

Constituent of Concern	Concent. in Soil (CS) (ug/kg)	Volatilize Factor (VF) (m^3/kg)	Exposure Duration (ED) (yrs)	Fraction of EF in contact with soil (ET) (unitless)	Exposure Frequency (EF) (days/yr)	Particulate Emission Factor (PEF) (m^3/kg)	Reference Concentration (RfC) (µg/m^3)	Averaging Time (AT) (days)	Hazard Quotient
Benzo(a)pyrene	76	1.8E+07	5	1	96	--	--	1825	--
Arsenic	1.00E+04	--	5	1	96	7.3E+08	--	1825	--

total hazard index= 0.0E+00

CARCINOGEN

Risk = [CS x (1/VF) x ED x EF x ET x URF]/(AT) (organics) **Risk = [CS x (1/PEF) x ED x EF x ET x URF]/(AT) (inorganics)**

Constituent of Concern	Concent. in Soil (CS) (ug/kg)	Volatilize Factor (VF) (m^3/kg)	Exposure Duration (ED) (yrs)	Fraction of EF in contact with soil (ET)	Exposure Frequency (EF) (days/yr)	Particulate Emission Factor (PEF) (m^3/kg)	Unit Risk Factor (µg/m^3)$^{-1}$	Averaging Time (AT) (days)	Cancer Risk
Benzo(a)pyrene	76	1.8E+07	5	1	96	--	--	25550	--
Arsenic	1.00E+04	--	5	1	96	7.3E+08	0.0043	25550	1.1E-09

total Cancer Risk= 1.1E-09

PART E OF APPENDIX J
INHALATION WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 13-17)

		Benzo(a)pyrene	
$VF=(Q/C(3.14xDaxT)^{1/2}x10^{-4})/(2xPbxDa)$			
VF	Volatilization Factor (m^3/kg)	1.8E+07	
Q/C	Inverse of the mean concentration at the center of source (g/m^2-s per Kg/m^3)	50.38	(10 acre for Cleveland)
T	Exposure Interval (s)	9.5E+08	
Pb	Dry Soil Bulk Density (g/cm^3)	1.5E+00	
Da	Apparent Diffusivity (cm^2/s)		
$Da=[(\Theta a^{10/3}DiH'+\Theta w^{10/3}Dw)/n^2]/(PbKd+\Theta w+\Theta aH')$		2.7E-11	
Θa	Air-filled Soil Porosity (Lair/Lsoil)	0.28	
Di	Diffusivity in Air (cm^2/s)	0.043	
H'	Henry's Law Constant (dimensionless)	4.60E-05	
Θw	Water-filled Soil Porosity (Lwater/Lsoil)	0.15	
Dw	Diffusivity in Water (cm^2/s)	9.E-06	
n	Total Soil Porosity (Lpore/Lsoil)	0.43	
Kd	Soil-water Partion Coefficient (cm^3/g) = Koc x foc (organics)	6.E+03	
Koc	Soil Organic Carbon Partition Coefficient (cm^3/g)	1.E+06	
foc	Fraction of Organic Carbon (unitless)	0.006	
$PEF=Q/C((3600seconds/hr)/(0.036(1-V)(Um/Ut)^3(F(x)))$			
PEF	Particulate Emission Factor (m^3/kg)	7.3E+08	
Q/C	Inverse of the mean concentration at the center of source (g/m^2-s per Kg/m^3)	50.38	(10 acre for Cleveland)
V	Fraction of vegetative cover (unitless)	0.5	
Um	Mean annual wind speed (m/s)	4.69	
Ut	Equivalent threshold value of wind speed at 7 m (m/s)	11.32	
F(x)	Function dependent on Um/Ut derived using Cowherd et al. (1985) (unitless)	0.194	

PART E OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SURFACE SOIL
RECREATIONAL RECEPTOR (AGE 13-17)

NON-CARCINOGEN

Intake= (CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2-event)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)pyrene	0.076	1.00E-06	0.3	0.03	1	96	5	4003	58.1	1825	1.24E-08
Arsenic	1.00E+01	1.00E-06	0.3	0.03	1	96	5	4003	58.1	1825	1.63E-06

CARCINOGEN

Intake= (CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)

Chemical of Concern	Maximum Soil Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2-event)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)pyrene	0.076	1.00E-06	0.3	0.03	1	96	5	4003	58.1	25550	8.85E-10
Arsenic	1.00E+01	1.00E-06	0.3	0.03	1	96	5	4003	58.1	25550	1.16E-07

Hazard Quotient =

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)pyrene	1.24E-08	--	--
Arsenic	1.63E-06	0.0003	5.4E-03
		total hazard index=	5.4E-03

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SF $(mg/kg-d)^{-1}$	Cancer Risk
Benzo(a)pyrene	8.85E-10	21.9	1.9E-08
Arsenic	1.16E-07	1.5	1.7E-07
		total Cancer Risk=	1.9E-07

PART E OF APPENXI J
RECREATIONAL RECEPTOR (AGE 13-17)
Average Body Weight
Rohm and Haas Chemicals LLC
Reading, Ohio

Age(yr)	Body Weight of Children (Boys and Girls Mean) (kg)
13	50.4
14	56.0
15	58.1
16	62.6
17	63.2
Average body weight for Jvenile (13-17yr)	58.1

Source: Bodyweight from USEPA Exposure Factors Handbook, 1997, Table 7-3.

PART E OF APPENDIX J
RECREATIONAL RECEPTOR (Age 13-17)
Average Surface Soil Skin Contact Area
Rohm and Haas Chemicals LLC
Reading, Ohio

	Fraction of Total SA (unitless)				Total Body SA (m2, 50th %tile)	Total Body SA (m2, 50th %tile)	Total Body SA (m2, 50th %tile)	Exposed Surface (3)=(1)*(2)*10000
Age(yr)	hands	forearms	lower legs	Total (hands, forearms, lower legs, and feet) (1)	Female	Male	Male & Female	(cm^2)
13<14	0.0511	0.0545	0.128	0.2336	1.48	1.47	1.48	3446
14<15	0.0568	0.0590	0.134	0.2498	1.55	1.61	1.58	3947
15<16	0.0568	0.0590	0.134	0.2498	1.57	1.7	1.64	4084
16<17	0.0568	0.0590	0.134	0.2498	1.6	1.76	1.68	4197
17	0.0513	0.0788	0.123	0.2531	1.63	1.8	1.72	4341

Average Surface Area for Jvenile (13-17yr) **4003**

Source: Fraction of total surface area (SA) and total body SA for male and female children are from Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final, July 2004, Exhibit C-1.

PART F OF APPENDIX J

RECREATIONAL FISHERMAN

FISH INGESTION

PART F OF APPENDIX J
FISH INGESTION - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Fish Ingestion Intake = (mg/kd-day)	**(CF x IR x FI x EF x ED)/(BW x AT)**		
CF	Chemical Concentrations in Fish (mg/kg)	Calculated	ERA
IR	Ingestion Rate (kg/meal)	0.228	US EPA, 2000b
FI	Fraction of Ingested from Contaminated Source	1	Conservative Assumption
EF	Exposure Frequency (meals/year)	20	Professional Judgement based on 5 months (May, June, July, August, and September) that are likely to have fishing activities. One meal per week during the fishing season.
ED	Exposure Duration (years)	30	EPA default value for an adult resident
BW	Body Weight (kg)	70	EPA default value for an adult resident
AT	Averaging Time (days) non-cancer	10950	EPA default value for an adult resident
	Averaging Time (days) cancer	25550	EPA default value for an adult resident

COPCs in Surface Water	**Fish Conc (mg/kg)**	**Fish Intake (Cancer) (mg/kg-d)**	**Fish Intake (Non-Cancer) (mg/kg-d)**	**Slope Factor $(mg/kg\text{-}d)^{-1}$**	**RfD (mg/kg-d)**	**Risk**	**Hazard Quotient**
Arsenic	1.08E+00	8.26E-05	1.93E-04	1.5E+00	3.0E-04	1.2E-04	6.43E-01
Copper	1.34E+00	1.02E-04	2.39E-04		4.0E-02	--	5.98E-03
Zinc	2.31E+01	1.77E-03	4.12E-03		3.0E-01	--	1.37E-02

COPCs in Sediment	**Fish Conc (mg/kg)**	**Fish Intake (Cancer) (mg/kg-d)**	**Fish Intake (Non-Cancer) (mg/kg-d)**	**Slope Factor $(mg/kg\text{-}d)^{-1}$**	**RfD (mg/kg-d)**	**Risk**	**Hazard Quotient**
1,2-Dichlorobenzene	7.89E-01	6.03E-05	1.41E-04		9.0E-02	--	1.56E-03
					Total	**1.2E-04**	**6.6E-01**

PART F OF APPDNEIX J
INCIDENTAL INGESTION OF SURFACE WATER - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Noncarcinogen

Intake (mg/kg-d) = (CW x IRW x ET x EF x ED)/(BW x AT)

Chemical of Concern	SW Conc. (CW) (mg/l)	Ingestion Rate (IR) L/event	Exposure Time (ET) hours/event	Exposure Frequency (EF) (events/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochloromethane	0.00086	0.05	0.5	20	30	70	10950	1.68E-08
Thallium	0.0068	0.05	0.5	20	30	70	10950	1.33E-07

Carcinogen

Intake (mg/kg-d) = (CW x IRW x ET x EF x ED)/(BW x AT)

Chemical of Concern	SW Conc. (CW) (mg/l)	Ingestion Rate (IR) L/event	Exposure Time (ET) hours/event	Exposure Frequency (EF) (events/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochloromethane	0.00086	0.05	0.5	20	30	70	25550	7.21E-09
Thallium	0.0068	0.05	0.5	20	30	70	25550	5.70E-08

PART F OF APPENDIX J
DERMAL CONTACT WITH SURFACE WATER - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NONCARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochlorometha	7.95E-12	1	20	30	18000	70	10950	1.12E-10
Thallium	3.40E-09	1	20	30	18000	70	10950	4.79E-08

CARCINOGEN

Intake (mg/kg-d) = (DAevent x EV x EF x ED x SA)/(BW x AT)

Chemical of Concern	Dose per Event (DA event) (mg/cm^2)	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Dibromochlorometha	7.95E-12	1	20	30	18000	70	25550	4.80E-11
Thallium	3.40E-09	1	20	30	18000	70	25550	2.05E-08

Calculate dose absorbed (DA). For organics DA event is calculated as follows:

Absorbed dose (mg/kg-d) = (DA event x EV x EF x ED x SA)/(BW x AT)

Organics: DA event is calculated as follows:

If Tevent < T*, then: DA event = 2FA x Kp x Cw x CF1 x CF2 x $(6\tau Tevent/3.14)^{1/2}$

If Tevent>t*, then: DA event = FA x Kp x Cw x CF1 x CF2 x $[Tevent/(1+B) + 2\tau(1+3B+3B^2)/(1+B)^2]$

Where: CF = Correction factor of 0.001 L/cm^3

Tevent = 0.5 hrs for dermal contact during each swimming event

	Cw (mg/L)	t* (hrs)	Kp(cm/hr)	τ(hr)	B	DA event (mg/cm^2)	FA
Dibromochlorometha	0.00086	2.12	4.60E-03	0.88	0	7.95E-12	1

Inorganic: Daevent= Kp x Cw x Tevent Where: CF = Correction factor of 0.001 L/cm^3

	Cw (mg/L)	Kp	Tevent	DA event (mg/cm^2)
Thallium	0.0068	1.00E-03	0.5	3.40E-09

PART F OF APPENDIX J
SURFACE WATER INCIDENTAL INGESTION AND DERMAL CONTACT - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

SURFACE WATER INGESTION

Chemical of Concern	CARCINOGEN			NON-CARCINOGEN		
	Intake	Slope Factor	Cancer Risk	Intake	RfD (mg/kg/day)	Hazard Quotient
Dibromochloromethar	7.50E-09	8.40E-02	6.30E-10	2.19E-08	2.00E-02	1.09E-06
Thallium	5.93E-08	--	--	1.73E-07	6.60E-05	2.62E-03
		Total Risk	**6.30E-10**		Hazard Index	**2.62E-03**

SURFACE WATER DERMAL CONTACT

Chemical of Concern	CARCINOGEN			NON-CARCINOGEN		
	Intake	Slope Factor	Cancer Risk	Intake	RfD (mg/kg/day)	Hazard Quotient
Dibromochloromethar	4.80E-11	8.40E-02	4.03E-12	1.12E-10	2.00E-02	5.60E-09
Thallium	2.05E-08	--	--	4.79E-08	6.60E-05	7.26E-04
		Total Risk	**4.03E-12**		Hazard Index	**7.26E-04**

PART F OF APPENDIX J
INCIDENTAL INGESTION OF COPCS IN SEDIMENTS - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NON-CARCINOGEN

Intake= **(CS x IR x CF x FI x EF x ED)/(BW x AT)**

Chemical of Concern	Maximum Sediment Concentration (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	100	1	20	30	70	10950	1.10E-07
Benzo(a)pyrene	1.20E+00	1.00E-06	100	1	20	30	70	10950	9.39E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	100	1	20	30	70	10950	1.02E-07
beta-BHC	9.40E-02	1.00E-06	100	1	20	30	70	10950	7.36E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	100	1	20	30	70	10950	1.49E-08
Dieldrin	2.40E-02	1.00E-06	100	1	20	30	70	10950	1.88E-09
Arsenic	6.30E+00	1.00E-06	100	1	20	30	70	10950	4.93E-07

Intake= **(CS x IR x CF x FI x EF x ED)/(BW x AT)**

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Ingestion Rate (IR) (mg/day)	Fraction Ingested (FI) (unitless)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	100	1	20	30	70	25550	4.70E-08
Benzo(a)pyrene	1.20E+00	1.00E-06	100	1	20	30	70	25550	4.03E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	100	1	20	30	70	25550	4.36E-08
beta-BHC	9.40E-02	1.00E-06	100	1	20	30	70	25550	3.15E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	100	1	20	30	70	25550	6.37E-09
Dieldrin	2.40E-02	1.00E-06	100	1	20	30	70	25550	8.05E-10
Arsenic	6.30E+00	1.00E-06	100	1	20	30	70	25550	2.11E-07

PART F OF APPENDIX J
INCIDENTAL INGESTION OF COPCS IN SEDIMENTS - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SForal (mg/kg-d)$^{-1}$	Cancer Risk
Benzo(a)anthracene	4.70E-08	0.73	3.43E-08
Benzo(a)pyrene	4.03E-08	7.3	2.94E-07
Benzo(b)fluoranthene	4.36E-08	0.73	3.18E-08
beta-BHC	3.15E-09	1.8	5.68E-09
Dibenz(a,h)anthracene	6.37E-09	7.3	4.65E-08
Dieldrin	8.05E-10	16	1.29E-08
Arsenic	2.11E-07	1.5	3.17E-07
		total Cancer Risk=	7.42E-07

Hazard Quotient

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)anthracene	1.10E-07	--	--
Benzo(a)pyrene	9.39E-08	--	--
Benzo(b)fluoranthene	1.02E-07	--	--
beta-BHC	7.36E-09	0.0002	3.68E-05
Dibenz(a,h)anthracene	1.49E-08	--	--
Dieldrin	1.88E-09	0.00005	3.76E-05
Arsenic	4.93E-07	0.0003	1.64E-03
		total hazard index=	1.72E-03

PART F OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SEDIMENTS - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

NON-CARCINOGEN

Intake= (CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	0.2	0.13	1	20	30	1450	70	8760	5.16E-08
Benzo(a)pyrene	1.20E+00	1.00E-06	0.2	0.13	1	20	30	1450	70	8760	4.43E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	0.2	0.13	1	20	30	1450	70	8760	4.80E-08
beta-BHC	9.40E-02	1.00E-06	0.2	0.1	1	20	30	1450	70	8760	2.67E-09
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	0.2	0.13	1	20	30	1450	70	8760	7.01E-09
Dieldrin	2.40E-02	1.00E-06	0.2	0.1	1	20	30	1450	70	8760	6.81E-10
Arsenic	6.30E+00	1.00E-06	0.2	0.03	1	20	30	1450	70	8760	5.36E-08

Intake= (CS x CF x AF x DAF x EF x ED x SA x EV)/(BW x AT)

Chemical of Concern	Maximum Sediment Conc. (CS) (mg/kg)	Conversion Factor (CF) (kg/mg)	Adherence Factor (AF) (mg/cm^2)	DAF	Event Frequency (EV) (events/d)	Exposure Frequency (EF) (days/yr)	Exposure Duration (ED) (yrs)	Skin Surface Area (SA) (cm^2)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Intake (mg/kg-d)
Benzo(a)anthracene	1.40E+00	1.00E-06	0.2	0.13	1	20	30	1450	70	25550	1.77E-08
Benzo(a)pyrene	1.20E+00	1.00E-06	0.2	0.13	1	20	30	1450	70	25550	1.52E-08
Benzo(b)fluoranthene	1.30E+00	1.00E-06	0.2	0.13	1	20	30	1450	70	25550	1.64E-08
beta-BHC	9.40E-02	1.00E-06	0.2	0.1	1	20	30	1450	70	25550	9.15E-10
Dibenz(a,h)anthracene	1.90E-01	1.00E-06	0.2	0.13	1	20	30	1450	70	25550	2.40E-09
Dieldrin	2.40E-02	1.00E-06	0.2	0.1	1	20	30	1450	70	25550	2.33E-10
Arsenic	6.30E+00	1.00E-06	0.2	0.03	1	20	30	1450	70	25550	1.84E-08

PART F OF APPENDIX J
DERMAL CONTACT WITH COPCS IN SEDIMENTS - RECREATIONAL FISHERMAN (ADULT)
ROHM AND HAAS CHEMICALS LLC
READING, OHIO

Cancer Risk = Intake x SF

Chemical of Concern	Intake (mg/kg-d)	SFder $(mg/kg-d)^{-1}$	Cancer Risk
Benzo(a)anthracene	1.77E-08	0.73	1.29E-08
Benzo(a)pyrene	1.52E-08	7.3	1.11E-07
Benzo(b)fluoranthene	1.64E-08	0.73	1.20E-08
beta-BHC	9.15E-10	1.8	1.65E-09
Dibenz(a,h)anthracene	2.40E-09	7.3	1.75E-08
Dieldrin	2.33E-10	16	3.74E-09
Arsenic	1.84E-08	1.5	2.76E-08
		total Cancer Risk=	1.86E-07

Hazard Quotient

Chemical of Concern	Intake (mg/kg-d)	RfD (mg/kg-d)	Hazard Quotient
Benzo(a)anthracene	5.16E-08	--	--
Benzo(a)pyrene	4.43E-08	--	--
Benzo(b)fluoranthene	4.80E-08	--	--
beta-BHC	2.67E-09	0.0002	1.33E-05
Dibenz(a,h)anthracene	7.01E-09	--	--
Dieldrin	6.81E-10	0.000025	2.72E-05
Arsenic	5.36E-08	0.0003	1.79E-04
		total hazard index=	2.19E-04

APPENDIX K

BACKGROUND SAMPLE INFORMATION

APPENDIX K

BACKGROUND DATA

Background samples were collected to evaluate chemicals occurring naturally in soil (e.g., metals) or regionally as a result of activities in the area (e.g., pesticides). A total of ten off-site background locations were sampled and two samples from each location were analyzed as part of the facility investigation program. Five locations were sampled near the Baseball Fields and Swimming Pool and Recreation Center (south of the site; B01 to B05), and five locations were sampled near the Former Municipal Water Supply Well Field (north of the site; B06 to B10). Two samples were collected at each location at depths of 1.5 to 2 feet bgs and 9 to 11.5 feet bgs. Background sample locations are shown on Figure 2.

As expected, metals and other naturally occurring chemicals (e.g., calcium) were detected in the majority of samples analyzed (Table K-1). Statistical analysis of the background concentrations was conducted independently for surface samples, subsurface samples, and for surface and subsurface samples combined. This evaluation indicated that with the exception of calcium, potassium, selenium, thallium, and tin, concentrations of metals and other naturally-occurring chemicals were higher in surface samples than in subsurface samples. In general, the higher concentrations in surface soil were detected in samples collected north of the site. For the purpose of identifying COPCs at the site, results for surface soils were used to define background concentrations. This estimate of background concentrations does include surficial impacts resulting from human activities. Background concentrations were represented by the 95 percent upper tolerance limit (95% UTL) of the surface data, which defines the 95 percentile of the population at a 95 percent confidence level.

Twenty-six SVOCs, pesticides, and PCBs were also detected in one or more samples from background locations (Table K-2). With the exception of B-4 at 1.5 feet, where nine SVOCs were detected, the remaining detections occurred at sample locations in the Former Municipal Water Supply Well Field. Concentrations of 18 SVOCs in B-08 at 2 feet were generally an order of magnitude higher than concentrations detected at any other sample locations. Thirteen of these SVOCs were detected in the sample B-08 at 9 feet bgs, the only sample at depth where SVOCs, pesticides or PCBs were reported. Considering B-08 at 2 feet bgs for SVOCs as an anomalous result, background concentrations of SVOCs, pesticides and PCBs were lower than the Human Health Screening Levels (HHSLs) for the project for all chemicals except dieldrin. For the purpose of identifying COPCs at the site, the 95 percent upper tolerance limit for

dieldrin in surface soil was used to represent background concentrations of dieldrin in soil (0.07 mg/kg). Only surface soil results were used because dieldrin is likely present in the area as a result of surficial use as a pesticide.

TABLE K-1
METALS BACKGROUND SAMPLE DATA
Rohm and Haas LLC
Reading, Ohio

Concentrations in milligrams per kilogram (mg/kg)

Sample Location	Sample Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
B01-1.5'	10/9/2001	9620	0.55	7.4	47.4	0.260	0.19	1210	10.1	7.1	12.5	15600	9.5	1680	424	0.026	12.5	655	0.28	0.28	278	0.55	0.88	20	39
B02-1.5'	10/9/2001	10800	0.55	8.4	58.7	0.370	0.21	1720	11.8	6.7	13.3	17200	10.1	1840	379	0.027	13.2	688	0.285	0.285	284.5	0.55	0.79	21.9	42
B03-1.5'	10/9/2001	10800	0.55	5.1	68.0	0.500	0.27	3870	12.2	8.0	13.4	18700	11.1	2380	589	0.026	15.1	976	0.285	0.285	284.5	0.55	0.9	18.3	41.1
B04-1.5'	10/9/2001	1870	0.55	4.0	9.8	0.270	0.16	86600	3.7	2.8	7.3	5760	4.1	31100	191	0.0098	6.5	368	0.27	0.27	69.2	1.5	0.93	6.2	22.3
B04-1.5' Blind Dup	10/9/2001	2200	0.55	3.7	11.4	0.265	0.16	97000	3.7	2.9	6.8	5980	4.3	36200	198	0.055	6.2	387	0.265	0.265	66.6	1.2	0.97	6.7	21.6
B05-1.5'	10/9/2001	13000	0.55	10.0	66.1	0.460	0.22	2370	15.7	8.0	15.6	19800	11.4	2090	393	0.03	14.9	660	0.28	0.28	282.5	0.55	0.82	23.9	51.4
B06-1.5'	10/9/2001	6950	0.55	6.2	67.7	0.350	0.52	38300	13.5	6.4	18.4	12600	25.3	9650	585	0.15	12.2	1130	0.285	0.285	64.1	1.1	1.5	19.9	63.3
B07-1'	10/9/2001	8140	0.6	6.2	134.0	0.64	0.43	35600	15.4	6.8	17.6	12600	29.0	8670	645	0.073	12.2	1210	0.69	0.295	292.5	0.6	1.5	16.3	49.9
B08-2'	10/9/2001	11500	0.6	7.5	123.0	0.61	0.70	8400	69.7	8.6	22.4	18800	59.3	2690	854	0.16	15.7	1810	1.6	0.29	290	0.6	2.9	56.4	88.1
B09-2'	10/9/2001	5780	3.3	16.2	985.0	0.85	0.33	3960	50.6	5.0	64.8	10600	410.0	838	69	0.046	10.6	674	2.5	0.33	328.5	0.92	1.9	24.9	85.2
B10-2'	10/9/2001	5020	0.65	13.5	327.0	1.4	0.14	1910	5.9	5.0	26.1	4030	16.1	340	15	0.047	11.1	993	1.7	0.33	329.5	0.96	1.3	22.8	15.7
B01-11.5'	10/9/2001	1620	0.5	2.3	6.9	0.260	0.15	115000	3.8	2.8	6.2	5010	3.2	37400	171	0.05	5.7	384	0.26	0.26	98.8	1.3	0.95	5.9	18.8
B02-11.5'	10/9/2001	1750	0.5	3.9	7.1	0.260	0.16	113000	3.8	3.0	6.9	6000	3.6	35700	182	0.05	6.2	369	0.26	0.26	91.7	0.74	1	6.1	20.1
B03-11.5'	10/9/2001	1650	0.5	3.0	7.5	0.260	0.15	126000	4.0	2.0	6.2	5620	2.8	37800	329	0.0089	4.8	370	0.26	0.26	105	1.5	0.93	5.5	15.6
B04-11.5'	10/9/2001	1550	0.55	2.7	6.0	0.265	0.13	114000	3.5	2.5	5.4	4670	3.0	37300	163	0.055	5.4	346	0.265	0.265	91.1	1.8	0.93	5.5	17.3
B05-11.5'	10/9/2001	1660	0.55	3.7	6.4	0.265	0.15	98200	3.2	2.3	7.9	5880	4.0	39400	158	0.055	4.8	370	0.265	0.265	92.9	1.5	1.1	6.4	21.9
B06-11'	10/9/2001	1860	0.6	1.4	9.4	0.059	0.20	119000	4.1	2.3	6.9	5380	3.7	36600	196	0.013	6.3	399	0.29	0.29	111	1.2	0.96	5.7	25
B07-9'	10/9/2001	6520	0.6	2.6	33.4	0.290	0.19	43800	8.4	5.4	8.8	9050	7.2	20500	221	0.013	9.9	729	0.295	0.295	67.3	1.5	5.9	12.1	31.7
B08-9'	10/9/2001	6210	0.55	3.0	20.4	0.230	0.26	65100	13.4	4.5	15.6	11300	7.0	23000	225	0.01	7	637	0.285	0.285	58.9	0.55	5.65	13	30.4
B09-10'	10/9/2001	12800	0.6	6.0	71.5	0.310	0.20	13000	25.1	3.7	41.8	22600	8.9	1710	82	0.026	14.2	1750	0.31	0.31	309	0.6	6.2	42.3	59.2
B10-11'	10/9/2001	9360	0.6	4.9	69.0	0.460	0.24	4160	16.5	3.6	20.4	17100	9.4	1640	123	0.018	11.5	730	0.3	0.3	299.5	0.6	0.89	20.8	41.5
Statistics																									
Surface Soils																									
Mean		7789.1	0.6	8.3	172.6	0.4	0.3	25540.0	19.3	6.1	19.8	12879.1	53.7	8861.6	394.7	0.1	11.8	377.5	0.3	N/A	233.6	0.8	1.3	21.6	47.2
Std. Deviation		3757.83	0.03	4.29	283.23	0.10	0.18	35471.83	21.07	1.97	15.99	5699.54	119.24	12674.47	260.71	0.05	3.16	13.44	0.01	N/A	108.65	0.33	0.64	13.16	24.08
Tolerance Factor, K*		2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911	2.911
Statistical Background Concentration**		**18728**	**0.7**	**20.8**	**997.0**	**0.636**	**0.82**	**128799**	**80.6**	**11.9**	**66.4**	**29470**	**400.7**	**45757**	**1154**	**0.206**	**21**	**417**	**0.30**	**N/A**	**550**	**1.79**	**3.17**	**59.9**	**117.3**
Subsurface Soils																									
Mean		4498.0	0.6	3.6	23.8	0.3	0.2	76917.8	7.7	3.2	12.6	5325.0	5.3	27105.0	185.0	0.0	7.6	373.0	0.3	N/A	132.5	1.1	2.5	12.3	28.2
Std. Deviation		4044.63	0.04	1.21	25.99	0.10	0.04	46910.68	7.34	1.09	11.34	597.47	2.57	14882.33	66.42	0.02	3.20	17.66	0.02	N/A	91.90	0.46	2.40	11.66	13.48
Tolerance Factor, K*		2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815	2.815
Statistical Background Concentration**		**15884**	**0.7**	**7.0**	**96.9**	**0.539**	**0.30**	**208971**	**28.4**	**6.3**	**44.5**	**7007**	**12.5**	**68999**	**372**	**0.086**	**17**	**423**	**0.33**	**N/A**	**391**	**2.44**	**9.19**	**45.1**	**66.1**
Surface and Subsurface Soils Combined																									
Mean		6221.9	0.6	5.9	101.7	0.3	0.2	48660.0	14.1	4.7	16.4	10864.7	30.6	17549.0	294.8	0.0	9.8	374.1	0.3	N/A	185.5	1.0	1.9	17.2	38.1
Std. Deviation		4154.39	0.04	3.91	214.97	0.10	0.14	47712.85	17.07	2.17	14.12	5936.01	87.89	16344.91	217.91	0.04	3.79	15.91	0.02	N/A	111.27	0.42	1.77	13.04	21.62
Tolerance Factor, K*		2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371	2.371
Statistical Background Concentration**		**16072**	**0.7**	**15.2**	**611.4**	**0.548**	**0.59**	**161787**	**54.6**	**9.9**	**49.9**	**24939**	**239.0**	**56303**	**811**	**0.142**	**19**	**412**	**0.31**	**N/A**	**449**	**1.97**	**6.05**	**48.1**	**89.4**

Notes:
Shaded results are for samples with non-detect analyses, and are listed at one-half the detection limit.
* Values are from "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities," 4/89 from Table 5, Page B-8 for n = 11, 10, and 21 respectively for surface, subsurface and total (varies with n).
**Upper Tolerance Limit = 95 percentile of referenced data set. UTL = Mean + Standard Dev. * K*

TABLE K-2
PESTICIDE, PCB, AND SVOC BACKGROUND SAMPLE DATA
Rohm and Haas LLC
Reading, Ohio

Concentrations in milligrams per kilogram (mg/kg)

Sample Location	Sample Date	4,4'-DDE	Aldrin	Dieldrin	Endrin ketone	Isodrin	Aroclor 1254	Aroclor 1260	2-Methyl-naphthalene	Acenaphthene	Anthracene	Benzo(a) anthracene	Benzo(a)pyrene	Benzo(b) fluoranthene	Benzo(ghi) perylene	Benzo(k) fluoranthene	bis(2-Ethylhexyl) phthalate	Carbazole	Chrysene	Dibenz(a,h) anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
B01-1.5'	10/9/2001	-0.0019	-0.0019	-0.0019	-0.0019	-0.0037	-0.037	-0.037	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37
B02-1.5'	10/9/2001	-0.0039	-0.0039	-0.0039	-0.0039	-0.0075	-0.038	-0.038	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38
B03-1.5'	10/9/2001	-0.0019	-0.0019	-0.0019	-0.0019	-0.0038	-0.038	-0.038	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38
B04-1.5'	10/9/2001	-0.0036	-0.0036	-0.0036	-0.0036	-0.0071	-0.035	-0.035	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	0.06	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35
B04-1.5' Blind Dup	10/9/2001	-0.0036	-0.0036	-0.0036	-0.0036	-0.0071	-0.035	-0.035	-0.35	-0.35	-0.35	0.063	0.076	0.1	0.072	-0.35	-0.35	-0.35	0.082	-0.35	-0.35	0.15	-0.35	-0.35	-0.35	0.096	0.14
B05-1.5'	10/9/2001	-0.0019	-0.0019	-0.0019	-0.0019	-0.0037	-0.037	-0.037	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37	-0.37
B06-1.5'	10/9/2001	-0.0039	-0.0039	0.041	-0.0039	-0.0075	-0.038	0.015	-0.38	-0.38	-0.38	0.12	0.19	0.18	0.16	0.096	-0.38	-0.38	0.14	-0.38	-0.38	0.19	-0.38	0.15	-0.38	0.12	0.19
B07-1'	10/9/2001	0.0015	0.11	0.055	-0.004	0.0054	0.11	-0.039	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39
B08-2'	10/9/2001	0.019	-0.02	0.031	0.13	-0.038	-0.038	-0.038	4.3	37	26	36	24	29	9.2	18	-19	4.4	37	3.5	26	120	32	9.2	3	110	83
B09-2'	10/9/2001	-0.0045	-0.0045	0.015	-0.0045	-0.0087	-0.043	0.24	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	0.18	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43
B10-2'	10/9/2001	-0.0022	-0.0022	-0.0022	-0.0022	-0.0044	-0.044	-0.044	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44
B01-11.5'	10/9/2001	-0.0018	-0.0018	-0.0018	-0.0018	-0.0034	-0.034	-0.034	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34
B02-11.5'	10/9/2001	-0.0018	-0.0018	-0.0018	-0.0018	-0.0034	-0.034	-0.034	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34
B03-11.5'	10/9/2001	-0.0018	-0.0018	-0.0018	-0.0018	-0.0034	-0.034	-0.034	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34
B04-11.5'	10/9/2001	-0.0018	-0.0018	-0.0018	-0.0018	-0.0035	-0.035	-0.035	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35
B05-11.5'	10/9/2001	-0.0018	-0.0018	-0.0018	-0.0018	-0.0035	-0.035	-0.035	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35
B06-11'	10/9/2001	-0.002	-0.002	-0.002	-0.002	-0.0038	-0.038	-0.038	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38
B07-9'	10/9/2001	-0.002	-0.002	-0.002	-0.002	-0.0039	-0.039	-0.039	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39	-0.39
B08-9'	10/9/2001	-0.0019	-0.0019	-0.0019	-0.0019	-0.0037	-0.037	-0.037	0.23	0.3	0.15	0.14	0.08	0.094	-0.37	-0.37	-0.37	-0.37	0.14	-0.37	0.33	0.51	0.32	-0.37	0.088	0.68	0.35
B09-10'	10/9/2001	-0.0021	-0.0021	-0.0021	-0.0021	-0.0041	-0.041	-0.041	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41
B10-11'	10/9/2001	-0.002	-0.002	-0.002	-0.002	-0.004	-0.04	-0.04	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Statistics																											
Surface Soils																											
Mean				0.0138																							
Std. Deviation				0.0195																							
Tolerance Factor, K*				2.911																							
Statistical Background Concentration**				0.0707																							
Subsurface Soils																											
Mean				0.001																							
Std. Deviation				6E-05																							
Tolerance Factor, K*				2.815																							
Statistical Background Concentration**				0.0011																							
Surface and Subsurface Soils																											
Mean				0.0077																							
Std. Deviation				0.0153																							
Tolerance Factor, K*				2.371																							
Statistical Background Concentration**				0.0439																							

Notes:
Shaded results are for samples with non-detect analyses.
* Values are from "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities," 4/89 from Table 5, Page B-8 for n = 11, 10, and 21 respectively for surface, subsurface and total (varies with n).
**Upper Tolerance Limit = 95 percentile of referenced data set. UTL = Mean + Standard Dev. * K*

APPENDIX L

CORRESPONDENCE WITH AGENCIES CONCERNING ENDANGERED AND THREATENED SPECIES

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR SAMUEL W. SPECK, DIRECTOR

Division of Natural Areas & Preserves
Nancy Strayer, Acting Chief
1889 Fountain Square, Bldg. F-1
Columbus, OH 43224-1388
Phone: (614) 265-6453 Fax: (614) 267-3096

July 14, 2005

Karen Fields
Parsons
2443 Crowne Point Dr.
Cincinnati, OH 45241

Dear Ms. Fields:

After reviewing our Natural Heritage maps and files, I find the Division of Natural Areas and Preserves has no records of rare or endangered species within two miles of the Parsons Rohm & Haas Chemicals LLC-Cincinnati project #441807. The site is located in Sec. 33, Sycamore Twp., Hamilton Co., Cincinnati East Quadrangle.

There are no existing or proposed state nature preserves at the project site. We are also unaware of any unique ecological sites, geologic features, breeding or non-breeding animal concentrations, champion trees, state parks, state forests, scenic rivers, or wildlife areas within the project area. However the site is near the Mill Creek Conservancy. They should be contacted at (513) 721-8173 regarding possible impacts to this area. The map I have included with this letter displays the location of this area.

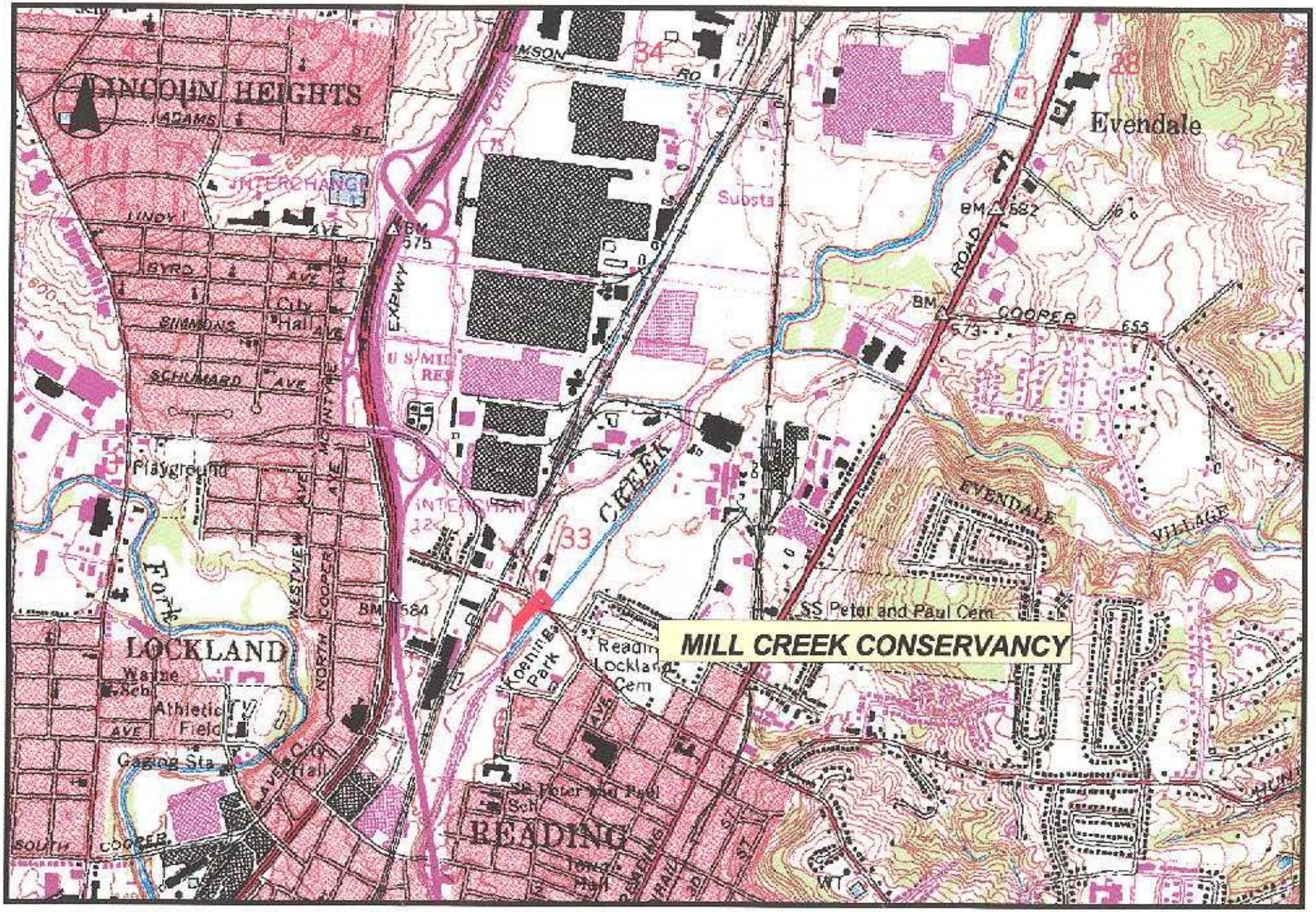
Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Although we inventory all types of plant communities, we only maintain records on the highest quality areas. Also we do not have data for all Ohio wetlands. The Division of Wildlife has a statewide wetland inventory that can give you additional data. Their phone number is (614) 265-6300. For National wetlands Inventory maps, please contact Madge Fitak in the Division of Geological Survey at (614) 265-6576. Aerial photos may be obtained from ODOT at (614) 275-1369. USGS maps can be requested directly from the U.S. Geological Survey at 1-888-275-8747.

Please contact me at (614) 265-6409 if I can be of further assistance.

Sincerely,

Butch Grieszmer, Data Analyst
Resource Services Group

Rohm & Haas Chemicals LLC-Cincinnati/441807



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
6950 Americana Parkway, Suite H
Reynoldsburg, Ohio 43068-4127

(614) 469-6923/FAX (614) 469-6919
August 19, 2005

Karen A. Fields
Parsons
2440 Crowne Point Dr.
Sharonville, OH 45241

Dear Ms. Fields:

This is in response to your July 11, 2005 letter requesting information that we have regarding the occurrence or possible occurrence of Federally-listed threatened or endangered species in the vicinity of proposed ecological risk assessment and other site investigation activities that are being conducted at the Rohm and Haas Chemicals LLC facility located in Reading, Hamilton County, Ohio.

ENDANGERED SPECIES COMMENTS:

Based on your description of the site, we believe that the likelihood of finding a Federally-listed species on the 34 acres is remote; however, the possibility still exists, depending on habitat conditions. For example, trees may provide the required conditions for the Indian bat, and the resulting partial shading could provide conditions for the running buffalo clover. Therefore, we are providing you with our standard guidance for those two species.

The Rohm and Haas Chemicals LLC facility lies within the range of the **Indiana bat** (*Myotis sodalis*), a Federally-listed endangered species. Since first listed as endangered in 1967, its population has declined by nearly 60 percent. Several factors which have contributed to the decline of the Indiana bat include the loss and degradation of suitable hibernacula, human disturbance during hibernation, pesticides, and the loss and degradation of forested habitat, particularly stands of large, mature trees. Fragmentation of forest habitat may also contribute to declines. Summer habitat requirements for the species are not well defined, but the following are considered important:

1. Dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or branches, or cavities, which may be used as maternity roost areas.
2. Live trees (such as shagbark hickory and oaks) which have exfoliating bark.
3. Stream corridors, riparian areas, and upland woodlots which provide forage sites.

Should the proposed site contain trees or associated habitats exhibiting any of the characteristics listed above, we recommend that the habitat and surrounding trees be saved wherever possible. If the trees must be cut, further coordination with this office is recommended. Additionally, suitable bat roost trees should not be cut between April 15 and September 15.

If desirable trees are present and must be cut, mist net or other surveys may be warranted to determine if bats are present. Any survey should be designed and conducted in coordination with the Endangered Species Coordinator for this office. The survey should be conducted in June or July, since the bats would

only be expected in the project area from approximately April 15 to September 15.

The above facility also lies within the range of the **running buffalo clover** (*Trifolium stoloniferum*), a Federally listed endangered species. This species can be found in partially shaded woodlots, mowed areas (lawns, parks, cemeteries), and along streams and trails. Running buffalo clover requires periodic disturbance and a somewhat open habitat to successfully flourish, but cannot tolerate full-sun, full-shade, or severe disturbance. If suitable habitat is present, we recommend that surveys for this species be conducted by a trained botanist in May or June when the plant is in bloom.

The facility is within the range of **bald eagle** (*Haliaeetus leucocephalus)*, a Federally-listed threatened species, and the **sheepnose mussel** (*Plethobasus cyphyus*), a Federal candidate species. Due to the site location, we anticipate that any project would have no effect on these two species, provided best management practices are implemented. This precludes the need for further action on this project as required by the 1973 Endangered Species Act, as amended.

Should additional information on listed or proposed species or their Critical Habitat becomes available, or if new information reveals effects of the action that were not previously considered, this determination may be reconsidered. If the scope of the assessment changes, we would recommend that you contact our office for further review.

This technical assistance letter is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act, of 1973, as amended, and is consistent with the intent of the National Environmental Policy Act of 1969, and the U. S. Fish and Wildlife Service's Mitigation Policy.

If you have questions, or if we may be of further assistance in this matter, please contact Ken Lammers of this office.

Sincerely,

Mary Knapp

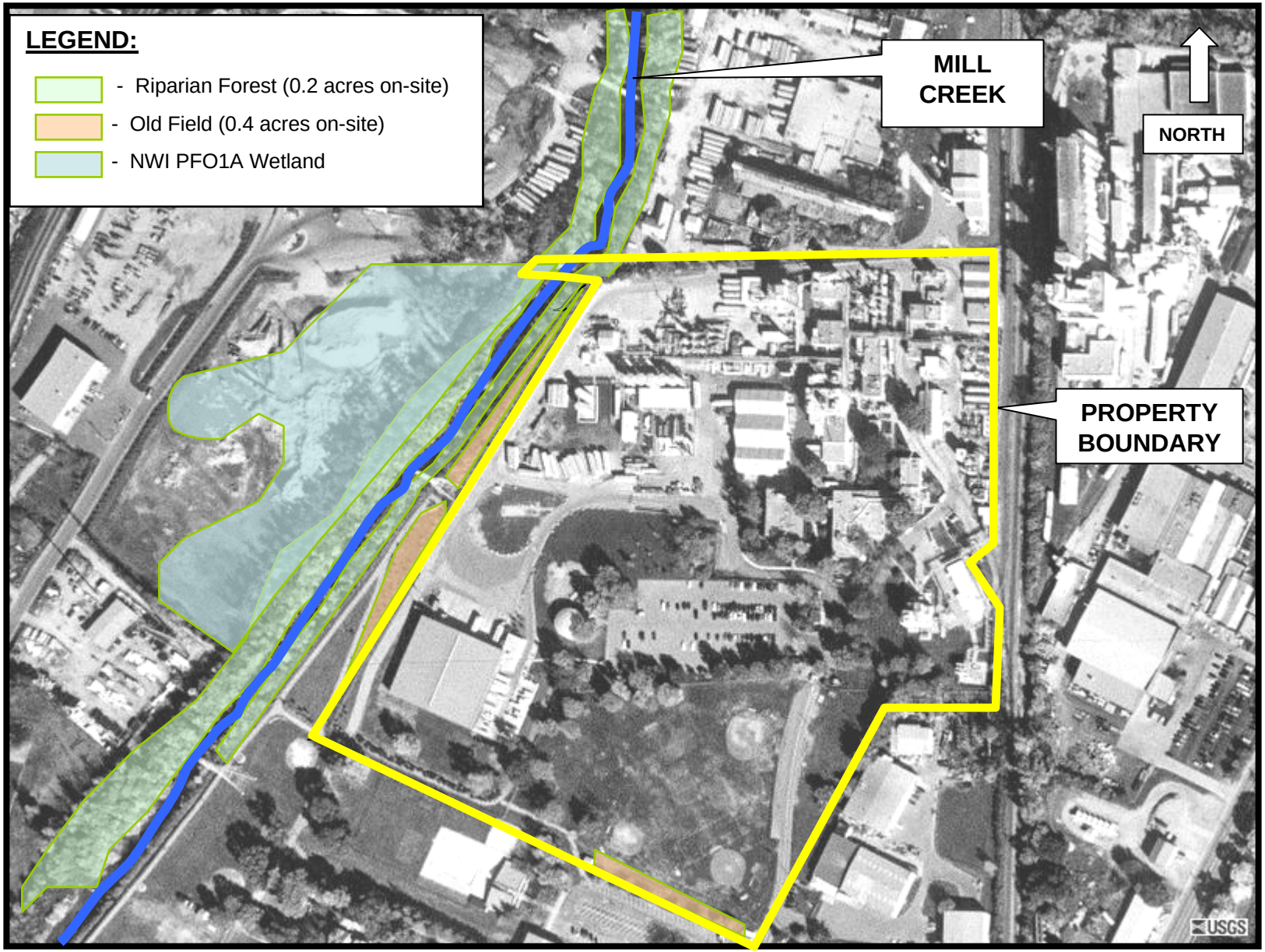
Mary M. Knapp, Ph.D.
Supervisor

cc: ODNR, Div. of Wildlife, SCEA Unit, Columbus, OH

APPENDIX M

AERIAL PHOTOGRAPHS OF THE SITE

AND SURROUNDING VICINITY



Aerial Photograph of the Rohm and Haas Cincinnati Plant, 2000.

USGS
science for a changing world

39°14′13″N
84°26′39″W Map Extent 84°26′2″W
39°13′51″N

The National Map
http://nationalmap.gov/

Geographic Coordinate System (WGS84)

ELEVATION

1/3 ArcSecond NED, CONUS

TRANSPORTATION

County Road Labels (USGS)

No legend available

Ohio Roads (BTS)

- BTS Roads-Ohio Ferry Crossings
- BTS Roads-Ohio Interstates
- BTS Roads-Ohio Local Roads
- BTS Roads-Ohio Local Roads (Small Scale)
- BTS Roads-Ohio Secondary Roads
- BTS Roads-Ohio Trails
- BTS Roads-Ohio US/Major State Highways

State Highway Labels (USGS)

No legend available

US Highway Labels (USGS)

No legend available

US Road Labels

No legend available

HYDROGRAPHY

Wetland Polygons (USFWS)

Wetlands

- Freshwater Forested/Shrub wetland
- Freshwater Emergent wetland
- Freshwater pond
- Estuarine and Marine wetland
- Riverine
- Lake
- Estuarine and Marine Deepwater
- Other Freshwater wetland

ORTHOIMAGERY

Cincinnati (2004)

No legend available

BOUNDARIES

State Boundaries (USGS)

- State Boundaries

APPENDIX N

ECOLOGICAL EFFECTS OF THE COPECS

APPENDIX N

ECOLOGICAL EFFECTS OF DETECTED COMPOUNDS

The ecological effect of a chemical contaminant depends on many factors, such as the contaminant's bioavailability, its concentration in the environment and/or receptor organism, synergistic interactions among contaminants, the duration and frequency of receptor biota exposure to that contaminant, the species of the receptor, the metabolic rate of the species, and the characteristics of the metabolic processes of the species (USEPA, 1988). Contaminants in the environment can affect receptor biota and ecosystems in both lethal and sublethal ways, such as the following:

- Altered developmental rates, metabolic and physiologic processes and functions, or behavior.
- Increased susceptibility to disease, parasitism, or predation.
- Disrupted reproductive functions.
- Mutations or other reduction in the viability of offspring (USEPA, 1989a).

When the potential effects of an environmental contaminant on biotic receptors are being evaluated, the toxicity of the contaminant must be determined. The determination should be based on field data, monitoring data, and the results of toxicity testing of contaminated media (USEPA, 1989a).

The following sections summarize toxicology information from scientific literature for compounds detected at the Rohm and Haas Cincinnati facility. The summaries present information on contaminant toxicity; likely mechanisms of toxicity; and potential effects on receptor biota, populations, and ecosystem.

VOLATILE ORGANIC COMPOUNDS

Acetone. Acetone is a chemical that is naturally found in the environment. It is also normally present in animals from the breakdown of fat. It can also be used in normal processes that make sugar and fats for energy. Chronic exposure to acetone can cause liver and nerve damage, birth defects, and impaired reproduction (in males only) in animals. Acetone does not cause skin cancer when applied dermally. It is unknown whether ingesting or inhaling acetone can cause cancer (ATSDR, 1994a).

Acute oral $_{LD50}$ values were calculated only for rats. In general, the lethality of acetone decreases with the age of the rat (Kimura et al., 1971). The LD_{50} values ranged from 1,726 mg/kg for newborn rats to 6,667 mg/kg for older adults.

No effects were observed in male rats exposed to 1,071 mg/kg/day for 6 weeks in drinking water (Larsen et al., 1991). Mice treated with 3,500 mg/kg/day during gestation had reduced postnatal pup survival, increased gestation duration, and reduced reproduction index (EHRT, 1987)

Acetone is moderately toxic to the liver and kidney of animals. In a 13-week drinking water study, increased liver weights were observed in rats treated with 1,600 mg/kg/day (Dietz et al., 1991). Acetone also induces liver microsomal enzymes. Kidney weights were increased in male and female rats exposed to 3,400 mg/kg and 1,600 mg/kg, respectively for 14-days in drinking water (Dietz et al., 1991).

Bromodichloromethane

Volatilization of bromodichloromethane from soils will be the primary removal mechanism when soils are exposed to the atmosphere. Where volatilization does not occur readily, the relatively low sorptive tendencies (K_{OC} = 53 - 251) of bromodichloromethane allow for leaching to groundwater. Once leached to subsurface soils and/or groundwater, anaerobic biodegradation may be the major removal mechanism. For releases to surface waters, volatilization is also the dominant removal mechanism; hydrolysis, oxidation, photolysis, and adsorption are not considered environmentally important. In addition, bioconcentration of bromodichloromethane in aquatic organisms is not considered an important removal mechanism (log BCF = 1.37). Atmospheric concentrations of this material should, given its high vapor pressure, exist entirely in the vapor phase. The only identifiable removal mechanism for atmospheric bromodichloromethane is through reaction with hydroxyl radicals; rainfall washout may occur, but is considered cyclical in nature given the revolatilization rate of this material [1].

General. There is probably some volatilization of bromodichloromethane, though not rapid. No information on biomagnification was available in the technical literature. Hydrolysis, oxidation, direct photolysis, absorption, and bioconcentration are not environmentally important aquatic fate processes [5].

Vegetation. Bromodichloromethane is moderately to highly mobile in soil and can therefore leach into ground water [5]. Review of the technical literature did not produce information regarding the phytotoxic effects of bromodichloromethane.

Aquatic Life. If bromodichloromethane is released into surface water, volatilization will be the dominant environmental fate process. The volatile half-life in rivers and streams has been estimated at 33 minutes to 12 days, with a typical half-life being 35 hours [5]. Aquatic hydrolysis half-life at 25°C and pH 7 is 137 years, so it is an unlikely removal mechanism [6]. There are no federal or Ohio water quality standards established to protect aquatic life [7,8].

Wildlife. The acute toxic levels of bromodichloromethane to mice is as low as 450 mg/kg. The chronic 90-day toxic level to mice is µ125 mg/kg [6]. Micromedex, Inc. [5] lists the LD50 concentrations for rats from 916 to 969 mg/kg and mice from 450 to 900 mg/kg.

References

1.Howard, P.H., 1989. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume I: Large Production and Priority Pollutants. Lewis Publishers, Inc. Chelsea, MI. 574 pp.

5.Micromedex, Inc., 1992. Tomes Plus System. Toxicology, Occupational Medicine and Environmental Series. Volume 14. Denver, Colorado.

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7.USEPA, 1991. Water Quality Criteria Summary. Washington, D.C.

8.OEPA, 1991. Ohio Water Quality Standards. Ohio Administrative Code, Title 3745-Chapter 1. Ohio Environmental Protection Agency.

Chlorobenzene

Chlorobenzene released to moist soils will volatilize fairly readily. Releases to sandy or dry soils, however, can be expected to leach to groundwater. Once in groundwater, chlorobenzene will undergo slow biodegradation to 2-chlorophenol and/or 4-chlorophenol (among others). If released to surface water, the primary removal mechanism will be volatilization. Biodegradation of this material will occur in surface waters; rapidity increases with increasing temperature and decreasing salinity. Chlorobenzene is not expected to bioconcentrate at significant levels among most aquatic species, although the BCF of 447 observed in fathead minnows indicates bioconcentratibility in select species. The K_{OC} value suggests only slight to moderate adsorptive tendencies to soils and sediments in waters. Chlorobenzene is expected to exist almost entirely in the vapor phase in the atmosphere. The dominant mechanism for removal of chlorobenzene from the atmosphere is reaction with hydroxyl radicals, with the resultant production of chlorophenols. Reaction with nitrous oxides (in polluted air) may also occur, with the production of chloronitrobenzenes and chloronitrophenols. Photolysis may occur, but at a rate much slower than previously discussed atmospheric reactions. [2]

References

2.Howard, P.H., 1989. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume 1: Large Production and Priority Pollutants. Lewis Publishers, Inc. Chelsea, MI. 574 pp.

1,2-Dichlorobenzene

In soil, 1,2-dichlorobenzene will be moderately to tightly adsorbed. Leaching to groundwater, however, has been reported to occur. An important transport mechanism from surface soil appears to be volatilization, although this process may be attenuated due to tight adsorption or leaching. 1,2-Dichlorobenzene will slowly biodegrade in soil under aerobic conditions. Hydrolysis, oxidation and photolysis are not expected to be important processes [2].

In water, adsorption to sediment is the major environmental fate process for 1,2-dichlorobenzene. 1,2-Dichlorobenzene will volatilize from water, but adsorption to sediment will attenuate this process. Biodegradation in aerobic water after microbial adaptation is expected to occur, however, biodegradation under aerobic conditions which may exist in sediments is not likely to occur. Bioaccumulation in aquatic organisms is considered to be an important process (BCF values of 66-650). Aquatic hydrolysis, oxidation and photolysis are not expected to be important processes [2].

In air, 1,2-dichlorobenzene will exist primarily in the vapor stage. 1,2-Dichlorobenzene will react with photochemically produced hydroxyl radicals in the atmosphere. Direct photolysis is not expected to be an important process. Atmospheric removal of 1,2-dichlorobenzene via wash-out is possible [2].

References

2.Howard, P.H. 1990. Handbook of Environmental Fate and Exposure Data. Volume I: Large Production and Priority Pollutants. Lewis Publishers. Chelsea, Michigan.

1,3-Dichlorobenzene

In soil, 1,3-dichlorobenzene will be moderately to tightly adsorbed. Leaching to groundwater, however, has been reported to occur. An important transport mechanism from surface soil appears to be volatilization, although this process may be attenuated due to tight adsorption or leaching. 1,3-Dichlorobenzene will slowly biodegrade in soil under aerobic conditions. Hydrolysis, oxidation and photolysis are not expected to be important processes [2].

In water, adsorption to sediment is the major environmental fate process for 1,3-dichlorobenzene. 1,3-Dichlorobenzene will volatilize from water, but adsorption to sediment will attenuate this process. Biodegradation in aerobic water after microbial adaptation is expected to occur, however, biodegradation under aerobic conditions which may exist in sediments is not likely to occur. Bioaccumulation in aquatic organisms is considered to be an important process (BCF values of 89-740). Hydrolysis, oxidation and photolysis are not expected to be important processes [2].

In air, 1,3-dichlorobenzene will exist primarily in the vapor stage. 1,3-Dichlorobenzene will react with photochemically produced hydroxyl radicals in the atmosphere. Direct photolysis is not expected to be an important process. Atmospheric removal of 1,3-dichlorobenzene via wash-out is possible [2].

References

2.Howard, P.H. 1990. Handbook of Environmental Fate and Exposure Data. Volume I: Large Production and Priority Pollutants. Lewis Publishers. Chelsea, Michigan.

1,4-Dichlorobenzene
Volatilization of 1,4-DCB is an important mechanism for transport in soil, as well as being the dominant mechanism for removal from water. Tight adsorption of 1,4-DCB to soils and sediments attenuates volatilization. 1,4-DCB will undergo aerobic biodegradation in soils and waters, but is not expected to hydrolyze, photolyze, oxidize, or anaerobically biodegrade. If released to the air, 1,4-DCB exists predominantly in the vapor phase, and will react with photochemically produced hydroxyl radicals; atmospheric washout, via rainfall, is possible. Significant bioconcentration of 1,4-DCB in aquatic organisms is not predicted [1].
References
1.Howard, P.H., 1989. Handbook of Environmental Fate and Exposure Data For Organic Chemicals, Vol. I: Large Production and Priority Pollutants. Lewis Publishers, Inc. Chelsea, MI. 574 pp.

Tetrachloroethene
PCE released to surface soil will be subject to evaporation into the atmosphere and leaching to the groundwater. It is weakly adsorbed to soil organic material. Since it is only somewhat soluble in water and substantially denser, when it occurs as a separate phase it tends to sink to the bottom of the aquifer. Biodegradation of PCE occurs in soils and, to a lesser extent, in some types of groundwater. PCE released to surface water will be subject to rapid volatilization; it will not be expected to significantly biodegrade, bioconcentrate in aquatic organisms, or adsorb to sediment. Photooxidation degrades PCE in the atmosphere, although some may be washed out in rain before this occurs [1].
References
1.Howard, P.H., 1990. Handbook of Environmental Fate and Exposure Data For Organic Chemicals, Vol. II: Solvents. Lewis Publishers, Inc. Chelsea, Michigan. 546 pp.

Toluene
Much of the toluene released to surface soil will be lost to volatilization. It is mobile in soils and will leach to groundwater. Biodegradation occurs slowly in soil and groundwater, but is inhibited by high concentrations. Under ideal conditions of low concentration and acclimated microbial populations, rapid biodegradation may occur. Losses from surface water occur due to volatilization and biodegradation. It will not significantly adsorb to sediment or bioconcentrate in aquatic organisms. In the atmosphere it will degrade or be washed out with rain [1].
References
1.Howard, P.H., 1990. Handbook of Environmental Fate and Exposure Data For Organic Chemicals, Vol. II: Solvents. Lewis Publishers, Inc. Chelsea, Michigan. 546 pp.

Trichlorofluoromethane
Freon 11 released to surface soil and surface water will be lost primarily by evaporation. It is mobile in soil, and will leach to groundwater. It is moderately sorbed to soil. The extent of its sorption on soils is strongly affected by soil water content and organic content of soils. In groundwater, Freon 11 is likely to persist for long period of time. Freon 11 has low potential for bioaccumulation [1].
References
1.Howard, P.H., Boethling, R.S., Jarvis, W.F., Meylan, W.M. and Michalenko, E.M., 1991. Handbook of Environmental Degradation Rates. Lewis Publishers. Chelsea, Michigan. 725 p.

Xylenes
Xylenes are moderately mobile in soil and may leach to groundwater where they are known to persist for several years despite evidence of biodegradation in both soil and groundwater. The dominant removal process in surface water is volatilization, but this is not a rapid process. Some adsorption to sediment will occur. Once released to the atmosphere, xylenes will undergo photochemical degradation at a moderate rate [1].
General. Xylenes are not a priority pollutant because they have low acute and chronic toxicity. Xylenes move through the soil/groundwater system when present at low concentrations, dissolved in water and adsorbed on soil, or as a separate organic phase resulting from a spill of significant quantities. Xylenes readily volatilize from water, are moderately adsorbed on soil, and have a moderate potential for bioaccumulation [8]. No information on biomagnification of xylenes was available in the technical literature.
Vegetation. Nearly all xylenes (98.8 percent) are expected to be sorbed into the soil. For the portion of xylenes in the gaseous phase of soil (0.5 percent), diffusion through the soil/air pores up to the ground surface and

removal by wind will be a significant loss pathway [8]. Review of the technical literature did not produce information regarding the phytotoxic effects of xylenes.

Aquatic Life. The half-life of xylenes in surface water has been calculated as 2.6 to 11.2 days [9]. Under normal environmental conditions, xylenes are not expected to undergo hydrolysis because they contain no hydrolyzable functional groups [8]. The LC50 value for freshwater fish was approximately 30 mg/L [9]. The 96-hour LC50 values for fathead minnows were 26.7 mg/L in soft water and 28.8 mg/L in hard water [10]. The 96-hour LC50 for bluegills was 20.9 mg/L in soft water [10]. There are no federal or state water quality standards established to protect aquatic life [11].

Wildlife. Xylenes are considered to be of low acute and chronic toxicity to birds and mammals [12]. No changes were found in rats, guinea pigs, dogs, and monkeys continuously exposed to 80 ppm for 127 days, nor in rats exposed to 700 ppm for 130 days [8]. Japanese quail showed no signs of toxicity at oral concentrations of 5,000 to 20,000 ppm (approximately 600 to 2,400 mg/kg body weight) [9]. Mallard eggs were immersed in xylene (10%) for 30 seconds and no significant effects on embryonic weight and length were observed when compared to controls [13]. Arthur D. Little, Inc. [8] reported an oral LD50 for rats at 4,300 mg/kg.

References

1.Howard, P.H., 1990. Handbook of Environmental Fate and Exposure Data For Organic Chemicals, Vol. II: Solvents. Lewis Publishers, Inc. Chelsea, Michigan. 546 pp.

8.Arthur D. Little, Inc., 1985. The Installation Restoration Program Toxicology Guide. Volume 1. Cambridge, MA.

9.CH2M Hill, Inc., 1989. Preliminary Endangerment Assessment for Lowry Landfill. Prepared for USEPA. Denver, Colorado.

10.Sax, N.I. (ed.), 1984. Dangerous Properties of Industrial Materials. 6th ed. Van Nostrand Reinhold, New York. p 2728.

11.USEPA, 1991. Water Quality Criteria Summary. Washington, D.C.

12.Clement Associates, Inc., 1985. Chemical, Physical, and Biological Properties of Compounds Present a Hazardous Waste Sites. Prepared for USEPA. September 27, 1985.

13.Micromedex, Inc., 1992. Tomes Plus System. Toxicology, Occupational Medicine and Environmental Series. Volume 14. Denver, Colorado.

SEMI-VOLATILE ORGANIC COMPOUNDS

bis(2-ethylhexyl)phthalate

BEHP has a strong tendency to adsorb to soils and sediments, suggesting low likelihood of leaching to groundwater. Given the very low vapor pressure and Henry's Law constant of BEHP, volatilization from soils and waters is very unlikely. BEHP may be transported in water via the formation of chemical complexes with humic matter [4,6].

Hydrolysis (from aquatic systems), photolysis (in the water and atmosphere), photo-oxidation (in atmospheric systems), and biodegredation (in water, sediments, and soil) are removal processes for BEHP, with biodegredation being the most common process [4,6]. In aquatic environments, aerobic biodegredation occurs rapidly following acclimation; no anaerobic biodegredation occurs. Some biodegredation in soils is expected. In the atmosphere, the primary removal mechanism is via rainfall washout [1].

This compound does show a tendency to bioconcentrate in aquatic and terrestrial organisms. However, no evidence of BEHP biomagnification in the food chain was reported [4].

General. Bis(2-ethylhexyl)phthalate (BEHP) is the best studied of the phthalate esters. Most information reported in the technical literature dealt with phthalate esters as a group. Autian [8] suggests there is evidence phthalate esters are degraded by microbiota and metabolized by fish and animals. As a result, phthalate esters are not likely to biomagnify. Phthalate esters readily complex with natural organic substances (e.g., fulvic acid) to form complexes which are very soluble in water. BEHP is nonvolatile, strongly adsorbed, and has a high potential for bioaccumulation [4].

Plants. Review of the technical literature did not produce information regarding the phytotoxic effects of BEHP.

Terrestrial Invertebrates. No information was found concerning BEHP toxicity to terrestrial invertebrates.

Amphibians and Reptiles. No information was found concerning BEHP toxicity to amphibian or reptiles.

Fish and Aquatic Organisms. Bioconcentration factors (BCFs) for fish and aquatic invertebrates range from 2 to 13,400. Fathead minnows accumulated levels of BEHP 1,380 times the water concentration of 2.5 µg/L after 28 days. Residue half-life was 7 days. Invertebrates accumulated BEHP up to 13,400 times when exposed to water concentrations ranging from 0.08 to 0.3 µg/L. Over 90 percent of the residues were lost within 10 days [9,6].

The 96-hour LC50 values for bluegill is more than 770 mg/L, 100 mg/L for coho salmon and rainbow trout, and 550 mg/L for sheepshead minnows [6,10,11,12]. In one study, a 96 hour survival NOEC of 75 mg/L was reported [13]. The LC50 of *Daphnia magna* exposed to BEHP was 11,000 µg/L [11] and the 48 hr EC50 for a related phthalate, butylbenzyl phthalate, was 780 ug/L for the eastern oyster [14]. Daphnids were reported to have reduced reproduction at concentrations as low as 3 ug/L [6,15,5]. In aquatic organisms, sublethal effects of BEHP exposure included decreased vertebral collagen synthesis and depressed reproduction [6,5].
Currently, there are no USEPA acute or chronic water quality criteria for the protection of aquatic life for BEHP [16].

Birds. Little information was available concerning BEHP toxicity to birds. In HSDB (1999), the only information concerning BEHP exposure to birds was that a concentration of 4,000 ug/L, *in vitro*, caused the cessation of chick embryo heart cells when added to the tissue culture medium [6,17]. In a review by Sample (1996), a 4 week diet study with ringed doves resulted in a LOAEL of 1.11 mg/kg/day (10 ppm diet) [18,19].

Mammals. The only information available on wildlife toxicity to BEHP concerns laboratory animals. Sublethal effects of BEHP in mammals include, reproductive, developmental, liver, enzyme, renal and lipid changes, carcinomas, and pulmonary effects [4,13]. The oral LD50 values for small mammals such as rats, mice, and guinea pigs range from 25,000-75,000 mg/kg [6,19]. At injected doses of 4 mg/L, BEHP prevented implantation and at 2 ml/kg, BEHP caused excessive bleeding, incomplete expulsion of fetuses and maternal deaths among pregnant female rats [6,20]. In a review by Sample (1996), a 105 day diet study with mice resulted in a LOAEL of 183 mg/kg/day (1,000 ppm diet) [18,21].

References

[1]Howard, P.H., 1989. Handbook of Environmental Fate and Exposure Data For Organic Chemicals, Vol. I: Large Production and Priority Pollutants. Lewis Publishers, Inc. Chelsea, MI. 574 pp.
[4]ATSDR, 1990. Toxicological Profile for Di(2-Ethylhexyl)Phthalate. Draft. Agency for Toxic Substances and Disease Registry. USPHS/USEPA. December, 1990.
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[19]Peakall, D.B., 1974. Effects of di-n-butylphthalate and di-2-ethylhexylphthalate on the eggs of ring doves. *Bull. Environ. Contam. Toxicol.* 12:698-702.
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4-Methylphenol

When released to water, biodegradation is expected to be the dominant loss mechanism. Volatilization of this chemical from water will be low. In soils, it is relatively mobile, and therefore can be expected to leach into groundwater. Biodegradation is rapid in soils, sewage, activated sludge, and freshwater inocula. In the atmosphere, it will react with hydroxyl radical during daylight hours and with nitrate radicals at night. Being a highly soluble chemical in water, it will be scavenged from the atmosphere by rain [1].

References

1.Howard, P.H., 1990. Handbook of Environmental Fate and Exposure Data For Organic Chemicals, Vol. I: Large Production and Priority Pollutants. Lewis Publishers, Inc. Chelsea, Michigan. 574 pp.

POLYCYCLIC AROMATIC HYDROCARBONS

Polycyclic aromatic hydrocarbons (PAHs) are a large group of chemicals formed during the incomplete combustion of organic materials. There are over one hundred PAHs, and they are found throughout the environment in air, water, and soil. Seven of the 15 PAHs addressed in this profile are classified as probable human carcinogens [1,2].

CAS NumberS

Acenaphthene	83-32-9	Chrysene	218-01-9
Acenaphthylene	208-96-8	Dibenzo(a,h)anthracene	53-70-3
Anthracene	120-12-7	Fluoranthene	206-44-0
Benzo(a)anthracene	56-55-3	Fluorene	86-73-7
Benzo(a)pyrene	50-32-8	Indeno(1,2,3-cd)pyrene	193-39-5
Benzo(b)fluoranthene	205-99-2	Phenanthrene	85-01-8
Benzo(g,h,i)perylene	191-24-2	Pyrene	129-00-00
Benzo(k)fluoranthene	207-08-9		

Because the physical and chemical properties of PAHs vary substantially depending on the specific compounds in question, the fate and transport characteristics vary. Thus, the following discussion is presented in very general terms. Some fate characteristics are roughly correlated with molecular weight; so the compounds are grouped as follows [1]:

- Low molecular weight: acenaphthene, acenaphthylene, anthracene, fluorene, and phenanthrene;
- Medium molecular weight: fluoranthene and pyrene; and
- High molecular weight: benzo(a)anthracene, benzo(b)fluoranthene, benzo-(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenzo-(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

PAHs are present in the atmosphere in the gaseous phase and sorbed to particulates. They may be transported great distances, and are subject to photodegradation as well as wet or dry deposition [1].

PAHs in surface water are removed by volatilization, binding to particulates and sediments, bioaccumulation, and sorption onto aquatic biota. The low molecular weight PAHs have Henry's Law constants in the range of 10^{-3} to 10^{-5} atm-m^3/mole, and would therefore be expected to undergo significant volatilization; medium molecular weight PAHs have constants in the 10^{-6} range; and high molecular weight PAHs have constants in the range of 10^{-5} to 10^{-8}. Half-lives for volatilization of benzo(a)anthracene and benzo(a)pyrene from water have been estimated to be greater than 100 hours. It has been reported that lower molecular weight PAHs could be substantially removed by volatilization under conditions of high temperature, shallow depth, and high wind. For example, anthracene was found to have a half-life for volatilization of 18 hours in a stream with moderate current and wind. In an estuary, volatilization and adsorption are the primary removal mechanisms for medium and high molecular weight PAHs, whereas volatilization and biodegradation are the major mechanisms for low molecular weight compounds. PAHs can bioaccumulate in plants and animals, but are subject to extensive metabolism by high-trophic-level consumers, indicating that biomagnification is not significant [1].

Potential mobility in soil is related to the organic carbon partition coefficient (K_{OC}). The low molecular weight PAHs have K_{OC} values in the range of 10^3 to 10^4, which indicates a moderate potential to be adsorbed to organic material. Medium molecular weight compounds have values on the order of 10^4, while high molecular weight compounds have values in the 10^5 to 10^6 range. The latter compounds, then, have a much greater tendency to adsorb and resist movement through soil. Volatilization of the lower molecular weight compounds from soil

may be substantial. However, some portion of PAHs in soil may be transported to groundwater, and then move laterally in the aquifer, depending on soil/water conditions [1].

General. The molecular weight of the individual PAHs affects their mobility and solubility in the environment, with lower weight compounds generally being more volatile and soluble than higher weight compounds, which have strong sorption properties. In aquatic environments, PAH partitioning in sediments occurs in an equilibrium process, with a potential for localized occurrences of high levels of dissolved PAHs [5,6]. PAHs can bioaccumulate in plants and animals, but do not biomagnify in food chains. Inter- and intraspecies responses to carcinogenic PAHs are variable, and some PAHs tend to inhibit the carcinogenicity of other compounds in mammals [7]. A variety of adverse effects on aquatic and terrestrial animals has been observed.

Vegetation. Plants absorb PAHs from soils through their root systems, and can translocate them to above ground parts. Lower weight PAHs are absorbed more readily than other PAHs [7]. Airborne deposition of particulate PAHs, and the subsequent adsorption to the skins of fruits and vegetables, accounts for reported higher PAH concentrations in aboveground versus underground plant parts. Soil concentrations of benzo(a)pyrene typically may reach 1,000 mg/kg; concentrations for total PAHs typically exceed benzo(a)pyrene concentrations by at least one order of magnitude. PAH concentrations in vegetation typically range from 20 to 1,000 µg/kg [6]. Some plants biocentrate PAHs in their oily parts (e.g., seeds) above levels in surrounding soils, but this does not appear to be typical [6]. In limited studies on PAHs in plants, phytotoxic effects were rare; photosynthetic inhibition in algae has been documented [7,6]. Some vascular plants catabolize benzo(a)pyrene [6], and PAHs synthesized by plants may act as growth hormones [7,8]. Plants may serve as a pathway for exposure of higher-order consumers to toxic levels of PAHs.

Aquatic Life. Most PAHs in aquatic environments tend to sorb to sediments, and sediment-associated PAHs have accounted for up to 77 percent of the steady-state body burden in benthic amphipods [7]. Absorption and assimilation of PAHs vary widely among species and according to the specific compound. Crustaceans and fish appear better able to assimilate, metabolize, and eliminate PAHs than do molluscs and polychaetes [7,8]. Fish appeared to detoxify benzo(a)pyrene as quickly as it was absorbed in water-only exposures [9]. Little potential for biomagnification through aquatic food chains exists, and bioconcentration factors range widely. A 2- to 3-day exposure BCF of 485 was reported for anthracene in fathead minnows, and a 24-hour BCF of 12 was reported for benzo(a)pyrene in bluegill [7].

Toxic effects of PAHs in fish include liver, thyroid, gonad, and skin tumors. Phenanthene has an LC50 of 370 µg/L in grass shrimp, and benz(a)anthracene has an LC_{87} of 1,000 µg/L in bluegill [7]. In the Black River, Ohio, where sediment PAH levels were 10,000 times those in a control location, brown bullheads showed elevated concentrations of lower molecular weight PAHs in their livers and a higher incidence of liver tumors [5,7,8]. Dissolved fluorene introduced into pond waters resulted in reduced growth in bluegill at 0.12 mg/L, and in increased vulnerability to predation at 1.0 mg/L [7].

There are no promulgated federal or state aquatic life water quality criteria for any of the PAHs, though the USEPA has proposed a chronic criterion of 6.3 µg/L and an acute criterion of 30 µg/L for phenanthrene in fresh waters [10,11].

Wildlife. PAH toxicity studies in animals are mostly confined to laboratory experiments. Many PAHs can produce tumors in skin and epithelia tissues in all animal species tested, with malignancies induced by microgram acute exposures. Some carcinogenic PAHs can pass across skin, lungs, intestines, and placenta in mammals. Target organs are diverse, and the tissue affected is dependent on the compound and method of exposure. For example, dietary benzo(a)pyrene caused leukemia, lung adenoma, and stomach tumors in mice. Ancillary tissue damage may accompany carcinomas [7]. Selective effects based on age and gender of the receptor have also been observed [8,12,9,13]. Mammals do not tend to accumulate PAHs, which is likely due to the rapid metabolism of these compounds. For example, the biological half-life of benzo(a)pyrene in rat blood and liver was 5 to 10 minutes [7].

There is a scarcity of data on PAHs that are not carcinogenic [14]. Many chemicals, including other PAHs, modify the carcinogenic actions of PAHs in laboratory animals. Inhibitors of PAH-induced tumors include selenium, vitamins A and E, flavones, and ascorbic acid [7]. LD50 values also range widely: acute oral LD50 values for rodents range from 50 mg/kg body weight for benzo(a)pyrene to 700 mg/kg for phenanthrene, to 2,000 mg/kg for fluoranthene. Chronic oral carcinogenicity values for rodents include 40 mg/kg for benzo(b)fluoranthene, 72 mg/kg for benzo(k)fluoranthene, and 99 mg/kg for chrysene [7].

In a study on mallards, no mortality or visible toxic effects were observed over 7 months during which birds were fed diets containing 4,000 mg/kg PAHs, though heptatic changes were observed. Sax [9] reports that single oral doses of 250 ppm benzo(a)pyrene were not acutely toxic to ducks or chickens.

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POLYCHLORINATED BIPHENYLS (PCBS)

As a class of compounds, PCBs exhibit a tendency to sorb strongly to soils and suspended solids/sediments in waters. PCB releases to the environment, then, will be expected to show very limited mobility and present only a slight danger of leaching to unprotected groundwater. There is a wide distribution of a variety of microorganisms capable of degrading PCBs, mainly through dechlorination actions. The degradation rate/action of these microorganisms is lowered, however, as the number of chlorine ion substitutions on the biphenyl parent compound increases. In addition, biodegradation rates are slowed by the tight sorptive ability of PCBs, low ambient temperatures, low moisture content, extremes in pH, and available oxygen content (with no biodegradation evidenced under anaerobic conditions). The number of chlorine ion substitutions also affects volatilization and photoionization rates; as chlorine ion substitutions increase, so do these rates.

PCBs volatilize to the atmosphere undergo two major modes of degradation: reaction with hydroxyl radicals and/or reaction with ozone. Reaction with hydroxyl radicals (resulting in substitution of OH^- for Cl^- on the biphenyl parent compounds) is the more important of these two processes. Hydrolysis and/or oxidative reactions are not considered to be important fate processes for PCBs. Bioconcentration of PCBs in aquatic organisms is expected to be an important process for all PCBs, and shows an increase as the chlorine content increases [3]. PCBs subjected to intense heat may be converted to polychlorinated dibenzofurans and dioxins (PCDFs and PCDDs). PCDDs are also formed during the combustion of organic matter and therefore are also produced in small amounts as naturally-occurring compounds. These by-products are thought to have greater acute and chronic toxic effects than PCBs. The mixture of PCBs, PCDFs, and PCDDs in commercially produced products greatly affects the potential toxicity. The position and number of chlorine atoms and the planarity (co-planar versus planar) of these compounds are the primary factor affecting the relative toxicity of the PCB congeners [4].

The physiochemical properties of PCB compounds allow them to resist environmental degradation processes. The degree of chlorination and the position of chlorine substituents of a PCB compound influences the ability of environmental processes to break down the compound. In general, the more chlorinated PCB compounds resist environmental break down reactions and thus remain in the environment for longer periods of time. Due to their physicochemical characteristics, PCBs bind tightly to soil and sediment particles and organic matter. Depending on the particular isomer of PCB, K_{oc} values range from 510 to 13,300,000. As a general rule, most K_{oc} values for PCB mixtures are greater than 5,000 [5].

The environmental persistence of PCBs combined with their lipophilic nature allow them to bioconcentrate, bioaccumulate, and biomagnify significantly in the environment. The physicochemical properties of the PCBs influence the extent of uptake and the metabolic fate of PCBs in the body. The ability of animals to metabolize

PCBs tends to increase in the following order: fish< birds< mammals [5]. PCBs are absorbed from the stomach, skin, and lungs. PCBs initially concentrate in the liver, blood, and muscle; however, they soon are sequestered into fat tissue, where they have a long half-life. PCBs that are poorly metabolized tend to become concentrated in the fatty tissue [6].

PCBs have been found in every environmental medium and have been detected in virtually every location across the globe. High body burdens of PCBs and their metabolites are found in wildlife and humans from arctic, tropical, and temperate climate zones. Dispersive and degredative forces have, in general, reduced the concentrations of tissue residues in plants and animals. However, releases of PCBs continue to occur and several locations on the planet contain areas of PCB "hot spots". Therefore, a significant decrease in worldwide levels of PCBs is unlikely in the near future [4].

General. Environmental persistence of PCBs is determined by the degree of chlorination and the spatial arrangement of the chlorine atoms (planarity). Higher chlorobiphenyls, i.e., those with five or more chlorine atoms, are more persistent in the environment than those with three or fewer chlorine atoms. Aroclor 1254 has five chlorine atoms per molecule, and Aroclor 1260 has six or more, making them among the most stable compounds in this chemical class [23].

Since 1979, the manufacture, processing, distribution, and use of PCB's has been banned in the United States [23]. However, because these chemicals are so stable, the major source of Aroclor 1254 and Aroclor 1260 release to the environment is an environmental cycling process of these compounds previously introduced into the environment. The cycle involves volatilization from water and soil into the atmosphere with subsequent removal from the atmosphere via wet or dry deposition, followed by revolatilization [5]. Although biodegradation of Aroclor 1254 and Aroclor 1260 may occur very slowly in the environment, no other degradation mechanisms have been shown to be important in natural systems. Therefore, biodegradation may be the ultimate fate process [5].

Biological effects of PCBs include enzyme induction, endocrine disruption, and porphyria. PCBs are both mixed function oxidase (MFO) stimulators and endocrine disrupters. The MFO enzymes present primarily in the liver are induced by various PCB concentrations in almost all MFO containing organisms [24]. This enzyme functions primarily in a detoxifying manner; however, the potential for toxic metabolites is of concern. Levels of MFO and other enzymes in organisms also serves as bio-indicators (biomarkers) of exposure to PCBs and other enzyme inducing contaminants [25].

As an endocrine disrupter, PCBs alter the hormonal cycle and functions in many organisms. The fecundity, reproduction, development, and growth of organisms may be adversely affected by disruption of the hormones [26]. Another biomarker of exposure to PCBs and other contaminants is porphyrins and porpyrin related enzyme analyses. The porphyrin/heme pathway in organisms is essential in the production of cytochromes and hemoproteins. Disruption of this pathway may cause adverse effects in a wide range of biological functions such as photosynthesis in plants to blood cell activity in animals [25].

In general, bioaccumulation of PCBs is rapid, depuration is slow, and diet appears to be an important route of PCB accumulation. PCB body burdens in marine organisms, especially benthic organisms, appear directly related to log PCB concentrations in sediments [27]. In terrestrial or semi-aquatic vertebrates, PCBs tend to bioaccumulate to their highest concentrations in the livers of fish-eating birds followed by species that feed on small birds and mammals, worms and insects [23]. In marine food chains, concentrations of PCBs rapidly biomagnify in higher trophic level carnivores. In these food chains, piscivores, such as gulls and pelicans, often have the highest level of PCBs in their body tissues.

PCBs are toxic to several classes of wildlife including invertebrates, fish, birds, and mammals. PCBs are highly lipophilic in biological organisms and tend to bioaccumulate and biomagnify in the food chain [23]. Their persistence in the environment and their ability to bioconcentrate and biomagnify through the food chain make PCBs a potentially significant hazard to fish, wildlife, and invertebrate resources [23].

Vegetation. In general, PCBs are not considered to be potent phytotoxins. In one study, phytoplankton exhibit depressed photosynthesis and cell motility when exposed to concentrations of PCBs [28]. Algae have been demonstrated to bioconcentrate PCBs in water at a range of 10,000 to 100,000 times. It was also demonstrated that as the degree of chlorination of PCB congeners increased, the uptake (bioconcentration) also increased in the algae [29]. In other studies, algae exposed to PCB concentrations had an increased mortality rate, decreased reproduction, and impaired growth [30].

PCBs have been shown to bioconcentrate in both terrestrial and aquatic plants. Studies summarized in Eisler [23] showed dry-weight concentrations in foliage, grasses, aspen leaves, and goldenrod leaves of up to 0.29 ppm, 0.14 ppm, 0.12 ppm, and 0.32 ppm dry weight, respectively [31]. Some of these values exceed the FDA limit of

0.2 ppm for PCBs in feeds for livestock [23]. Crop leaves (soybeans, string beans, and corn) grown on a contaminated site had PCB levels of 30 ppb to 50 ppb [7] Although in-tissue concentrations of PCBs may not be toxic to the plants, they could be important as sources of PCBs in higher trophic levels.

Terrestrial Invertebrates. Very little information was available on the toxicological effects of PCBs on terrestrial invertebrates. PCBs are known to bioconcentrate in invertebrates, and are usually detected at very low concentrations in terrestrial invertebrates such as earthworms and insects. However, as potential food sources for higher trophic level organisms, these primary consumers are often the first step in the biomagnification process. At each successive trophic level, the concentration of PCBs in each organism increases and significant impacts are often seen with top predators in the food chain [1]. As summarized in the ATSDR profile [1], the biomagnification of PCBs was demonstrated within a terrestrial food chain [32]. PCB concentrations (wet weight) ranged from 14.8-18.6 ug/kg in earthworms, 0-208.8 g/kg in mammals, 39.2-68.3 ug/kg in starlings, 71.5-157.2 ug/kg in robins, and 56-219.9 ug/kg in kestrels. PCBs were also detected in robin, kestrel, and herring gull eggs at a range of 66-5,298 ug/kg [32].

Amphibians and Reptiles. PCBs and their metabolites are known to effect the reproduction, sex determination, and development of amphibians via various enzyme changes and the disruption of the endocrine system [26]. Amphibians are often classified as environmental sentinels because of their complex, sensitive life-cycles, occurrence in terrestrial and aquatic habitats, and membrane-permeable eggs, gills, and skin. A comprehensive review of PCB levels in freshwater systems of the southeastern US suggests that chronic adverse effects from PCB exposure occurs at very low concentrations [26]. This study compared the 95th percentile of data from the USEPA STORNET water quality system to chronic concern levels of PCB exposure to amphibians. Findings indicated that levels of PCBs in the environment from the areas where samples were collected (95th percentile was approximately 0.5 ug/L for each congener), are greater than the 0.04 - 0.143 ug/L chronic concern level [26].

PCBs and their metabolites also known to affect the reproduction and sex determination of several reptile species such as the alligator. Toxicity (acute and chronic) in reptiles appears to occur at higher exposure concentrations than for amphibians. For example, snapping turtle populations in New York were abundant in heavily contaminated areas although PCB levels were detected at concentrations of up to 8,000 ppm in fat, 680 ppm in the liver, 27 ppm in muscle, and 43 ppm in eggs [33]. These concentrations are well above established toxicity thresholds in other wildlife species, including amphibians.

Fish and Aquatic Organisms. Adverse effects associated with exposure to PCBs in aquatic organisms include decreased growth, reproductive toxicity, mutagenicity, histopathology, and a variety of biochemical perturbations [23,30]. Reproductive toxicity has been reported for several aquatic species, and the effects include reduced survival of developing eggs, increased mortality in eggs and fry, and reduced fertilization success [23].

The federal water quality criteria for PCBs for the protection aquatic life is 0.014 ug/L (freshwater chronic criteria) and 0.03 ug/L (saltwater chronic criteria) [34]. In addition, tissue level criteria has also been established for PCBs in some states.

Water quality criteria are derived in part from the toxicity of contaminants to aquatic invertebrates and fish. Studies show the PCB 96-hour LC50 values (acute toxicities) for freshwater invertebrates are usually between 50 µg/L and 800 µg/L. Most 96-hour LC50 values for warm water fish are between 100 µg/L and 600 µg/L [2,5,26]. For aquatic invertebrates, a large concentration range for PCB toxicity has been demonstrated. For example, 96 hour LC50 values determined for the amphipod range from 0.052 to 10 mg/L. For oysters and clams, toxicity ranges from approximately 0.01 (96 hr EC50) to 10 mg/L (5 day LOAEL). Generally, an application factor of 0.01 is used to convert acute toxicities to criteria that provide for the chronic protection of aquatic life [35]. However, because of the extent to which PCBs bioaccumulate, more stringent criteria were considered to be appropriate [35].

A major concern to aquatic life is the bioconcentration of PCBs. Studies cited in virtually every summary article on PCBs showed concentration factors ranging from 10^3 to 10^5 in freshwater invertebrates and fish [2,5,26]. PCBs with the highest degree of chlorination (which would include Aroclor 1254 and Aroclor 1260) accumulate most readily [23]. This ability to bioaccumulate further enhances the toxicity of these compounds [23]. Diet contributes most of the total PCB body burdens of upper-level aquatic carnivores, with diet accounting for 90 percent of the total PCB body burden in brown trout and 51 to 83 percent in striped bass [36,37]. Elimination of accumulated PCBs is slow, with no elimination by codfish larvae after 12 days and 97.8 percent retention by chironomid (an invertebrate) larvae after 7 days [38,39].

Mammals. Because of their demonstrated human toxicity and ability to bioaccumulate, PCB toxicity has been studied the most extensively in mammals. In the body, PCBs are accumulated primarily in the adipose tissue, skin, and liver [26].

Studies summarized by Eisler [23] and Sample [40] show that mammalian effects vary among PCB compounds. For example, tissues from cattle that had been dosed with Aroclor 1254 and fed to mink at levels as low as 0.64 ppm fresh weight of diet caused severe reproductive effects. However, Aroclors 1016 and 1221 at dietary concentrations of 2 ppm produced no adverse reproductive effects in mink over a 9-month period, nor did Aroclor 1242 at 5 ppm during a similar period [41].

A 14 month diet study of Aroclor 1248 exposure in rhesus monkeys resulted in a reproductive LOAEL of 0.1 mg/kg/day (2.5 ppm in diet) [42]. A reproductive LOAEL for a 12 month exposure of Aroclor 1254 in oldfield mice was reported to be 0.68 mg/kg/day (5 ppm in diet) [43]. PCB exposures in mammals are associated with reproductive impairment and failure, physiological effects, altered behavior, mutagenic, carcinogenic, and teratogenic effects [30].

Aroclor 1254 has been tested in a number of species of wildlife and toxicity data for dietary intake. These studies have been summarized in Eisler (1986) [23], Sample (1996) [40], and HSDB (1999) [5] and are presented below.

Raccoon	>50 mg/kg LD50, 8 days
Cottontail rabbit	>10 mg/kg LD50, 12 weeks
Mink	4 mg/kg LD50, no time given
Mink	6.7 mg/kg LD50, 9 months
White-footed mouse	>100 mg/kg LD50, 3 weeks
Norway rat	>75 mg/kg LD50, 6 days
Mouse, PCB-resistant	> 250 mg/kg LD50, 18 weeks
Oldfield mouse	5 ppm LOAEL, 12 months
Mink	1 ppm NOAEL, 4.5 months

Aroclor 1254 apparently is more toxic to rats than Aroclor 1260. Rats fed Aroclor 1254 at the rate of 1,000 mg/kg in the diet all died in 53 days; mortality started at day 28 [44]. These and other feeding studies suggest that a total intake of about 500 to 2,000 mg of Aroclor 1254 per kg body weight is the lethal level in rats for dietary exposures of 1 to 7 weeks [44].

In mammals, the most consistent pathological changes occur in the liver. In females, however, PCBs are transferred through lactation and the placenta from adult to offspring; hence, in utero effects and fetotoxicity have been observed.

Birds. Birds exposed to PCB concentrations have shown the following effects: disruptions in normal patterns of growth, reproduction, metabolism, and behavior [23]. PCBs can damage the liver, kidney, spleen, and thyroid in birds [30]. However, reproductive impairment is the most sensitive endpoint for birds exposed to PCBs. Reproductive effects caused by PCB exposure include embryo mortality, teratogenic effects, decreased hatching success, and reduced eggshell thickness [30].

Birds are generally more resistant to acutely toxic effects of PCBs than mammals [5]. Studies summarized in Eisler (1986) [23], Sample (1996) [40], and HSDB (1999) [5] showed that mallards, ring-necked pheasants, bobwhite quail, and Japanese quail had 5-day LD50 values for ingestion of Aroclor 1254 and Aroclor 1260 ranging from 600 ppm to more than 2,000 ppm in the diet. Acute LD50 values for European starlings, red-winged blackbirds, and brown-headed cowbirds were all 1,500 mg/kg in the diet [45].

Sublethal effects can occur at much lower concentrations. For example, 20 ppm in the diet of chickens caused a significant decrease both in the hatchability of eggs and in the viability of the surviving chicks [35]. In a review by Sample (1996) [40], a NOAEL of 0.41 mg/kg day (1300-1700 g/month/pair) for Aroclor 1242 was reported for breeding screech owls [46]. For the ring-necked pheasant, a reproductive LOAEL of 1.8 mg/kg/day (12.5 mg/bird/week via oral gelatin capsule) Aroclor 1254 was measured over a 17 week period [47].

Bioaccumulation also occurs in birds. Diet is an important route of PCB accumulation, with highest liver concentrations of PCBs in birds that fed on fish, followed by species that feed on small birds and mammals then on worms and insects. Concentrations were lowest in herbivorous bird species [23]. In general, PCB accumulation is rapid and elimination is slow. For example, in common grackles, the biological half-life of Aroclor 1254 was calculated to be 89 days [45].

Prager (1989), [48] indicates that PCBs cause eggshell thinning and reduced reproductive ability. Although Eisler (1986) [23] cited several PCB-related instances of eggshell thinning and associated reproductive failure in

cormorants, peregrine falcons, bald eagles, and black-crowned night herons, he states, "At present, the evidence implicating PCBs as a major source of eggshell thinning is inconclusive."

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METALS

Antimony. Antimony, a silvery-white metal that occurs naturally in the environment, has no known essential biological functions (Wood and Wang, 1985 and Puls, 1988). Antimony is a potential carcinogen (Sax 1992). Toxicity of antimony is dependent on its valence state with the trivalent form being more toxic than the pentavalent form (Puls, 1988). Sittig (1985) reported permissible antimony concentrations to protect freshwater aquatic life on an acute basis as 9,000 μg/l, and on a chronic basis as 1,600 μg/l.

Important processes influencing the fate of antimony in the aquatic environment include chemical speciation, volatilization, and sorption to sediments. Biomethylation is also an important process that may act to remobilize antimony from sediments (Andreae et al., 1981). Acute toxicity of antimony (III) to several freshwater species (a worm, aquatic insect, crustaceans, and fish), did not occur below the limits of solubility of antimony salts. Growth of juvenile fathead minnows was reduced at a concentration of 2,310 μg/l (Kimball manuscript).

Data on the effects of antimony on aquatic plants is limited. An EC_{50} (chlorophyll a) of 610 μg/l was determined during a 4-day exposure with green algae. However, Brooke et al., (1986) reported the EC_{50} for duckweed to be greater than solubility. No effects were observed at the highest concentrations attainable 25,200 μg/l.

Antimony is one of several elements known to form methyl-metal compounds in environmental exposures which readily bioaccumulate. Barrows et al., (1980) found no antimony residues significantly greater than those of controls in a 28-day study conducted with bluegills. A BCF value of 9E-01 has been determined by USEPA (1991).

Toxicity of antimony to plants is moderate and that plants concentrate this element slightly above the concentration in the soils (Gough et al., 1979). Little is known about antimony in terrestrial wildlife. Holdgate (1971) reported livers of dead birds exposed to industrial waste contained 40 to 400 ppm of antimony. Tucker (1972) stated that the 400 ppm that was found could be considered the lethal limit.

Arsenic. Background concentrations of arsenic are generally <10 μg/l in surface water and <15 mg/kg in soil; uncontaminated soils in the United States have a mean arsenic concentration of 7.4 mg/kg soil (Eisler, 1988a). Commercial use and production of arsenic compounds, such as agricultural insecticides and herbicides, have raised local concentrations above natural background concentrations in some areas. In the United States, arsenic levels >240,000 μg/l in surface water and 2.5 x 106 mg/kg soil (DW) in arsenic-pesticide-treated soils have been reported (Eisler, 1988a). Arsenic concentrations of up to 3,500 mg/kg sediment (DW) in contaminated areas

(Eisler, 1988a), up to 30 mg/kg sediment in Lake Michigan (Eisler, 1988a), and 47 to 209 μg/g sediment in Lake Texoma (Hunter et al., 1981) have been reported.
Arsenic toxicity depends strongly on its chemical form and oxidation state. In general, inorganic arsenic compounds are more toxic than organic compounds, and trivalent forms are the most toxic (Eisler, 1988a). Biota may take up arsenic via ingestion, inhalation, or absorption through body surfaces, and cells take up arsenic via the active transport system normally used in phosphate transport (Eisler, 1988a).
Adverse effects on crops and vegetation, such as poor growth, seedling death, defoliation, and inhibition of photosynthesis, have been reported at concentrations of 1 to 25 mg water soluble arsenic/kg soil (equivalent to approximately 25 to 85 mg total arsenic/kg soil) (Eisler, 1988a). Data on effects of arsenic on soil biota and insects are limited. Tolerant soil microbiota can withstand arsenic concentrations as high as 1,600 mg/kg soil (NAS, 1977). In contrast, reduced growth and metabolism in sensitive species have been reported at arsenic concentrations of 375 mg/kg soil (NAS, 1977), and soils with arsenic levels of 150 to165 mg/kg soil lost their earthworm biota and showed reduced quantities of microfauna (Eisler, 1988a).
Mammals and birds are exposed to arsenic primarily by ingestion of contaminated vegetation and water. Arsenic is bioconcentrated by organisms but is not biomagnified in the food chain (Eisler, 1988a). In birds, arsenic poisoning produces many effects, including loss of muscular coordination, slowness, loss of righting reflex, seizures, and death. Single oral doses producing 50% fatality in sensitive species (such as the turkey) range from 17 to 33 mg/kg body weight. In mammals, arsenic toxicosis can produce trembling, extreme weakness, vomiting, and death (Eisler, 1988a). Because arsenic detoxification and excretion are rapid, poisoning is generally caused by acute or subacute exposures. Single doses reported to produce 50% fatality in sensitive mammal species ranged in concentration from 2.5 to 33.0 mg/kg body weight. Susceptible species have been adversely affected at chronic arsenic doses of 1 to 10 mg/kg body weight or 50 mg/kg diet (Eisler, 1988a).
Adverse effects on aquatic biota have been reported at concentrations of 19 to 85 μg/l (Eisler, 1988a). Fish exposed to 1 to 2 mg/l total arsenic for 2-3 days exhibited gill hemorrhages; fatty infiltration of the liver; and necroses of the heart, liver, and ovarian tissues. Developing toad embryos exhibited increased malformity or mortality following a 7-day exposure to 40 μg trivalent arsenic/L, and concentrations of 48 μg pentavalent arsenic/L significantly reduced growth in freshwater algae (USEPA, 1986). Many organisms accumulate arsenic from water, but there is little evidence of magnification through aquatic food chains (NAS, 1977; Eisler, 1988a).
The AWQC for trivalent arsenic for the protection of aquatic life are 360 and 190 μg/l for acute and chronic exposure, respectively (USEPA, 1986). Although no criteria for the protection of aquatic life have been developed for pentavalent arsenic because of insufficient data, the lowest-observed-effect levels for freshwater acute and chronic exposure are 850 and 48 μg/l.

Cadmium. Soil pH, organic matter, and hydrous oxides strongly influence cadmium adsorption and its bioavailability; in general, adsorption increases with increasing soil pH (Page et al., 1981; Xian and Shokohifard, 1989). Typical soil concentrations range from 0.5 to 1.0 μg/g, although concentrations of up to 30 μg/g have been reported for unpolluted shale-derived soils in California (Page et al., 1981). In freshwater systems, cadmium availability is strongly controlled by the adsorption and desorption process, pH, and Eh. Background cadmium concentrations in uncontaminated waters have been reported as 0.05 to 0.02 μg/l (Eisler, 1985).
Plants readily take up cadmium from the soil (Fassett, 1980; Eisler, 1985). The soil concentration of cadmium that will adversely affect plants depends strongly on the species. For example, cadmium concentrations of 4 to 640 μg/g soil reduced yield by 25% among 15 crop species (Page et al., 1981).
Birds and mammals are comparatively resistant to the biocidal properties of cadmium. For example, adult drake mallards fed up to 200 mg/kg body weight showed no ill effects; the lowest oral doses producing death in rats and guinea pigs ranged from 150 to 250 mg/kg body weight (Eisler, 1985). Sublethal effects of cadmium exposure in birds include growth retardation, anemia, and testicular damage (Eisler, 1985). Dietary concentrations of 4 to 20 mg/kg body weight resulted in altered blood chemistry, mild to severe kidney lesions, and hyperresponsiveness in ducks (Cain et al., 1983; Heinz and Haseltine, 1983). In small laboratory mammals, dietary cadmium concentrations of 1.8 mg/kg body weight depressed hematocrit and hemoglobin values; altered other blood chemistry factors; and produced teratogenic, mutagenic, and carcinogenic effects (Eisler, 1985). Among mammals, evidence suggests cadmium may bioaccumulate at higher trophic levels (Eisler, 1985; Scanlon, 1987).
In freshwater biota, ambient cadmium concentrations of >10 μg/1- are associated with high mortality, reduced growth, inhibited reproduction, and other adverse effects (Eisler, 1985); concentrations of 0.8-9.9 μg/l produced significant mortality in several species of invertebrates and fishes. Freshwater organisms bioaccumulate

cadmium to a greater extent than does terrestrial wildlife. Bioconcentration factors in freshwaters range from 164 to 4,190 for algae and invertebrates and from 3 to 7,440 for fishes (Eisler, 1985; USEPA, 1986). The AWQC for cadmium for the protection of aquatic life are 3.9 and 1.1 μg/l (at a hardness of 200) for acute and chronic exposure, respectively (USEPA, 1986).

Chromium. Chromium concentrations range from 5 to 300 mg/kg in soils and 1 to 10 μg/l in contaminated rivers and lakes (Eisler, 1986). Sheppard and Evenden (1990) reported a mean chromium concentration of 38 μg/g for soil collected from 64 sites throughout Canada, and the World Health Organization (WHO, 1988) reported an average concentration of 53 mg/kg for 863 samples collected in the United States. Chromium is most frequently encountered in the trivalent (III) or hexavalent (VI) oxidation states; the hexavalent form is more toxic because it has a higher oxidation potential and can easily penetrate biological membranes (Eisler, 1986). A variety of plants take up and accumulate chromium. Adverse effects include decreased growth and leaf necrosis (Peterson and Girling, 1981). Treatment of plants with nutrient solutions containing chromium (VI) concentrations of 5 mg/l or less resulted in decreased chlorophyll concentration, inhibition of seed germination and growth, and decreased root uptake of nutrients (WHO, 1988). The high chromium concentrations reported in many plants may represent a significant pathway of chromium transport to herbivorous biota. Adverse effects of chromium on sensitive wildlife species have been reported at concentrations of 5.1 and 10.0 mg/kg of diet for chromium (VI) and chromium (III), respectively (Eisler, 1986). Documented effects in birds include limb deformities, everted viscera, and stunting. In mammals, chromium exposure has resulted in altered blood chemistry, skin ulcerations, bronchial carcinomas, kidney and liver lesions, and teratogenic effects (Eisler, 1986).
In aquatic systems, exposure to 10 μ/L of chromium (VI) inhibited growth in algae; frond growth in common duckweed; and survival and fecundity in Daphnia (Eisler, 1986). For chromium (VI), acute toxicity values range from 23.07 μg/1- for a cladoceran to 1,870,000 μg/l for a stonefly; chronic values range from <2.5 μg/l for a daphnid to 1,987 μg/l for fathead minnows (USEPA, 1986). Acute values for chromium (VI) range from 2,221 μg/l for a mayfly to 71,060 μg/l for a caddisfly; chronic values range from 66 μg/l for Daphnia to 1,025 μg/l for fathead minnows (USEPA, 1986). For fish, chromium (VI) concentrations of 16 to 21 μg/l resulted in reduced growth; altered plasma cortisol metabolism; altered enzyme activities; chromosomal aberrations; and morphological changes in gill, stomach, and kidney tissues. The AWQC for chromium (VI) for the protection of freshwater biota are 16 and 11 μg/l for acute and chronic exposure, respectively (USEPA, 1986). The AWQC for chromium (III) is hardness dependent. At a hardness of 200, the AWQC are 3,100 and 370 μg/l for acute and chronic exposure, respectively.

Cobalt. Total cobalt soil concentrations typically range from 1 to 100 mg/kg soil (Peterson and Girling, 1981); Sheppard and Evenden (1990) reported a mean concentration of 11 μg/g for Canadian soils. Many plant species take up cobalt; the swamp black gum was reported to bioaccumulate up to 845 mg/kg plant (DW). Reported plant-soil concentration ratios range from 0.27 to 0.87 (Peterson and Girling, 1981). The effects of cobalt on plants depend on the species. For example, cobalt-accumulating plants with tissue concentrations up to 3,300 mg/kg (ash weight) showed no signs of cobalt toxicity, although cobalt-sensitive plants with leaf-tissue cobalt concentrations of only 11 mg/kg exhibited marked growth depression and chlorosis (Peterson and Girling, 1981). No information was found in the literature regarding adverse effects of cobalt on aquatic biota or terrestrial wildlife.

Copper. Copper causes lethal and sublethal effects in aquatic systems, including reduced primary productivity and decreased growth, increased mortality, inhibited spawning, and altered foraging behavior in fish (Benoit, 1975; Harrison, 1986; Sandheinrich and Atchison 1989). Copper toxicity in aquatic systems decreases with increased hardness, alkalinity, and total organic carbon (USEPA, 1986). At a hardness of 50, acute values for 41 genera of freshwater organisms ranged from 16.74 μg/l for Ptychocheilus to 10,240 μg/l for the stonefly Acroneuria. Chronic toxicity values at a hardness of 50 for 15 freshwater species ranged from 3.873 μg/l for brook trout to 60.36 μg/l for northern pike (USEPA, 1986). The AWQC for copper is hardness dependent. At a hardness of 200, the AWQC for copper for the protection of aquatic biota is 34 and 21.4 μg/l for acute and chronic exposures, respectively (USEPA, 1986).
Soil copper concentrations range from 9.3 to 159.4 μg/g soil (average 38.3 μg/g) in forests of the northeastern United States (Herrick and Friedland, 1990) and from 29.2 to 129.8 μg/g soil in an urban forest in southwestern

Ohio (Tong and Farrell, 1991). Sheppard and Evenden (1990) reported a mean soil copper concentration of 14 μg/g soil at 64 sites throughout Canada. In terrestrial systems, soil copper concentrations of <500 mg/kg induce a wide range of adverse impacts, such as reduced microbial and fungal abundance and biomass, and decreased species diversity, density, and biomass in invertebrates. Soil concentrations of 50 to 100 μg copper/g soil have been reported to be toxic to nontolerant plants (Tyler et al., 1989).

Lead. Lead concentrations have been reported as 26 μg/g of soil at 64 sites through Canada (Sheppard and Evenden, 1990), 69.4 to 180.8 μg/g of soil (average 115.3 μg/g) in montane forests of the northeastern United States (Herrick and Friedland, 1990), and 160.7 to 196.3 μg/g of soil (average 178.5 μg/g) among urban maple and maple-pine forest sites in southeastern Ohio (Tong and Farrel, 1991). In the United States, lead concentrations are generally <2 μg/l in lakes, but the average lead concentration in major rivers has been reported as 23 μg/l (Biddinger and Gloss, 1984).

Plants readily take up lead (under certain soil conditions such as low pH and low organic matter levels) via absorption in ionic solution through the roots. Lead can also enter plants across vegetative surfaces following aerosol deposition; little translocation occurs after uptake (Koeppe 1981; Eisler, 1988b; Xian and Shokohifard, 1989). Elevated lead levels generally cause negligible damage to plants, depending on species. Very high concentrations (several hundred milligrams per kilogram or more), however, have inhibited growth and reduced photosynthesis, water absorption, and mitosis (Demayo et al., 1982). Elevated levels of particulate lead may occur on plant surfaces as a result of aerosol deposition. This topical lead coating typically does not affect the plant but may represent a significant route of lead entry into higher trophic levels via food chain transfer to herbivores (Koeppe 1981; Eisler, 1988b).

Soil invertebrate communities exposed to soil lead levels as low as 34 mg/kg soil exhibited a significant decrease in species diversity, while exposure to lead soil levels of 34 to 4,800 mg/kg soil significantly altered biomass, density, species number, and vertical distributions in individual soil groups, such as earthworms, ants, and spiders (Tyler et al., 1989). Terrestrial invertebrates take up and accumulate lead, and some taxa (e.g., woodlice and spiders) have been proposed for use as environmental monitors of lead concentrations in soil and litter. Elevated levels of lead (up to 270 mg/kg body [DW]) have been reported in amphibians and reptiles collected near lead mines and smelters. Lead in tadpoles may contribute to the lead levels observed in wildlife that prey on tadpoles (Eisler, 1988b). Lead poisoning in frogs may result in sloughing of the integument; sluggishness; decreases in red and white blood cells, neutrophils, and monocytes; and death. Death has been reported in frogs at lead concentrations of 25 mg/l and in salamanders at 1.4 mg/l (Eisler, 1988b).

Lead concentrations in birds tend to be highest in specimens collected from urban areas and near lead mining and smelting facilities (Eisler, 1988b). Lead poisoning in birds has been extensively documented. Its effects include loss of appetite; impaired locomotion, balance, and depth perception; microscopic lesions in brain, kidney, muscle, and bone tissues; and altered blood composition and chemistry and immune system (Eisler, 1988b). Birds of prey may be exposed to lead by feeding on dead or dying game animals that contain lead shot or by consuming prey (such as waterfowl and small mammals) that contain high levels of biologically incorporated lead (Eisler, 1988b). Ingestion of lead-contaminated prey may represent a significant source of mortality in golden and bald eagles (Frenzel and Anthony, 1989; Craig, 1990).

The highest body burdens of lead in mammals have been reported for specimens collected from urban areas and near lead mining and smelting facilities (Eisler, 1988b). The lead exposure route for mammals is via diet; species high on the food chain are apparently more susceptible to lead contamination (Scanlon, 1987; Eisler, 1988b). Reported effects of lead poisoning in mammals include altered structure and function in kidneys, bone, and the hematopoietic and central nervous systems, as well as biochemical, histopathological, teratogenic, and reproductive effects. The effects are species specific; younger developmental stages are the most sensitive; and organolead compounds are more toxic than inorganic ones (Eisler, 1988b). Little is known about the toxic and sublethal effects of lead on mammalian wildlife. In laboratory and domestic mammals, adverse effects have been observed with lead doses ranging from 0.05 mg lead/kg body weight (mice) to 5 mg lead/kg body weight (rats and dogs) (Eisler, 1988b).

Lead is toxic to all phyla of aquatic organisms. Its effects are determined by species and physical and chemical factors. Dissolved waterborne lead is more toxic than total lead; organic lead forms are more toxic than inorganic ones; toxicity decreases with increasing hardness; and toxic effects generally increase under conditions of rapid growth (USEPA, 1986; Eisler, 1988b). Although lead is concentrated by aquatic biota, little evidence of biomagnification exists (Demayo et al., 1982; Eisler, 1988b). In fishes, toxic and sublethal effects of lead include increased mucus production, which interferes with the respiratory and ion-exchange functions of gills;

spinal curvature; anemia; destruction of spinal neurons; reduced swimming ability; growth inhibition; altered blood chemistry; and death (Holcombe et al., 1976; Demayo et al., 1982; Eisler, 1988b).
Reduced survival, impaired reproduction, and reduced growth have been reported in aquatic organisms at lead concentrations of 1.0 to 5.1 μg/l (Eisler, 1988b); lead concentrations of >10 μg/l are expected to cause increasingly severe long-term effects on aquatic biota (Demayo et al., 1982). At a hardness level of 200, the AWQC for lead for the protection of freshwater life is 200 and 7.7 μg/l for acute and chronic exposure, respectively (USEPA, 1986).

Mercury. Mercury and its compounds have no known normal biological function, and the presence of mercury in living cells is undesirable and potentially hazardous (NAS, 1978). Mercury exists in three oxidation states: elemental mercury, mercurous ion (Hg_2^{+2}) , and mercuric ion (Hg^{+2}). All mercury compounds interfere with thiol metabolism. Chemical speciation is probably the most important factor affecting the ecotoxicology of mercury (Boudou and Ribeyre, 1983).
In general, organic forms of mercury are more readily absorbed than inorganic forms. Organic mercury compounds are also more soluble in organic solvents and lipids, pass more readily through biological membranes, and are slower to be excreted (Eisler, 1987a). In aquatic systems, low toxicity forms of mercury may become methylated by biological or chemical processes. Methylmercury is the most hazardous mercury species owing to its high stability, high lipid solubility, and high ability to penetrate biological membranes (Eisler, 1987a; Hobson, 1988).
Total mercury concentrations range from about 0.001 to 0.05 μg/l in uncontaminated natural waters and are typically <1.0 mg/kg in uncontaminated sediments (Eisler, 1987b). In aquatic systems, sediments act as mercury sinks, while methylation tends to release mercury from sediments into the ecosystem (Hobson, 1988). Mercury levels are usually <1 mg/kg (fresh weight) in biota from uncontaminated areas and > 1 mg/kg in biota from areas that have received mercury from anthropogenic sources. Mercury can bioconcentrate in biota and biomagnify through food chains (Eisler, 1987b).
Early developmental stages are most sensitive to the effects of mercury, and organomercury compounds are more toxic than inorganic forms. In addition to its lethal effects, mercury is a mutagen, teratogen, and carcinogen. Lethal concentrations of total mercury range from 0.1 to 200 μg/l in aquatic biota; 2.2 to 31 mg/kg body weight (acute oral dose) and 4.0 to 40 mg/kg (dietary) for birds; and 0. 1 to 0.5 mg/kg body weight (daily dose) and 1.0 to 5.0 mg/kg (dietary) for mammals (Eisler, 1987b). Sublethal effects of mercury have been observed at concentrations of 0.03 to 0.1 μg/l for aquatic species, 604 μg/kg body weight (daily dose) and 50 to 500 μg/kg (dietary) for birds, and 250 μg/kg body weight (daily dose) and 1,100 μg/kg (dietary) for mammals (Eisler, 1987b).
No information was found regarding the effects of mercury on terrestrial vegetation. Mercury poisoning in fish can result in increased respiratory movements, loss of equilibrium, emaciation, brain lesions, inability to capture food, abnormal motor coordination, and death. Sublethal effects can include inhibited reproduction; reduced growth; and altered behavior, metabolism, blood chemistry, and osmoregulation (Eisler, 1987b). The AWQC for mercury for the protection of freshwater biota is 2.4 and 0.012 μg/l for acute and chronic exposure, respectively. However, the AWQC of 2.4 μg/l for acute exposure is above the mercury concentration of 0.03 to 0.1 μg/l reported to produce sublethal effects and also above the lower limit (0.1 μg/l) reported to be fatal to sensitive aquatic biota. On the basis of these data, the U.S. Fish and Wildlife Service considers the acute mercury AWQC to provide no significant protection for freshwater aquatic biota (Eisler, 1987b).
Mercury poisoning produces muscular incoordination, falling, slowness, and death in birds. Sublethal effects in birds include decreased growth, developmental abnormalities, inhibited reproduction, altered blood chemistry and composition, altered metabolism, and behavioral modifications (Eisler, 1987b). Mercury bioaccumulation and biomagnification has been observed in birds, and young are more sensitive than older individuals. In mammals, methylmercury affects the central nervous system and the kidneys. Toxic effects include convulsions, widespread brain damage, kidney damage, and increased stillbirths. Sublethal effects include reduced fertility, increased anomalous fetuses, behavioral changes, visual disturbances, tremors, and motor incoordination (Eisler, 1987b).

Nickel. Nickel concentrations in soils range from 5 to 500 mg/kg, with an average of about 100 mg/kg (Hutchinson, 1981). Reported nickel concentrations in surface waters from the major U.S. river and lake basins range from 3 μg/l in the western gulf to 56 μg/l in Lake Erie (Snodgrass, 1980).

Nickel concentrations in plants grown in uncontaminated soils are typically <10 mg/kg. The bioavailability and uptake of nickel by plants depend on the soil type and plant species (Hutchinson 1981). Plants collected near nickel smelters had nickel concentrations ranging from 2 to 40 mg/kg DW (Hutchinson 1981), while concentrations ranged from 0.2 to 4.5 μg/g for nearly 2,000 specimens of field crops and natural vegetation in the United States (Brooks 1980). The effects of nickel toxicity in plants include induced iron-deficiency chlorosis, foliar necrosis, stunted root and shoot growth, deformation, leaf and stem spotting, abnormal starch accumulation, and accumulation of apolar soluble phenolics (Hutchinson 1981).

Nickel accumulation has been reported for only a few wildlife species. Nickel concentrations were <3.67 μg/g (wet weight) in liver, heart, and kidney tissues collected from white-tailed deer, gray and red squirrels, and cottontail rabbit (Jenkins, 1980). Scanlon (1989) measured heavy metal concentrations in several species of small mammals living in roadside environments and reported average body burdens of nickel ranging from 0.23 μg/g (DW) in the house mouse to 4.19 μg/g in the masked shrew. Scanlon (1989) suggested that small mammals at higher trophic levels are more vulnerable to heavy metal contamination. Reported nickel levels in kidney tissues collected from the ruffed grouse and the American robin were 4.96 and 1.66 μg/g (wet weight), respectively (Jenkins, 1980).

No information was found regarding nickel toxicity in wildlife. In laboratory animals, reported effects of nickel include inhibition of enzyme systems, elevated ATPase levels, inhibition of RNA synthesis, significant increases in serum glucose, loss of ATPase activity in brain capillaries, interference with spermatogenesis, reduced litter size, and enhanced neonatal mortality (Mushak, 1980). Oral intake of nickel is associated with the lowest level of toxicological response; dogs and cats that received daily oral doses of 12 mg/kg for more than 6 months exhibited no adverse effects (Mushak, 1980).

In freshwater systems, nickel toxicity decreases with increasing hardness (USEPA, 1986). Nickel results in a variety of adverse effects in freshwater biota. Adverse effects on algae exposed to nickel concentrations of 1.0 to 45 mg/l included reduced growth, inhibition of flagellar movement, decreased capacity for phototaxis and geotaxis, and changes in community structure and species diversity (Spencer, 1980). In aquatic invertebrates, nickel adversely affected locomotion, reproduction, development, and growth. In fish, exposure to nickel reduced fecundity and egg hatchability, increased embryo and larvae mortality, and increased incidence of abnormal larvae (Birge and Black, 1980).

Acute toxicity values for 21 freshwater species ranged from 1,101 μg/l for a cladoceran to 43,240 μg/l for fish. Chronic toxicity values for two invertebrates and two fish in freshwaters ranged from 14.77 μg/l for Daphnia magna in soft water to 526.7 μg/l for the fathead minnow in hard water (USEPA, 1986). Reported bioconcentration factors range from 0.8 for fish to 193 for a cladoceran. The AWQC for nickel for the protection of freshwater biota is 2,500 and 280 μg/l (hardness of 200) for acute and chronic exposure, respectively (USEPA, 1986).

Silver. Silver is one of the most toxic of the heavy metals, but because it is easily reduced and has a low solubility, it is not readily available to iota (Peterson and Girling, 1981; Biddinger and Gloss, 1984). The toxic actions of silver include enzyme inhibition, complexation with nitrogenous bases in DNA, inhibition of DNA synthesis and transcription, reduced yields in plants, and reduced germination of fungal spores. A tissue concentration of 180 mg/kg (DW) reduced root growth in maize and barley seedlings; significant reductions in shoot growth were evident at tissue concentrations >60 mg/kg (DW) (Peterson and Girling, 1980).

No data were found regarding the effects of silver on wildlife. In aquatic systems, silver can bioaccumulate, but there is no evidence of biomagnification (Biddinger and Gloss, 1984).

Thallium. Thallium is a trace metal widely distributed in the earth's crust. It exists in two chemical states, thallous and thallic. The thallous state is the more common and stable form (ATSDR, 1991a).

The lowest oral doses of thallium compounds showing lethality ranged from 12 (guinea pig) to 29 (rat) mg thallium acetate/kg and 5 (guinea pig) to 30 (dog) mg thallic oxide/kg (Downs et al., 1960). Subchronic exposure has caused reproductive effects. Abnormalities in testicular morphology, function, or biochemistry were evident in rats that received an average daily intake of 0.7 mg/kg/day as thallium sulfate during a 60-day-treatment period (Formigli *et al.,* 1986). Hair loss was observed in rats exposed to 1.2 mg/kg/day as thallium acetate for 15 weeks (Downs et al., 1960).

The thallium content of plants seems to be a function of the thallium concentration in soils. Increased thallium levels in plant tissues are highly toxic to both plants and animals. The concentration of 5 ppm thallium in the

soil solution decreased by 50% the length of roots of collards and wheat, with no visual symptoms of thallium toxicity (Kabata-Pendias and Pendias, 1992).

Tin. Metallic tin causes nonspecific smooth surface carcinogenesis in experimental animals where small tin disks are implanted subcutaneously or intramuscularly (Venugopal T.D. Luckey, 1978).
Results of animal experiments indicate that ingestion of considerable quantities of powdered tin may cause vomiting but not permanent injury. (International Labour Office, 1983).

Zinc. Soil levels of zinc typically range from 10 to 300 mg/kg (Collins, 1981); Sheppard and Evenden (1990) reported an average zinc concentration of 80 μg/g for 64 Canadian sites, and Herrick and Friedland (1990) reported zinc concentrations of 56.5 to 207.4 μg/g in montane forest soils of the northeastern United States.
In plants, zinc is actively taken up by the roots and can be translocated throughout the plant (Collins, 1981). Zinc concentrations of 18 mg/l in soil moisture (as measured in lysimeter solutions) resulted in appreciable damage to coniferous forest understory plants. Nutrient concentrations of 0.02 to 0.1 mg/l caused cytological changes, reduced root elongation, and decreased growth in some plants (Tyler et al., 1989). The symptoms of zinc toxicity include retardation of growth and chlorosis of older leaves; zinc may also inhibit CO_2 fixation, inhibit photosynthesis and respiration, disrupt electron transport, and restrict phloem translocation (Collins, 1981).
Zinc concentration of >170 mg/kg in soils reduced density, biomass, species diversity, and vertical distributions of soil invertebrates (Tyler et al., 1989). Zinc concentrations in small mammals living in roadside environments ranged from 50.94 to 146.18 μg/g, with higher levels found in species at higher trophic levels (Scanlon, 1987).
In aquatic systems, zinc damages gill surfaces in fishes and invertebrates, affecting ion regulation and gas exchange (de March, 1988). Zinc is bioaccumulated but does not appear to biomagnify in aquatic food chains (Biddinger and Gloss 1984). Acute toxicity in freshwater varies with hardness. At a hardness of 50, acute sensitivities for eight species ranged from 50.7 μg/l for Ceriodaphnia reticulate to 88,960 μg/l for a damselfly (USEPA, 1986). For invertebrates, chronictoxicity values were 46.73 μg/l for Daphnia magna and >5,243 μg/l for a caddisfly. Among seven fish species, chronic toxicity values ranged from 36.41 μg/l for the flagfish to 854.7 μg/l for the brook trout (USEPA, 1986). Freshwater plants are more sensitive than are animals; a zinc concentration of 30 μg/l inhibited growth of the alga Selenastrum capriocomutum (USEPA, 1986). In freshwater, zinc bioaccumulates in animal tissues 51 to 1,130 times the ambient water concentration. The AWQC for zinc for the protection of aquatic life is 210 and 190 μg/l for acute and chronic exposure, respectively (USEPA, 1986).

PESTICIDES

Aldrin/Dieldrin

Aldrin is no longer produced or used in the United States. Since it is readly converted to dieldrin in the environment, there should be relatively little left. Aldrin is considered to be moderately persistent. Biodegradation of aldrin should be slow and it should not leach to groundwaters. Photooxidation in water is significant. Reaction with hydroxyl radicals in air should be rapid.
Dieldrin is an extremely persistent compound. Releases of dieldrin to soils may persist for periods exceeding 7 years. The low water solubility and high K_{OC} values make leaching into groundwaters unlikely even over long periods of time at elevated temperatures. Soil runoff may carry particle-adsorbed dieldrin to the water system. Dieldrin in water systems will not undergo hydrolysis or appreciable biodegradation; photoarrangement to photodieldrin is a possibility. Adsorption to sediments/suspended solids in waters, and moderate to significant bioconcentration in aquatic organisms are predicted to be important transport/fate mechanisms. At low water flow conditions, the main "sink" for dieldrin in water systems will be the sediment (via desorption and pore water diffusion through sediments). Evaporation from waters may be an important process. Volatilization from soils, slight in any case, will increase as the moisture content of the soils increases. Dieldrin in the atmosphere is probably associated with particulate matter, given the low vapor pressure and high K_{OC} values of dieldrin, and may be transported over long distances. Vapor-phase dieldrin in the atmosphere may undergo photodegradation to photodieldrin although it is not expected to be an important process [2].
General. Both aldrin and dieldrin were developed and widely used as insecticides. As would be expected from this class of compounds, both chemicals have a high environmental toxicity for invertebrates and are also quite

toxic to fish, birds, and mammals. They also shows strong tendencies for bioaccumulation, with bioconcentration factors on the order of 10^5 in fish tissue, ostracods, and snails; 10^3 in algae, freshwater vascular plants (*Elodea*), and clams; and 10^2 for crabs [6]. As a result, the use and manufacture of these chemicals has been prohibited in the United States since the 1970's.

Vegetation. In soils, aldrin is volatilized or slowly transformed to dieldrin. In studies reviewed by Micromedex, Inc. [7], the half-life of aldrin in soils was reported in one source to be from 20 to 100 days, while another source reported a 2- to 3-month half-life for the first half year, and 9 months to 13 months for the following 3 years. Although aldrin has some affinity for soil particles, it is not strongly adsorbed like many other organochlorines. It therefore is more bioavailable to plants than are many other members of this chemical group.

Sax [8] states that aldrin has no phytotoxicity to irrigable plants when it is used in the proper formulation. This appears to be demonstrated by studies that involved the application of a 5-percent solution of aldrin to *Viburnum lantana* (a woody shrub) with resulting injury to only 15 percent of the test species [9]. Corn seed soaked in aldrin at a rate of 2 ounces per bushel had a 40 percent decrease in germination [10].

Data summarized by Micromedex, Inc. [7] indicate that dieldrin in the environment is very persistent, having a half-life in soils of 7 years. Biodegradation and hydrolysis are unimportant processes, and losses occur only through slow photodegradation at the soil surface or the volatilization of small amounts from soil.

No data on the phytotoxicity of dieldrin were found. However, its widespread application to corn and other crops for many years without reports of decreased crop germination, growth, or yields indicates a low level of phytotoxicity. Dieldrin is strongly adsorbed to soils, and is immobile even with high temperatures and prolonged leaching [7]. As a result, this compound is not readily bioavailable for plant uptake.

Aquatic Life. The federal aquatic life criterion for dieldrin for the chronic protection of freshwater aquatic life is 0.0019 µg/L. The corresponding State of Ohio criterion for dieldrin is 0.005 µg/L. There is neither a federal nor a state standard for aldrin in freshwater aquatic systems.

Aldrin and dieldrin are highly toxic to aquatic invertebrates and fish. For example, studies cited in the USEPA "Red Book" [6] show 96-hour LC_{50}s (acute toxicities) of dieldrin for invertebrates of 0.2 µg/L to 0.3 µg/L. Micromedex, Inc. [7] shows 96-hour LC_{50}s of dieldrin for invertebrates ranging from 0.9 to 6,700 µg/L and most 96-hour LC_{50}s of aldrin for invertebrates between 1.3 µg/L and 50 µg/L. Dieldrin is acutely toxic to frog and toad tadpoles at 100 to 150 µg/L [7]. Acute toxicities to common freshwater fish species such as bluegill, trout, largemouth bass, and catfish typically range from 1 to 20 µg/l [6,7]. Generally, an application factor of 0.01 is used to convert acute toxicities to criteria that provide for the chronic protection of aquatic life [6].

A major concern for aquatic life is the bioconcentration of dieldrin. (Aldrin has a negligible bioconcentrating effect because it is rapidly converted to dieldrin by aquatic organisms [6] Studies cited in the Red Book showed bioconcentration factors on the order of 10^5 in fish tissue, ostracods, and snails; 10^3 in algae, freshwater vascular plants (*Elodea*), and clams; and 10^2 for crabs [11].

Wildlife. Toxicity of aldrin and dieldrin to non-human mammals is indicated by the human toxicity information presented earlier, which was based on studies of rodents and dogs. The lethal dose of dieldrin by ingestion for mule deer was 75 mg/kg to 100 mg/kg [7]. Adverse effects on deer occurred with long-term feeding at 2 ppm dieldrin [6]. In the mammalian body, dieldrin accumulates chiefly in the adipose tissue where some bioconcentration occurs [8]. For example, in cattle and swine, the adipose tissue concentrations of dieldrin after 28 days were approximately twice the concentrations in the animals' feed [8].

Birds are also susceptible to aldrin and dieldrin poisoning. Studies summarized in Micromedex, Inc. [7] showed that ring-necked pheasant, bobwhite quail, Japanese quail, grey partridge, and house sparrows had 5-day LC_{50}s for ingestion of dieldrin ranging from 10 to 80 mg/kg. Waterfowl appeared to be more tolerant of this compound, with 5-day LC_{50}s of 100 to 380 mg/kg. Aldrin was toxic to bird species at concentrations ranging from 6 to 520 mg/kg. In long-term feeding studies, 1 ppm of dieldrin affected reproduction in Hungarian partridge, and slight eggshell thinning was noted in mallards fed 3 ppm dieldrin.

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BHC (Lindane)

BHC is a man-made chemical which exists in eight different isomers. Three of these isomers, alpha-, delta-, and gamma-BHC are addressed in this profile. Technical-grade BHC is a mixture consisting of (by weight) 18-22% alpha-, 40-45% gamma-, and 20-22% delta-BHC.

CHEMICAL IDENTITY

Isomer	CAS No.	Common Synonyms
alpha-Hexachlorocyclohexane	319-84-6	alpha-HCH, alpha-lindane, alpha-benzenehexachloride, alpha-BHC.
beta-Hexachlorocyclohexane	319-85-7	beta-HCH, beta-lindane, beta benzenehexachloride, beta-BHC.
delta-Hexachlorocyclohexane	319-86-8	delta-HCH, delta-lindane, delta-benzenehexachloride, delta-BHC.
epsilon-Hexachlorocyclohexane	6108-10-7	epsilon-HCH, epsilon-lindane, epsilon-benzenehexachloride, epsilon-BHC.
gamma-Hexachlorocyclohexane	58-89-9	gamma-HCH, lindane, gamma-benzenehexachloride, gamma-BHC.
technical Hexachlorocyclohexane	608-73-1	technical HCH, technical BHC

Lindane (gamma-BHC) in soil is not expected to bind tightly to organic matter. Given a moderate K_{oc} value and a slight solubility in water, lindane is expected to leach slowly to unprotected groundwaters. Lindane can be expected to volatilize from moistened soils. This compound has been shown to support the growth of microorganisms, so biodegradation does occur. Anaerobic biodegradation is expected to proceed much more rapidly than aerobic biodegradation. Metabolites of lindane biodegradation include: chloride ion, 1,2,4-trichlorobenzene, 1,2,3,5- and/or 1,2,4,5-tetrachlorobenzene, 1,2,3,4-tetrachlorobenzene, gamma-2,3,4,5,6-pentachloro-1-cyclohexene, alpha-, beta-, and/or gamma-3,4,5,6-tetrachloro-1-cyclohexane, and pentachlorobenzene. These compounds may undergo further metabolism with the ultimate release of chlorine-free (or nearly chlorine-free) compounds and chloride ion.

Lindane released to water may partition from the water by adsorbing to sediments and suspended solids. Lindane may be expected to bioconcentrate in aquatic organisms in degrees ranging from slight (BCF approximately 63) to significant (BCF approximately 1,622). Lindane will volatilize from waters, but the degree of volatilization is greatly dependent upon the depth of the water (i.e., much slower volatilization at greater depths). Biodegradation, hydrolysis, and photolysis are all loss mechanisms for lindane in aqueous environments. In addition, since products of lindane hydrolysis are more susceptible to photolysis, it is expected that lindane in the aqueous environment will undergo a series of reactions.

Lindane released to the atmosphere is expected to exist almost exclusively in the vapor phase, given lindane's vapor pressure. Lindane in the vapor phase will undergo reactions with hydroxyl radicals. This compound can also be expected to undergo gravitational settling and/or atmospheric washout via rainfall [1].

General. BHC has been widely used as an insecticide for many years. Although it is a member of the organochlorine class of compounds, it has a somewhat lower environmental toxicity to invertebrates, fish, birds, and mammals than many other compounds in this class. It also shows lower tendencies for bioaccumulation, with biocencentration factors on the order of 10^2 to 10^3 in aquatic invertebrates and fish.

Vegetation. Lindane is used as an insecticide on seeds, vegetables and fruit, woody or ornamentals, and hardwood forests [6]. No data were found indicating adverse effects of lindane or other BHC isomers or plants. Factors indicating that BHC isomers have low phytotoxicity include the low toxicities of most other organochlorines to plants and the use of BHC as a seed treatment, which exposes highly susceptible sprouts and seedlings to high concentrations of this chemical without reported adverse affects.

Aquatic Life. There is neither a federal nor a state of Ohio criterion for BHC for the chronic protection of freshwater aquatic life. The USEPA has identified a lowest observed effect level (LOEL) of 100 µg/L, but states that there is insufficient data to develop criteria [7].

The "Red Book" [8] recommends a criterion of 0.01 µg/L for freshwater aquatic life. Other studies show 96-hour LC_{50}s (acute toxicities) for invertebrates of 3 µg/L to more than 100 µg/L and 96-hour LC_{50}s for fish usually between 25 µg/L and 90 µg/L [6,9]. The USEPA [8] reports that increased resistance to lindane toxicity has been documented among fish and invertebrates experiencing previous exposure to the chemical. Generally, an application factor of 0.01 is used to convert acute toxicities to criteria that provide for the chronic protection of aquatic life [8].

Bioconcentration is of lower concern for BHC than for most other organochlorines. Bioconcentration factors in aquatic invertebrates and fish are in the range of 10^2 to 10^3 [6,8,10]. Storage in body fat is directly proportional to concentration in feed [11]. However, lindane is eliminated in less than 2 days when fish are transferred to clean water [10].

Wildlife. Toxicity of BHC to non-human mammals is indicated by the human toxicity information presented earlier, which was based on studies of rodents. The USEPA [8] identified the dog as the most sensitive mammal tested and reported that the highest concentration of lindane to have no long-term effects on this species was 15 mg/kg in the diet. In the body, lindane accumulates chiefly in the adipose tissue, reaching equilibrium in 1 to 3 weeks, depending on dietary levels [11]. However, BHC is metabolized in the body and residues disappear within three weeks after dosing ceases [11].

Birds are also susceptible to BHC poisoning. Studies summarized in Micromedex, Inc. [6] showed that mallards, ring-necked pheasant, bobwhite quail, and Japanese quail had 5-day LD_{50}s for ingestion of lindane ranging from 425 ppm to more than 2,000 ppm. Bioaccumulation also occurs in birds, with a study cited in Extoxnet [11] showing birds of pray contained up to 89 ppm in adipose tissue. However, based on the ability of animal groups to excrete lindane, it is anticipated that birds also would be able to eliminate body burdens of this chemical after intake was eliminated.

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Chlordane

Chlordane may persist for long periods of time if released to soil. Given the high K_{OC} value, chlordane is expected to be generally immobile or only slightly mobile in soil; however, movement into groundwater may occur. Chlordane may volatilize from surface soils on which it has been sprayed, particularly if the soil is moist. Incorporation into shallow soils, however, will greatly reduce volatilization. If released to water, chlordane is not expected to undergo significant hydrolysis, oxidation or photolysis. Adsorption to sediment will inhibit volatilization. Chlordane is biotransformed very slowly and has a high potential to bioconcentrate (BCF for fish: 8,320-11,500). In the air, chlordane will be predominantly in the vapor phase. Long range transport of chlordane through the atmosphere is known to occur [1].

General. Chlordane was widely used as an insecticide until 1975, when the USEPA severely limited its use in the United States [7]. As would be expected from this class of compounds, it has a high environmental toxicity to invertebrates and is also quite toxic to fish, birds, and mammals. It also shows strong tendencies for

bioaccumulation, with bioconcentration factors on the order of 10^3 to 10^5 for both plants and animals. Its persistence in the environment, its ability to bioconcentrate in almost all classes of biota, and its ability to biomagnify through the food chain make chlordane a greater ecological risk than most other organochlorines.

Vegetation. Sax [8] summarized several articles that studied the effects of chlordane on plants. According to this source, Probst and Everly [9] found no effect to mature soybeans or to harvest yield from the application of chlordane at a rate of 2.1 pounds per acre (which translates to a concentration in near-surface soils of approximately 1 ppm). Juska [10] found decreased germination of *Poa annua* (annual bluegrass) seeds in soils treated with chlordane at a rate of 260 pounds per acre (about 130 ppm in near-surface soils) and in *Poa pratensis* (Kentucky bluegrass) seeds in soils with chlordane applications of 87 pounds per acre (about 40 ppm in near-surface soils). Sources reviewed by Eisler [11] found that low (0.1 to 100 µg/L) concentrations of chlordane stimulated the growth of simple freshwater plants like blue-green and green algae, but that growth was inhibited by higher concentrations [12,13]. These data indicate that chlordane has relatively low toxicities to plants compared to its effects on animals.

Chlordane has been shown to bioconcentrate in both terrestrial and aquatic plants. Studies summarized in Eisler [11] showed dry-weight concentrations in corn stalks and kernels of 1,260 µg/kg and 480 µg/kg, respectively. Dry-weight concentrations in sorghum were 420 µg/kg. Bioconcentration factors of 10^4 were reported in green algae [14]. Although in-tissue concentrations of chlordane may not be toxic to the plants, they could be important as sources of chlordane in higher trophic levels.

Aquatic Life. The federal aquatic life criterion for chlordane for the chronic protection of freshwater aquatic life is 0.0043 µg/L [15]. The corresponding criterion from Ohio for chlordane is 0.0048 µg/L [16].

These standards derive from the high toxicity of chlordane to aquatic invertebrates and fish. For example, studies show that 96-hour LC_{50}s (acute toxicities) for invertebrates are usually between 4 µg/L and 40 µg/L [7,14,17]. Most 96-hour LC_{50}s for fish are in a similar range, falling between 10 µg/L and 60 µg/L [7,14,17]. Eisler [11] reports that water concentrations between 0.2 µg/L and 3 µg/L were harmful (chronic toxicity) to various species of fish and aquatic invertebrates. Generally, an application factor of 0.01 is used to convert acute toxicities to criteria that provide for the chronic protection of aquatic life [7].

A major concern to aquatic life is the bioconcentration of chlordane. Studies show bioconcentration factors for invertebrates and fish generally ranging from 10^3 to 10^5 [7,18,8,14]. The USEPA [18] cites data showing half lives for the elimination of chlordane in invertebrates and fish in the range of 2 to 3 days. However, most other sources indicate biological half lives in aquatic life of 4.4 weeks to 20 weeks [11,14,17]. One study reported in Eisler [11] estimated that 99 percent of alpha-chlordane remained in goldfish tissues after 25 days. Generally, alpha-chlordane persisted longer in tissue than did gamma-chlordane [11,17]. Bioaccumulation of chlordane is important both because the chemical can build up to toxic concentrations in the animal's tissues and because it serves as a source of toxic levels of chlordane to higher trophic levels.

Although the use of chlordane has been highly restricted since 1975, substantial concentrations of chlordane were detected in fish samples collected a decade later. Data presented in Eisler [11] show that numerous samples of whole fish, fish muscle, or fish eggs collected in the United States in the mid-1980's had chlordane concentrations in excess of 1,000 µg/kg wet weight, and some values were greater than 5,000 µg/kg wet weight. These values exceeded both the guideline for protection of predatory fish of 0.1 mg/kg fresh weight and the Food and Drug Administration's action level of 0.3 mg chlordane per kg of fresh weight for protection of human health [11].

Wildlife. Toxicity of chlordane to non-human mammals is indicated by the human toxicity information presented earlier, which was based on studies of rodents and rabbits. In warm-blooded animals, chlordane is transformed to oxychlordane and/or heptachlor epoxide, both of which are more toxic and persistent than chlordane [11]. (See the discussion on heptachlor epoxide in the heptachlor profile). Chlordane and its metabolites accumulate chiefly in the adipose tissue but are also found in the liver, kidney, brain, and muscle [11,14]. The half-life of chlordane in the mammalian body is reported as ranging from 1 day to 88 days [11,14]. The half-life for oxychlordane in mammals is about 92 days [11].

Birds are also susceptible to chlordane poisoning. Studies summarized in Micromedex Inc. [14] showed that mallards, ring-necked pheasants, bobwhite quail, and Japanese quail had 5-day LD_{50}'s for ingestion of chlordane ranging from 330 ppm to 850 ppm. However, Eisler [11] reports that sensitive bird species had reduced survival on diets containing chlordane at 1.5 mg/kg.

Some chlordane isomers persist in avian tissues for lengthy periods. For example, the biological half-lives of alpha-chlordane, cis-nonachlor (a chlordane metabolite) and oxychlordane in northern gannets were estimated to

be 11.2, 19.4, and 35.4 years, respectively [11]. As recently as 1986, maximum brain tissue concentrations of these compounds in many species of debilitated birds collected in New York were above 2,000 µg/kg fresh weight, with some values above 8,000 µg/kg. Affected species included hawks, herons, jays, owls, robins, grackles, bluebirds, and starlings [11]. Lethal exposures of birds to chlordane in the environment occurred at least a decade after the use of this chemical was restricted, with chlordane implicated as the principal toxicant in 30 pesticide poisonings of hawks, owls, herons, and other birds in New York between 1982 and 1986 [11]. Secondary poisonings of raptors after consumption of prey that had accumulated large quantities of chlordane also have been documented [11].

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4,4'-DDE

Like 4,4'-DDD and 4,4'-DDT, 4,4'-DDE is a highly stable compound. Generally, it is resistant to photodegradation and/or oxidation [1]. Given the high K_{OC} value, 4,4'-DDE is expected to adsorb tightly to soils and sediments/suspended solids in waters. In addition to the high K_{OC} value, the low level of solubility suggests little probability of groundwater infiltration via leaching through soils. The low vapor pressure and Henry's Law constant values suggest little tendency to volatilize from soils and/or waters. 4,4'-DDE has a high bioconcentration factor (51,000), indicating that it is expected to readily bioconcentrate in aquatic organisms [4]. Biodegradation, aerobic or anaerobic, is expected to be slow.

General. 4,4'-DDE is an impurity in 4,4'-DDT and also is formed as a degradation product of 4,4'-DDT [7]. It is not manufactured as a commercial product [8]. As would be expected from this class of compounds, 4,4'-DDE has a high environmental toxicity to invertebrates and is also quite toxic to fish, birds, and mammals. However, the primary concerns related to 4,4'-DDE are its persistence in the environment, its ability to bioconcentrate in almost all classes of biota, and its capacity to biomagnify through the food chain. These problems are particularly serious because, unlike 4,4'-DDT and 4,4'-DDD, 4,4'-DDE in biota appears to be a stable end product incapable of being further degraded by biotransformation [8]. This characteristic results in 4,4'-DDE being detected in 90 to 100 percent of fish and bird samples collected throughout the United States at least 11 years after the use of 4,4'-DDT was banned [7].

Vegetation. Although no data were found on the phytotoxicity of DDE, the risk of this compound to plants is probably low. According to Micromedex, Inc. [7], enough 4,4'-DDT was produced to cover all of the arable land in the world with this compound and its metabolites, 4,4'-DDD and 4,4'-DDE, at a rate of 1.5 pounds per acre. Despite the abundance of these chemicals, the scientific literature is virtually devoid of information on phytotoxicity. This implies that 4,4'-DDE has low toxicity to plants.

Like 4,4'-DDT, 4,4'-DDE bioconcentrates in aquatic plants. Studies summarized by the USEPA (1979) and Micromedex, Inc. [7] show bioconcentration factors in algae of 10^3 to 10^4. Tissue concentrations in aquatic vascular plants of 2 µg/kg dry weight were found in Finnish lakes. Although in-tissue concentrations of 4,4'-DDE may not be toxic to the plants, they are important as sources of 4,4'-DDE in higher trophic levels. Concerning the structurally similar compound 4,4'-DDT, Johnson and Finley [9] state that "Food seems to be more important than water as a source of body residues," while a study on DDE summarized by the USEPA [8] found concentration factors of 10^4 in mosquito larvae and fish exposed in a food-chain microcosm, but only 10^2 through aquatic exposure where a food chain did not exist.

Aquatic Life. Neither the USEPA nor the state has established a criterion for 4,4'-DDE for the chronic protection of freshwater aquatic life. However, because of the chemical similarities between 4,4'-DDE and 4,4'-DDT, it is assumed that the 4,4'-DDT criteria would provide adequate protection if applied to 4,4'-DDE. The federal aquatic life criterion for 4,4'-DDT for the chronic protection of freshwater aquatic life is 0.001 µg/L [10]. The corresponding criterion from the state of Ohio for 4,4'-DDT is also 0.001 µg/L [11]. 4,4'-DDE appears to be slightly less toxic to fish than 4,4'-DDT. Acute toxicities (96-hour LC_{50}s) from 4,4'-DDE for freshwater fish summarized by Micromedex, Inc. [7] ranged from 32 µg/L to 240 µg/L. Acute toxicities for 4,4'-DDT for fish seldom exceeded 10 µg/L. No data were found concerning acute toxicities of 4,4'-DDE to aquatic invertebrates. A major concern to aquatic life is the bioconcentration of 4,4'-DDE. Studies reported by the USEPA [8] and Micromedex, Inc. [7] show bioconcentration factors for invertebrates and fish generally ranging from 10^3 to 10^5. Bioaccumulation of 4,4'-DDE is important both because the chemical can build up to toxic concentrations in the animal's tissues and because it serves as a source of toxic levels of 4,4'-DDE to higher trophic levels. In fish collected from Great Lakes watersheds in the early 1980's, 94 percent were positive, with 4,4'-DDE concentrations ranging from 15 to 5,800 ppb [7]. More than 30 percent of snapping turtles from waters in New York had 4,4'-DDE concentrations of greater than 5 ppm [7].

Wildlife. Toxicity of 4,4'-DDE to non-human mammals is indicated by the human toxicity information presented earlier, which was based on studies of rodents. In the body, 4,4'-DDE accumulates chiefly in the adipose tissue, but is also found in significant concentrations in liver, brain, and muscle tissues [12].

Birds are also susceptible to 4,4'-DDE poisoning. Studies summarized by Micromedex, Inc. [7] showed that mallards, ring-necked pheasant, bobwhite quail, and Japanese quail had 5-day LD_{50}'s for ingestion of 4,4'-DDE ranging from 825 to 3,572 ppm. Bioaccumulation also occurs in birds. In other studies summarized by Micromedex, Inc. [7], 100 percent of 293 dead or moribund bald eagles collected in the United States from 1978 through 1981 tested positive for 4,4'-DDE and had median carcass concentrations of 4,4'-DDE each year of 2.4 to 3.3 ppm. Mean 4,4'-DDE concentrations in Pacific black ducks were 331 ppm in fat, 42 ppm in wings, 10 ppm in liver, and 2.1 ppm in brain [7]. However, the greatest environmental threat to birds from 4,4'-DDE is associated with eggshell thinning and related reproduction failure. Studies cited by Micromedex, Inc. [7] showed 100 percent of black-crowned night heron eggs collected from Colorado and Wyoming in 1979 contained concentration of 4,4'-DDE ranging from 0.33 to 44 ppm (wet weight) as did 98 percent of colonial waterbirds eggs collected from Green Bay and Lake Michigan between 1975 and 1980 (0.30 to 44 ppm wet weight). Steep declines in populations of birds such as eagles, peregrine falcons, ospreys, and brown pelicans that occupy upper trophic levels prompted the United States and many other developed countries to ban the use of 4,4'-DDT in the early 1970's.

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4,4'-DDT

Like 4,4'-DDD and 4,4'-DDE, 4,4'-DDT is a highly stable compound and is considered a persistent pollutant in soils and waters. It is generally resistant to photodegradation and/or oxidative processes [4]. Given the high K_{OC} value, 4,4'-DDT is expected to adsorb very tightly to soils, sediments and suspended solids in waters. In addition to the high K_{OC} value, the low level of solubility suggests little probability of groundwater infiltration via leaching. The low values associated with this compound for vapor pressure and Henry's Law constant suggest little tendency to volatilize from soils or waters. The bioconcentration factor (54,000) associated with this compound suggests a readiness to bioconcentrate in aquatic organisms [5]. Biodegradation, aerobic or anaerobic, is expected to be slow [1].

General. 4,4'-DDT was widely used as an insecticide until 1972, when its use in the United States was banned. However, it is still manufactured and used elsewhere in the world. As would be expected from this class of compounds, 4,4'-DDT has a high environmental toxicity to invertebrates and is also quite toxic to fish, birds, and mammals. However, the primary concerns related to 4,4'-DDT are its persistence in the environment, its ability to bioconcentrate in almost all classes of biota, and its capacity to biomagnify through the food chain.

Vegetation. Although no data were found on the phytotoxicity of 4,4'-DDT, the toxicity of this compound to plants is probably low. Since the 1940's, more than 3.5 billion pounds of 4,4'-DDT have been produced, which is an amount sufficient to cover all of the arable land in the world at the rate of 1.5 pounds per acre [7]. Because of the environmental persistence of DDT and its metabolites, this application rate would have resulted in a concentration of 4,4'-DDT, 4,4'-DDD, and/or 4,4'-DDE of approximately 750 µg/kg in arable surface soils worldwide. Despite the abundance of these chemicals, the scientific literature is virtually devoid of information on phytotoxicity. This implies that 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE have low toxicities to plants. 4,4'-DDt bioconcentrates in many species of aquatic plants. Studies summarized by Micromedex, Inc. [7] show a bioconcentration factor in *Cladophora* (a green algae) of more than 21,000. Bioconcentration factors in aquatic vascular plants range from approximately 500 to 14,000. Although in-tissue concentrations of 4,4'-DDT may not be toxic to the plants, they are important as sources of 4,4'-DDT in higher trophic levels. Johnson and Finley [8] state that "Food seems to be more important than water as a source of body residues," while a study on DDE (a metabolite of 4,4'-DDT with a similar chemical structure) summarized by the USEPA [9] found concentration factors of 10^4 in mosquito larvae and fish exposed in a food-chain microcosm, but only 10^2 through aquatic exposure where a food chain did not exist.

Aquatic Life. The federal aquatic life criterion for 4,4'-DDT for the chronic protection of freshwater aquatic life is 0.001 µg/L [10]. The corresponding state criterion from Ohio for 4,4'-DDT is also 0.001 µg/L [11]. These standards derive from the high toxicity of 4,4'-DDT to aquatic invertebrates and fish. For example, studies cited in Johnson and Finley [8] and Micromedex, Inc. [7] show most 96-hour LC_{50}s (acute toxicities) for both invertebrates and fish between 1 and 10 µg/L. Generally, an application factor of 0.01 is used to convert acute toxicities to criteria that provide for the chronic protection of aquatic life [12].

A major concern to aquatic life is the bioconcentration of 4,4'-DDT. Numerous studies reported by the USEPA [9] and Micromedex, Inc. [7] show bioconcentration factors for invertebrates and fish generally ranging from 10^3 to 10^5. Residue accumulations in fish of up to 2 million have been reported [12]. Bioaccumulation of 4,4'-DDT is important both because the chemical can build up to toxic concentrations in the animal's tissues and because it serves as a source of toxic levels of 4,4'-DDT to higher trophic levels.

Wildlife. Toxicity of 4,4'-DDT to non-human mammals is indicated by the human toxicity information presented earlier, which was based on studies of rodents and rabbits. In the body, 4,4'-DDT and its metabolites accumulate chiefly in the adipose tissue, but are also found in significant concentrations in the liver, brain, and muscle tissues [13]. Cattle and swine fed 25 ppm in the diet for 28 days had 4,4'-DDT levels in fat of 22 ppm and 10 ppm, respectively [13].

Birds are also susceptible to 4,4'-DDT poisoning. Studies summarized by Micromedex, Inc. [7] showed that mallards, ring-necked pheasant, bobwhite quail, and Japanese quail had 5-day LD_{50}s for ingestion of 4,4'-DDT ranging from 300 ppm to 4800 ppm. Bioaccumulation also occurs in birds, with mean wet weight concentrations in muscle tissue from gamebirds (goose, quail, and woodcock) in several Tennessee counties ranging from 2.9 mg/kg to 9.9 mg/kg [14]. Bald eagle carcasses showed 4,4'-DDT concentrations as high as 25 ppm (lipid basis), while ospreys accumulated 4,4'-DDT up to 5.7 ppm (wet weight) [7]. However, the greatest environmental threat to birds from 4,4'-DDT and its metabolites is associated with eggshell thinning and associated reproductive failure. Studies cited by the USEPA [12] showed that dietary intake of 4,4'-DDT at more than 3 mg/kg wet weight in natural food adversely affected reproduction in captive waterfowl. By the late 1960's, populations of birds occupying upper trophic levels, such as eagles, peregrine falcons, ospreys, and brown pelicans, had declined sharply because of eggshell thinning caused by 4,4'-DDT and its metabolites in the natural diet. Concerned about these declining populations lead the United States and many other developed countries to ban to use of 4,4'-DDT in the early 1970's.

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Heptachlor

Heptachlor epoxide

Heptachlor strongly adsorbs to soils and should not leach extensively to groundwater. In soil, heptachlor will degrade to 1-hydroxychlordene and heptachlor epoxide, among other species. Volatilization from soil surfaces will be significant. Significant biodegradation occurs under both aerobic and anaerobic conditions. The volatilization half-life of heptachlor in aquatic media is estimated to range from 2 to 10 days. Heptachlor is expected to exist almost entirely in the vapor phase in ambient air. Reactions with photochemically-produced hydroxyl radicals and ozone in the atmosphere may be important fate processes. The physical removal of heptachlor from air by rainfall is of limited importance [1].

Heptachlor epoxide adsorbs strongly to soils and sediments/suspended solids in waters. On the soil surface, heptachlor epoxide may slowly photodegrade or volatilize, although it is expected to persist for many years. This compound is not expected to leach significantly to lower soil layers or to groundwaters. Little or no biodegradation, under aerobic or anaerobic conditions, is expected to occur in either soils or waters. In surface waters, photolysis may occur significantly in the presence of photosensitizers. Slow volatilization may occur as well, but is not considered a primary loss mechanism. Heptachlor epoxide, given its vapor pressure value, is expected to be found in the vapor phase, as well as adsorbing to particulate matter, in ambient air. Atmospheric loss mechanisms include vapor-phase reactions with hydroxyl radicals (considered an important process), gravitational setting of particulate matter, and atmospheric washout of heptachlor epoxide via rainfall. Wet deposition of heptachlor epoxide is considered to be the primary contamination mechanism of lakes. Atmospheric photolysis of heptachlor epoxide is expected to occur, as well as photolytic reactions occurring on plant surfaces (degradation products are ketones). This photolytic rate is affected by the form of solid material

and the intensity of illumination. Finally, bioconcentration of this material in aquatic organisms is expected to occur readily [1].

General. Heptachlor was developed and widely used as an insecticide for more than 20 years. Heptachlor expoxide is a degradation product of heptachlor. As would be expected, these compounds have a high environmental toxicity to invertebrates and are also quite toxic to fish, birds, and mammals. Heptachlor epoxide also shows strong tendencies for bioaccumulation, with bioconcentration factors on the order of 10^4 in algae, snails, and mosquito larvae and 10^3 for mosquito fish and spot [7].

Vegetation. Heptachlor that enters the soil system is strongly adsorbed to soil particles and resists both further volatilization and leaching into surface or ground waters. This characteristic limits the bioavailability of heptachlor in the soils to plants. In moist soils, heptachlor is decomposed primarily by hydrolysis, although biodegradation may also be significant. The half-life of heptachlor in soils is calculated to range from 04. to 0.8 years [8].

Heptachlor has been shown to inhibit the growth of simple plants like algae at concentrations of 26 to 2,260 µg/L [8]. No information was found concerning phytotoxic effects on higher plants. However, despite the widespread application of this compound for agricultural purposes, including seed treatment, there are few reported adverse effects on crop germination, growth, or yields. Therefore, it is assumed that heptachlor has low toxicity to vegetation.

As discussed previously, heptachlor epoxide is a decomposition product resulting from the hydrolysis of heptachlor. According to Micromedex, Inc. [8], heptachlor epoxide adsorbs strongly to soil and is extremely resistant to biodegradation, persisting for many years in the soil. Its strong bonds to soil also make it unavailable for plant uptake.

Heptachlor epoxide has a relatively low toxicity to plants, Lichtenstein et al. [9] grew corn, oats, peas, and cucumbers in quartz sand (which has minimal sorptivity) that had been treated with 30 ppm (30,000 µg/kg equivalent) of heptachlor epoxide. After 21 days, they found no significant differences in root or stem growth between the test plants and controls. Only oats had a significant decrease in respiration.

Aquatic Life. The federal aquatic life criteria for both heptachlor and heptachlor epoxide for the chronic protection of freshwater aquatic life are 0.0038 µg/L [10]. The corresponding criterion from the state for heptachlor is 0.001 µg/L [11]. Ohio does not have a state standard for heptachlor epoxide.

These standards derive from the high toxicity of heptachlor and heptachlor epoxide to aquatic invertebrates and fish. For example, studies cited in the USEPA "Red Book" [12] show 96-hour LC_{50}s (acute toxicities) for invertebrates of less than 1 µg/L and 96-hour LC_{50}s for fish usually between 1 µg/L and 10 µg/L. Generally, an application factor of 0.01 is used to convert acute toxicities to criteria that provide for the chronic protection of aquatic life [12].

A major concern for aquatic life is the bioconcentration of heptachlor or its derivatives. Studies cited in the Red Book showed concentration factors ranging from 1,840 in bluegills to 21,300 in estuarine fish [12].

Wildlife. Toxicity of heptachlor and heptachlor epoxide to non-human mammals is indicated by the human toxicity information presented earlier, which was based on studies of rodents and rabbits. In the body, heptachlor is rapidly transformed into heptachlor epoxide, which accumulates chiefly in the adipose tissue, but which is also found in significant concentrations in the liver, brain, and muscle tissues [8].

The bioaccumulation and bioconcentration of heptachlor epoxide in the body is the primary concern. For example, two horses poisoned by heptachlor had bone marrow concentrations of heptachlor epoxide of 530 mg/kg of fat and 370 mg/kg of fat. Other tissue concentrations of heptachlor epoxide in these animals were as follows: renal fat - 550 mg/kg; brain - 49 mg/kg [8].

Birds are also susceptible to heptachlor poisoning. Studies summarized by Micromedex, Inc. [8] showed that mallards, ring-necked pheasant, bobwhite quail, and Japanese quail had 5-day LC_{50}s for ingestion of heptachlor ranging from 92 to 480 ppm. The Red Book cites data showing 100 percent mortality of woodcock with a dietary dosage of 0.72 ppm [12]. Bioaccumulation also occurs in birds, with a study cited by Micromedex, Inc. [8] showing that concentrations in the fat of broiler chickens plateaued at levels approximately five times those in their feed.

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